



Protecting Our Bays & Estuaries

FY 2019 Comprehensive Annual Work Plan

Approved by
CBBEP Board of Directors
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COASTAL BEND BAYS & ESTUARIES PROGRAM

FY 2019 Comprehensive Annual Work Plan

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I. Introduction

History

In its 1987 reauthorization of the Water Quality Act, the U.S. Congress established the National Estuary Program (NEP) to promote long-term planning and management of nationally significant estuaries threatened by pollution, development, or overuse. The Administrator of the Environmental Protection Agency (EPA) was given authority to convene Management Conferences and to award Federal financial assistance grants to approved state programs for the purpose of developing and implementing a Comprehensive Conservation and Management Plan (CCMP). The Act defines criteria by which Management Conferences are charged with balancing the conflicting uses in target estuaries, while restoring or maintaining their natural character.

The Coastal Bend Bays & Estuaries Program (formerly the Corpus Christi Bay National Estuary Program) was formally established in October 1993 with committee meetings beginning in late 1993. The CBBEP was one of the first NEPs to use a streamlined approach to the development of a CCMP. The goal of the CBBEP to complete a Preliminary CCMP within 12 to 18 months (from 09/01/94) and a final CCMP (*Coastal Bend Bays Plan*) in approximately four years (by September 1998) was achieved.

A State-EPA Management Conference Agreement detailing this and other specific outputs of the four-year program was signed in May 1994 by the Regional Administrator of the EPA and the Chairman of the State-lead agency for the Program, the Texas Natural Resource Conservation Commission (now the Texas Commission on Environmental Quality – TCEQ). The CBBEP had been established since December 1993 as a program of the TCEQ. In 1999, CBBEP became a non-profit organization to lead implementation.

CBBEP Operations

The project area encompasses the estuarine environment of 75 miles of the south-central Texas coastline, and includes the 12 counties of the region known as the Coastal Bend. This 514 square mile area of water includes all bays, estuaries, and bayous in the Copano, Aransas, Corpus Christi, Nueces, Baffin, and upper Laguna Madre bay systems, which together represent three of the seven major Texas estuaries.

The priority Issues for the CBBEP are:

- Alteration of Freshwater Inflow into Bays and Estuaries
- Condition of Living Resources
- Loss of Wetlands and Estuarine Habitats
- Degradation of Water Quality
- Altered Estuarine Circulation
- Bay Debris
- Selected Public Health Issues

The *Coastal Bend Bays Plan* has been developed to address each of these priority issues under the following categories of action plans: Human Uses; Maritime Commerce and Dredging; Habitat and Living Resources; Water and Sediment Quality; Freshwater Resources; and Public Education and Outreach. The projects selected for implementation under this Cooperative

Agreement reflect a combination of priority and readiness or feasibility for implementation. Implementing Partners for other actions of the *Bays Plan* will likewise be called upon to begin and continue to implement their own portions of the Plan. The role of Program staff is multi-faceted, but will include at a minimum the following tasks: (1) acquire, manage, and disperse funds to implement the *Bays Plan*; (2) develop and implement partnership projects with local governments, state and federal agencies, and private organizations; (3) monitor, track, and report on implementation performance by implementing partners, and work to maintain implementation commitments; and (4) coordinate the environmental monitoring and assessment of *Bays Plan* implementation effectiveness.

Work Plan Development

The FY 2019 Comprehensive Work Plan will allow the CBBEP to continue the implementation of the *Coastal Bend Bays Plan*. This Work Plan describes implementation projects and administrative support that will be undertaken pending approval and receipt of funds by the funding entities.

All data and information produced under the auspices of the CBBEP will adhere to standardized formats and be made publicly accessible. A public participation strategy, refined under the “public education and outreach” chapter of the *Bays Plan*, will continue to guide public participation efforts in the *Bays Plan* implementation. The list of Priority Issues, refined through public input and characterization projects will continue to serve as the focus for implementation.

II. Starting Date

The starting date for this FY 2019 Comprehensive Work Plan will be September 1, 2018.

III. Federal and State Program Coordinators and Project Officers

Federal

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Ms. Teresita Mendiola
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State

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IV. Accomplishments To Date

CBBEP regularly assesses administrative program activities in order to improve its success. CBBEP has continuously had favorable annual financial audits, as well as the quality system audits conducted by the Texas Commission on Environmental Quality (TCEQ). The Program has identified the need for more project documentation in a timely manner. Specifically, project progress needs to be better documented in the CBBEP project database on a more regular basis – not just when reporting deadlines are due. In addition, CBBEP recognizes the need to make draw-downs on EPA funds on a timelier basis.

The CBBEP achieved its primary project-related goal for FY 2017, which was to continue the successful initiation and completion of projects developed to implement the *Coastal Bend Bays Plan*. To date, CBBEP and its partners have achieved programmatic progress on 94 percent of *Bays Plan* actions. The Program's success in leveraging funds for CBBEP projects has also been noteworthy. Broad support for CBBEP's activities continues to be evidenced by the range of contributors, including local governments, industries, NGOs, and state and federal agencies. The CBBEP Bays Council continues to support the priorities as listed in the *Bays Plan*.

In 2017 the CBBEP implemented numerous projects aligned with the goals and objectives of EPA's *Strategic Plan and Government Performance and Results Act*. These projects include well-defined outputs and outcomes.

All project deliverables identified prior to CBBEP FY 2014 implementation years have been completed. CBBEP will prepare a draft Revised Comprehensive Work Plan that reallocates funds not identified with projects for FY FY 2015, FY 2016, FY 2017 and FY 2018.

The project implementation teams continue to identify, initiate and select project ideas for inclusion in the Program work plans. The teams are: Habitat & Living Resources Team, Human Uses Team; Maritime Commerce & Dredging Team; Water & Sediment Quality Team; and Environmental Education & Outreach Team. The *Bays Plan* Coordination Team, consisting of all the chairs of the Implementation Teams and key members of the Bays Council, coordinates the annual work plan recommendations to the CBBEP Bays Council, and reviews and proposes update recommendations to the *Bays Plan*.

V. Goals for FY 2019

The overarching goal for FY 2019 is to continue the successful implementation of the *Coastal Bend Bays Plan*. CBBEP Implementation Teams continue to identify, initiate and select project ideas for inclusion in the Program work plans. The teams are: Habitat & Living Resources, Human Uses Team; Maritime Commerce and Dredging Team; Water & Sediment Quality Team; and Environmental Education & Outreach Team. The CBBEP Coordination Team, consisting of all the chairs of the Implementation Teams and key members of the Conference, coordinates the annual work plan recommendations to the CBBEP Board of Directors, and reviews and proposes update recommendations to the *Bays Plan*.

VI. Statement of Competency

CBBEP is committed to the development and implementation of procedures and policies in order to assure that activities that acquire, generate, compile, or use environmental data and technology that are of the appropriate type and quality for their intended use. CBBEP operates under, and maintains an annually approved Quality Management Plan to continually assure that

quality of the data generated is sufficient to meet the objectives of the project. To this end, CBBEP's activities meet all the requirements that have been set forth to receive and utilize funds from the Agency and can demonstrate this through the following commitment:

“Competency for generating environmental measurement data under USEPA funded assistance is demonstrated at the CBBEP through the maintenance of quality assurance project plans for data collection activities that involve water quality monitoring and other environmental measurements, and through the approved Quality Management Plan that provides descriptions of the quality policies, including all requirements described in EPA QA/R-2.”

VII. Implementation of Projects

Project activities for FY 2019 have been selected for their contribution towards implementation of the *Coastal Bend Bays Plan*. Twenty-nine projects will be implemented in FY 2019. A comprehensive list of projects outlining project numbers, titles, action items, performing party(s), and budget can be found in Table 1: FY 2019 Comprehensive Annual Work Plan Outline. This list represents the combined efforts of the many volunteers who have donated their time and expertise to help assure the successful implementation of the *Coastal Bend Bays Plan*.

VIII. Project Deliverables/Schedule

Specific project deliverables and schedules for completion are to be negotiated with the sub-contractor of the project and will be included in the scope of work of the project contract. The project contract and any amendments will be subject to review by funding entities and are incorporated into this annual work plan by reference.

Project 1901 CBBEP Coastal Bird Management

Performing Organization: **CBBEP**
Total Project Funding: **\$274,526**
CBBEP *Bays Plan* Actions: **HLR-1, HLR-4**

Background:

Coastal birds are important components of estuarine ecosystems and serve as indicators of ecosystem health. In addition, recreational bird viewing is a significant and growing component of ecotourism, a major facet of the local economy. The 2010 Environmental Indicators Report prepared by CBBEP documented the declining populations of many colonial waterbird species in Texas, with some species experiencing up to a 90% reduction in breeding pairs since the 1960's. Research continually provides evidence of the importance of the Texas coast to many other non-breeding coastal bird species, many of which are also experiencing major population declines.

This project will build on the efforts of the CBBEP Colonial Waterbird projects from previous years through the continued implementation and improvement of specific management actions from the *CBBEP Colonial Waterbird Rookery Island Management Plan*. This plan outlines habitat management actions such as planting and establishing native shrubs, removing exotic/invasive vegetation, building artificial nest platforms, and removing nest predators as needed throughout the year. With approximately 60 islands to manage, the CBBEP will continue to strive to develop and improve more efficient and effective methods of habitat management on rookery islands. All habitat management actions such as planting native vegetation and removing exotic/invasive vegetation will be completed by February 1, as this is the beginning of the waterbird nesting season. Predator management will be conducted on an as-needed basis for the entirety of the year.

Additionally, these efforts will extend to activities that support the conservation of non-breeding coastal bird species and their habitat. This project will provide assistance to other partners, where appropriate, in efforts to assess changes in populations, current wintering and migratory movements, and important areas of habitat for non-breeding coastal species. The timeline for these efforts will depend on the seasonality of the non-breeding species, but will begin September 1, and be completed by June 15.

Years of experience working with coastal bird species in the Coastal Bend makes the CBBEP uniquely qualified to provide expertise and assistance to partners and stakeholders working to conserve coastal birds. The CBBEP will assist resource agencies, universities, and other stakeholders in joint efforts to monitor changes in coastal bird populations at a large scale. These monitoring efforts will take place primarily in December and May and provide information that helps direct waterbird management priorities for CBBEP for the coming years. In addition, the CBBEP will meet with partners and stakeholders throughout the year to provide updated information on coastal bird species ecology and management in the Coastal Bend area, aiding in regional planning and monitoring efforts.

Public outreach will also be a key component of this project, with the objectives of minimizing anthropogenic impacts to rookeries, educating the public, and promoting stewardship of waterbird resources. This will be accomplished through on-site signage at rookery islands, public presentations and events, and other forms of public communications such as the distribution of flyers, regular updates on social media, interviews with local news agencies, and with the regular engagement of volunteers. Public outreach efforts will take place throughout the year

Objectives:

- Continue the restoration efforts of coastal bird populations through management of colonial waterbird nesting sites, including habitat enhancement, protection, and predator control, and by reducing anthropogenic impacts to coastal birds.
- Develop and implement public education and outreach programs that promote awareness and stewardship of coastal birds and their habitats.
- Assist partners in efforts to observe changes in coastal bird populations for management purposes.

- Provide resource agencies, researchers, and other stakeholders with expertise on coastal bird ecology, habitats, and conservation needs including assistance in tagging migratory birds for tracking.

Project 1902 Delta Discovery

Performing Organization: CBBEP
Total Project Funding: \$238,219
CBBEP *Bays Plan* Actions: BTR-1, PEO-2, PEO-3, PEO-5

Background:

Delta Discovery has become the tagline for our entire education program. The educational program cost consists of the following:

- Salary and continued training of CBBEP environmental educators & part time Teacher Naturalists.
- Supplies and facility expenses Nueces Delta Preserve educational (utilities, custodial and equipment).
- Bus funding for field trips.
- Supplies and food for teacher workshops

Teacher Workshops: CBBEP Environmental Educators will facilitate workshops throughout the school year. These workshops will address local environmental science topics and will align to the TEKS objectives. Participating teachers will receive SBEC credits. The workshops focus on equipping teachers with the skills, curriculum, support, and materials to strengthen science teaching as it relates to the environmental treasures of the Texas Coastal Bend. Partnering throughout the year would allow the CBBEP to introduce environmental issues to teachers who may not be able to dedicate time in the summer to workshops. The funding provides all fees for partnering, curriculum, and substitute teachers in order for these workshops to occur on weekdays. During the summer, the CBBEP partners with other successful educational programs to provide teachers the tools needed to successfully teach science and promote student awareness of local ecology and environmental issues affecting the bays and estuaries. CBBEP provides up to three free summer workshops per year

Fieldtrips: Many of the students that are being exposed to scientific concepts for the first time have never spent much time outdoors CBBEP Environmental Educators provide field trip opportunities for teachers and students to visit the Nueces Delta Preserve. The cross-curricular trip may to be organized by the teacher, with assistance from the Environmental Educator, to create an educational TEKS-aligned agenda for outdoor education. This program sees over 8000 students per school-year. The goal is to plant seeds of appreciation and passion for a new generation of naturalists, biologists, and nature lovers to protect and preserve the Coastal Bend through educating school children about preserving our environment and protecting our animal and plant life.

Home School Days: Home School families often request field experiences, yet have difficulty meeting our minimum student quota for the day. To better serve this audience, we offer two home school experience days to allow home school families and their students an opportunity to connect their classroom science curriculum to the natural world of the Coastal Bend using both place based and discovery education.

Delta Discovery Days: CBBEP will host four Delta Discovery Days. These hands-on “picnic days” provide families time and guidance to discover, connect and learn about the estuary in their back yard. Families bring a sack lunch and the CBBEP Education Staff facilitates learning activities throughout the four hour picnic.

Nature Story Time: CBBEP will host several nature story times. These programs are geared for 2-5 year olds and introduce children to nature and the joys of reading through stories, crafts, and outdoor play. Children and their families will explore and connect with the estuary and its inhabitants.

Project Objectives:

- provide educational field trips for K-12 students and also aid teachers in the community to increase their knowledge, skills and provide resources to more effectively teach science to their students in local schools.
- provide educational outdoor experiences to the coastal community residents that instill a sense of appreciation/value of the area and desire for conservation natural resources.

Project 1903 Coastal Bend Fertilizers and Pesticides Monitoring and Outreach Program

Performing Organization: City of Corpus Christi
Total Project Funding: \$37,048
CBBEF Bays Plan Actions: WSQ-1, HLR-9, NPS-1, PEO-4, PEO-5

Background:

In 2016, the City of Corpus Christi population was estimated to be 325,734; with an estimated 130,722 houses and condos. When used improperly, pesticide and fertilizer application can promote algal blooms and eutrophication of the receiving aquatic environment. Point and non-point source discharge is increased with the construction of impervious surface attributed to population growth.

Currently, the City of Corpus Christi and surrounding areas lack comprehensive management of pesticides and fertilizers. Many homeowners and businesses may be unaware of the effects improper application can have on the environment and their pocket book. Through qualitative and quantitative data collection, our team would like to establish a baseline soil analysis for zip codes, and in subsequent years, monitor that baseline to evaluate the effectiveness of the public awareness campaign within the City of Corpus Christi. The group will determine areas of the City to be sampled and will offer soil testing to the public to determine fertilizer use. The goal is to sample 1% or at least 20 samples from each zip code. Additionally, analytes will be added to the existing City of Corpus Christi Receiving Water Body Sampling Program and runoff analyses will continue as per the TPDES permit. The City of Corpus Christi Utilities-Treatment will gather stormwater discharge samples for analysis to determine how fertilizers are affecting soluble concentrations in the bay.

The public awareness campaign will include presentations to the public, educational literature and face to face engagement. The information from this project will be utilized to develop best management practices for the Coastal Bend.

Objective:

The primary project objective of the project is to reduce the levels of soluble pollutants and nutrients introduced into Coastal Bend Bays and Estuaries by stormwater runoff. Data will be analyzed to identify areas of concern, by zip code within the City of Corpus Christi.

Performing Organization: Center for Coastal Studies at TAMUCC
Total Project Funding: \$3,500
CBBEF Bays Plan Actions: PH-1, WSQ-1, WSQ-5, FW-1, PEO-5

Background:

Staff from the Center for Coastal Studies at Texas A&M University–Corpus Christi have been working with stakeholders since 2013 to develop a plan for water quality improvements in the Oso Bay/Oso Creek Watershed (Oso Watershed). The efforts of this plan have identified the need to connect the urban and rural communities within the Oso Watershed, specifically with the Colonias communities.

The Islander Stream Team, established in August 2015 at Texas A&M University-Corpus Christi (TAMUCC), is composed of both undergraduate and graduate TAMUCC student volunteers. The students collect monthly water quality data at sites along Corpus Christi Bay and Oso Bay. This project will give the Islander Stream Team latitude to move out into the rural areas of the Oso Watershed and help build relationships with the Colonias communities.

The data collected by the Islander Stream Team is submitted to the Center for Coastal Studies at Texas A&M University-Corpus Christi, which is the hub for the Coastal Bend Regional Stream Team. The Center for Coastal Studies takes the water quality data through Quality Assurance/ Quality Control (QAQC) measures before final submission to the Texas Stream Team database. Our partner, the Nueces River Authority supported the formation of the Islander Stream Team by purchasing kits, standards, refractometers, buckets, and other supplies needed for the students to sample.

The funding will support the Islander Stream Team by allowing the team to continue to expand their sampling activities to the rural areas of the Oso Watershed and connecting with the Colonias communities. Funds would also be used to purchase standards and water quality kits. The Islander Stream Team, with the help of the Center for Coastal Studies, will build relationships and communication with the Colonias communities using water quality monitoring as the foundation. Breaking the barrier between urban and rural watershed communities and building a strong relationship with the Colonias community is vital for the Oso Watershed TMDL and I-Plan process currently in progress by TCEQ. The Islander Stream Team would be our conduit to connect the rural Oso Creek Colonias communities with the urban communities along Oso Bay. This plan to connect communities in the Oso Watershed is essential and key to a successful I-Plan for Oso Bay and Oso Creek. This will be accomplished by visiting rural grade-schools and giving students hands on education about water quality using standard LaMotte Kits and visiting the Colonias communities and talking with them about water quality. Building and growing communities in the Oso Watershed to protect our water is the ultimate goal of this project.

Objective:

The project objective is to expand the Islander Stream Team water quality monitoring and outreach into the rural areas of the Oso Watershed to help build relationships with the Colonias communities.

Project 1905 Installation of a Full Range Gauging Station at Nueces River at Hwy 37

Performing Organization: United States Geological Survey
Total Project Funding: \$45,000
CBBEP Bays Plan Actions: WSQ-1, WSQ-3, WSQ-4, WSQ-5, FW-1, FW-2, FW-3, FW-4

Background:

The purpose of the proposed project is to provide continuous streamflow and water quality measurements of the Nueces River in near-real time to the public on the internet. This project supports a continuation of a study currently being conducted in conjunction with TWDB to examine freshwater inflows and nutrient and sediment concentrations into Texas bays and estuaries.

These bay and estuarine ecosystems depend on freshwater inflows to maintain adequate levels of salinity, nutrients, and sediment to support healthy ecosystem function and diverse biological communities. The delivery of freshwater into estuaries may be affected by alterations in the river course, including channelization and dam construction, resulting in changes in sedimentation patterns and biogeochemistry. In Texas, the quantity of water flowing to bays and estuaries is often influenced by withdrawals, diversions, and retention in reservoirs. With population and water demand projected to increase, the ability to provide adequate inflows to coastal ecosystems presents a resource management challenge that requires improving the current understanding of the quantity and quality of freshwater inflows into Texas bays and estuaries. Obtaining accurate freshwater inflow and nutrient/sediment input is fundamental to the assessment of the physical, chemical, and biological processes governing this aquatic system and imperative for regulating environmental flows for a sound ecological environment

In tidally affected areas, index velocity methods are commonly applied to compute discharge by using Acoustic Doppler Velocity Meters (ADVM). This method differs from the traditional stage-discharge method by separating velocity and area into two ratings, and it is also more appropriate when more than one specific discharge can be measured for a particular stage. These improved methods for determining freshwater inflow contributions of discharge, sediment, and nutrients may be useful for inclusion in hydrodynamic and water quality models and may help fill a data gap of the volume of freshwater inflow entering Texas coastal ecosystems.

This project proposes to relocate the Rincon Bayou at Calallan station and permanently install an ADVM backscatter instrumentation with water quality sensors at Nueces River at Hwy 37. A key consideration is that tidal influences at this location can be accounted using an ADVM. This gage location will also capture freshwater inflow from Hondo Creek that has not been properly accounted for with existing gage locations. Once installed, calculating continuous real-time suspended-sediment loads for the Nueces River Watershed could be possible by leveraging ongoing sampling activities with TWDB.

Objective:

The objective of this project is to install an ADVM with temperature and specific conductance water quality probes at the USGS station Nueces at Hwy 37. The continuous streamflow and water quality data will be transmitted on an hourly basis using the GOES satellite and delivered to the internet on the USGS National Water Information System (NWIS) website. The data will go through standard USGS quality assurance protocols. Developing the relationship between ADVM backscatter measurements and suspended sediment loads will be developed as part of a separate work effort funded by TWDB.

Project 1906 Outdoor Classrooms

Performing Organization: CBBEP & USFWS
Total Project Funding: \$10,000
CBBEP *Bays Plan* Actions: PEO-3, PEO-5

Background:

In several discussions with teachers and principals, it has been determined that moving students to learning opportunities (field trips) is becoming more difficult. Buses are expensive and finding personnel to supervise, as well as scheduling, has become challenging. Field trips at the middle school and junior high level are almost non-existent.

One way to solve this problem would be to bring learning opportunities to schools in the form of an outdoor classroom. Outdoor classroom is defined as an outdoor area on campus set aside for student investigation and learning. Components are varied but often include benches or picnic tables adjacent to a study or natural area where students can gain field experience.

Objective:

To provide public schools with the option of an outdoor classroom that will promote interest in science, include community experts, support parent involvement, provide field experience to students, and help to improve scores.

Performing Organization: Nueces River Authority
Total Project Funding: \$40,812
CBBEP Bays Plan Actions: WSQ-1, WSQ-3, HLR-1, PEO-5

Background:

A riparian area is the part of the landscape that borders a creek or river. A properly functioning riparian area positively influences water quality. Baffin Bay, a critical habitat for recreationally important fish and an inlet of the Laguna Madre, has experienced documented nutrient exceedances resulting in algal blooms and degraded fish habitat. Two of the three main tributaries to Baffin Bay have documented water quality problems, but their riparian condition has not been evaluated.

Petronila Creek runs through primarily ranch and farmland of Kleberg and Nueces counties. It is a 44-mile freshwater stream with chloride, sulfate, and total dissolved solids documented in excess of standards since 2000. Measures have been taken to reduce oilfield related contamination, but the functional condition of riparian areas has not been a focus. The second tributary, San Fernando Creek, is about 42 miles long and has had a record of bacterial impairment for contact recreation since 2006 as well as excessive levels of nitrates, chlorophyll-a, and total phosphorus. The creek primarily flows through rural areas, but also through the City of Alice and the City of Kingsville where it receives discharge from municipal wastewater treatment plants. Los Olmos Creek, a third tributary, is about 67 miles long. It is not routinely monitored for water quality and little is known about its contribution to Baffin Bay. The drainage areas for all three creeks are composed of mostly private land offering opportunity for enhanced riparian function and off-channel wetland treatment to improve water quality through private land stewardship.

A healthy and functioning riparian/wetland area filters and slows run-off and floodwaters, and allows for sediment trapping and groundwater infiltration. The water quality benefits of a healthy riparian area are documented in a recent study, "Putting a Price on Riparian Corridors as Water Treatment Facilities" by Ann L. Riley. The study finds that healthy and functional riparian areas have been shown to improve water quality by removing nutrients, improving dissolved oxygen, storing sediments, regulating temperatures, and buffering flood energies. They have been shown effective in reducing pathogens such as coliform and cryptosporidium. It also notes that the loss of riparian function equates to a loss in water quality treatment capability and this can contribute directly to a decline in water quality.

Objective:

The objective of this project is to conduct a riparian evaluation for all three Baffin Bay tributaries. This project will examine overall riparian conditions along each creek and identify strong functioning, weak functioning, and non-functioning areas. Apparent riparian hindrances, along with opportunities for improvement and possible constraints, will be identified. We will also locate 1-3 riparian areas on each creek for long-term evaluation and establish photo point sites within them. The riparian evaluation will ultimately help determine priority areas for restoration and conservation easements.

Project 1908 CBBEP Community Outreach Partnerships

Performing Organization: Coastal Bend Bays Foundation
Total Project Funding: \$30,000
CBBEP Bays Plan Actions: PEO-1, PEO-2, PEO-3, PEO-4 and PEO-5

Background:

As stated in the *Coastal Bend Bays Plan*, CBBEP is constantly working to promote public/private partnerships to help achieve its educational goals.

The CBBEP partnership with the Coastal Bend Bays Foundation (CBBF) addresses our educational goals set forth in the *Bays Plan*. One of the benefits of the partnership between the CBBEP and CBBF is addressing the need for continued dialogue between competing user groups and the need for an engaging public forum to allow for individual input in the public policy debate. The *Bays Plan* calls for continued involvement from CBBF, as the region prepares itself for ever-increasing number of people wanting to make use of the bays and estuaries. Minimizing conflict through informed discussion will help achieve the overall objective of ensuring the public's safety, health and enjoyment of our bays and estuaries.

This project will result in increase in the community's awareness of local environmental issues through Earth Day, forums and an awards banquet. An estimated 12,000 people are expected to attend these events.

Objectives:

- Host, organize and coordinate turnkey operation of Earth Day festival.
- Host, organize and coordinate CBBF Conservation and Environmental Stewardship Annual Awards Banquet.
- Conduct Coastal Issues Forums to increase communications between resource managers, users and general public.
- Organize and coordinate bay-resource/related workshops with CBBEP's approval.
- Continue to seek matching and/or leveraging funds.

Project 1909 CBBEP Property Management

Performing Organization: **CBBEP**
Total Project Funding: **\$105,000**
CBBEP *Bays Plan* Actions: **HLR-1**

Background:

CBBEP is owner and steward of properties in Nueces, San Patricio, Aransas, and Refugio Counties which includes the 10,500 acre Nueces Delta Preserve, public access properties, and more recently the Mission River Delta along the Mission River and Mission Bay.

The CBBEP Nueces Delta Preserve is located 3 miles from the City of Odem and 20 miles from downtown Corpus Christi. The CBBEP Nueces Delta Preserve consists of approximately 10,500 acres in San Patricio and Nueces Counties that are owned and managed by CBBEP as a conservation site for the purpose of preserving natural habitat, function and species diversity in the Nueces River delta. The preserve is rich in diversity that can be characterized by Tamaulipan thorn scrub, grasslands, lomas, freshwater wetlands, riparian habitat, brackish wetlands, tidal mud flats and estuarine shoreline. CBBEP's secondary goal for the preserve is for the property to be used for a variety of educational and research opportunities.

The funds provided by the project help support the land ownership obligations and some routine maintenance associated with CBBEP owned properties. Maintenance activities including but not limited to paying for portions of road maintenance, fencing replacement and repairs, brush control, equipment maintenance and purchases, habitat and predator management (as appropriate and necessary), and the payment of property taxes.

Past project accomplishments include fencing projects, preparation for prescribed burns, constructed wetland dike repair and vegetation manipulation, management of equipment purchases, building maintenance, volunteer project coordination, application of herbicide to invasive brush, road repairs, creation of a wildlife observation area, and establishing routine mowing of common areas and roadways.

Objectives:

- To provide the required ongoing maintenance and management of properties owned by Coastal Bend Bays & Estuaries Program.
- Purchase of replacement mower deck for use in vegetation maintenance and manipulation. Including mowing of roadways, fence lines, trails, and fireguards.
- Replace approximately 3.6 miles of perimeter fence.

Project 1910 Assessment of Organic Pollutants in Nueces Bay's Petroleum Brine Impacted Sediments

Performing Organization: Texas A & M University – Corpus Christi
Total Project Funding: \$48,290
CBBEP Bays Plan Actions: WSQ-5, NPS-1

Background:

The discharge of oilfield-produced water (petroleum brine) is one of the major environmental impacts associated with oil field exploration. In 1979, it was estimated that over 32 million gallons of petroleum brine were discharged daily to Texas tidal waters (Liebow et al. 1980). Nueces Bay served as discharge location of petroleum brine since early 1900 (Railroad Commission of Texas 1991) until ~1993. Earlier studies have identified the high toxicity of the brine discharged on the Nueces Bay ecosystem but there is limited information about the size of the impacted area in the bay and the level and types of pollutants.

Many earlier studies have identified the high toxicity of the petroleum brine discharged on the Nueces Bay ecosystem; for example, Caudle (1995) related the widespread denuded marsh on the bay to the long-term exposure to petroleum brine. Another study found that the Western Sandpipers (*Calidris mauri*) exposed to petroleum brine in Nueces Bay have a tenfold higher aromatic hydrocarbon concentration in their stomach contents relative to the birds collected at a reference site (Rattner et al. 1995). In 1990, D'unger et al. (1995) conducted toxicity tests on the sediment and sediment porewater near petroleum brine discharge sites in the bay and concluded that these sediments are highly toxic relative to the reference sediment or porewater. A recent study showed that the tissues of *Crassostrea virginica* (Eastern oyster), collected from northern Nueces Bay, had the highest toxicity index relative to other local coastal areas (Palmer et al. 2015).

There is limited information about the size of the impacted area in the bay, the current level of pollution in these regions and the types of pollutants these sediments are releasing into the water column. Recently, an untargeted analysis of dissolved organic compounds in Nueces Bay water using a state-of-the-art, high resolution mass spectrometer (FTICR-MS) identified over 4,000 organic compounds in each station. When plotting these compounds, the stations close to the petroleum brine discharge sites have a high abundance of oxygenated hydrocarbon compounds that are unique signatures of petroleum hydrocarbons. Surprisingly, these sites also have a high abundance of anthropogenic organophosphate compounds (like insecticides, herbicides). Many of these organophosphorus insecticides and herbicides have been banned recently due to their high toxicity and health impact on humans. However, it's not clear if these detected organophosphorus compounds are derived from insecticides and herbicides applied on the surrounding agricultural area decades ago and were trapped in the bay sediments. These contaminants could be released from the sediments during changes in redox conditions.

The goal of this project is to analyze the sediments and water column along the northern and center Nueces Bay for both petroleum hydrocarbon and organophosphorus compounds using GC/MS and our new state-of-the-art HPLC-Orbitrap Fusion mass spectrometer system.

Objective:

This objective of this study is to identify and quantify the size of the impacted area in the bay and ensure that water quality standards and sediment quality criteria are adequate and appropriate for the living organisms (e.g. oyster reefs) and recreational use of the bay. This project will also further develop a new method for measuring organophosphate pesticides in estuaries, which includes all the possible alterations of these contaminants, not limited to only indicators as the commonly used whole toxicity tests.

Project 1911 Nueces Delta Environmental Monitoring Project

Performing Organization: Conrad Blucher Institute
Total Project Funding: \$58,877
CBBEP Bays Plan Actions: FW-1, FW-2, FW-3, FW-4

Background:

The purpose of this project is for the Conrad Blucher Institute to continue to maintain 3 current real-time salinity monitoring stations along the Rincon Bayou, and a fourth station at "South Lake" and continue to maintain a tide gauge in west Nueces Bay in order to characterize freshwater inflows into the Nueces Delta. Salinity sensors along the Nueces Delta will be used to trace freshwater inflows from freshwater pumping events via the Rincon Bayou Pipeline from the Nueces River and will report water temperature, conductivity, and salinity every 30 minutes. Data from these salinity stations will be used to aid in the development of management strategies for the Rincon Bayou Pipeline. The Center for Coastal Studies, the Harte Research Institute at TAMUCC use the salinity data provided from the salinity stations to support various projects involving sampling in the Nueces Delta. Data from these salinity stations are also utilized by the University of Texas (UT) at Austin and the UT Marine Science Institute in Port Aransas to support various modeling projects which are investigating the interactions between water in sediment and tidal creeks in the Nueces Delta. The Nueces Delta Hydrodynamic Model being conducted by UT also utilized the tide gauge data in the western Nueces Bay. Several Texas Water Development Board funded projects have and currently are utilizing the available data. A weather station will also be maintained in the Nueces Delta and will provide air temperature, wind, precipitation, barometric pressure, relative humidity, and solar radiation data. All data will be available to the public on the contractor's webpage.

Normally, a river flows through a delta area prior to making its confluence with its receiving water body. The Nueces River is different in that it flows into Nueces Bay at a point along the south shore of the bay, 2 ½ to 3 miles from the delta-bay interface, completely bypassing the delta. Only during times of severe flooding, causing over-banking of the river, or locally heavy rain, did much freshwater make it into the delta proper. To provide more freshwater diversions during normal flow conditions, the City of Corpus Christi built a pipeline and pump station to divert up to the first 3,000 acre-feet of pass-throughs per month from above the saltwater barrier dam directly into the upper Rincon Bayou.

The primary project objectives will be to continue monitoring the freshwater inflows coming into the delta via the pipeline by recording salinities within the water column at various stations along the Rincon Bayou and within the Nueces Delta, as well as to maintain a real-time weather station and a tide gauge in Nueces Bay for the period of one year. These instruments will be used to calculate spatial and temporal environmental effects as well as the amount of freshwater needed to manage a healthier estuary.

Objective:

Maintain real-time water quality, tide gauge, and meteorological monitoring stations in the Nueces Delta and Bay to measure effects of Rincon Pipeline freshwater inflows.

Project 1912 City of Port Aransas Nature Preserve – New Trail Connection/Boardwalk/Tower

Performing Organization: City of Port Aransas
Total Project Funding: \$30,000
CBBEP Bays Plan Actions: HLR-1, PEO-1, BD-1, FW-1

Background:

Since the conceptual plans for the Preserve first started, in 2002, there has been a desire to connect the Leonabelle Turnbull Birding Center and the Charlie's Pasture trail system. This site received over 60,000 visitors in 2017. Hurricane Harvey destroyed the existing boardwalk and observation tower at this site and has expedited the need to build this trail connection and restore access to the freshwater wetlands and pond habitat that draw so many eco-tourists to the area. The geographic scope of Port Aransas includes stopover habitat for neotropical migrating birds in the spring and fall, summer nesting grounds for a variety of birds, wintering grounds for the endangered Piping Plover and Whooping Crane. This location brings in a tremendously diverse amount of birds. Families on summer vacation, nature lovers chasing migration and annually returning Winter Texans all frequent the site. Based on a study conducted by the City, the Nature Preserve was ranked as the most important recreation need of the region. There is great potential for loss of tourism due to destruction of the boardwalk and limited access to the site that could make a large impact to Port Aransas' eco-tourism driven economy.

A 500ft boardwalk and 20ft tall observation tower has been designed as a hike and bike trail and will create a new tie in to the Port Aransas Community Park as well as the only remaining Nature Preserve trail. The boardwalk will be constructed from more resilient materials than the previous lumber boardwalks. Work will be done in phases eventually creating a loop of trails that connects each of the popular nature destinations to each other. This project has been given \$400,700 by the Rebuild Texas Fund to cover debris removal and new construction. The total project cost for debris removal, construction of the boardwalk and construction of the observation tower is \$776,200. FEMA will not cover the construction of the boardwalk or observation tower as they are new constructions, and FEMA support is restricted to the rebuilding of previous structures.

Project Objectives:

Construction:

- A 6ft wide, 500ft long elevated hike and bike boardwalk at the Leonabelle Turnbull Birding Center or Node 6 of the proposed trail layout from Land Design Partners (2005)
- A 20ft tall observation tower over freshwater wetlands with a system of ADA compliant ramps. The viewshed includes the entire Nature Preserve and sits over freshwater wetlands with a diverse population of bird, fish, and reptiles.
- Renovation of an existing bike path along .42 miles along Ross Ave. to Community Park and Port Aransas Nature Preserve.
- Trail counter to monitor use of trail to measure the potential success of the project.

Project 1913 Volunteer Water Quality Monitoring Program in Baffin Bay

Performing Organization: Texas A&M University-Corpus Christi
Total Project Funding: \$50,000
CBBEF Bays Plan Actions: WSQ-3

Background:

The purpose of this project is to help maintain a volunteer water quality monitoring program in Baffin Bay that will be gathering water samples and identifying potential sources of water quality degradation in the system. Baffin Bay is also undergoing significant eutrophication, as exemplified by a long-term increase in nitrogen and phosphorus loads and chlorophyll *a* concentrations that have exceeded state criteria for nearly the past decade (Montagna and Palmer 2012). Additional symptoms include blooms of potential HAB species (*A. lagunensis*, *Pyrodinium bahamense*), episodic hypoxia and fish kills.

In response to concerns over water quality changes in Baffin Bay, Texas A&M University-Corpus Christi (TAMU-CC) recently initiated a spatially-temporally intensive volunteer water quality monitoring program to: 1) generate data for construction of nutrient budgets and to identify potential sources of nutrient/organic matter loadings that are contributing to water quality degradation in the system, and 2) characterize the ecosystem response to loading events, including from episodic storm events.

As part of the volunteer program and a TAMU-CC Ph.D. student project, samples will be collected from Baffin Bay on a monthly basis, as well as at higher frequencies in response to episodic storm events or fish kills. Two of the sites overlap with TCEQ quarterly monitoring stations, allowing for comparison with longer-term trends within Baffin Bay. At each site, vertical profiles will be performed and discrete surface samples collected. Additionally, a YSI Ecomapper Autonomous Underwater Vehicle (AUV), equipped with water quality sensors (temperature, salinity, D.O., pH, chlorophyll fluorescence) may be deployed to identify water quality “hot spots” and to characterize environmental conditions pre- and post-storm.

Objective:

Support and maintain a volunteer water quality monitoring program through TAMU-CC and collect monthly data, and rain event data, to identify nutrient concentrations and loading throughout the bay system.

Project 1914 CBBEP Public Outreach Events and Activities

Performing Organization: **CBBEP**
Total Project Funding: **\$35,000**
CBBEP *Bays Plan* Actions: **PEO-1, PEO-2, PEO-3, PEO-4 and PEO-5 and BTR-1**

Background:

One of the most important goals of the *Coastal Bend Bays Plan* is to educate citizens about the ecology of the bay system, its many environmental and economic values, and how an individual can make a positive difference to ensure its long-term health. To accomplish this, the *Public Education and Outreach Action Plan* is designed to raise the public's environmental awareness, foster community stewardship of bay resources; and increase individual involvement in bay resource management issues.

Helping residents and visitors understand the complex issues concerning bay resource management is a priority. CBBEP utilizes a public opinion survey to gauge the effectiveness of our education and outreach efforts. In addition to understanding how the bay system functions, it is important that citizens develop a sound appreciation for the significant value and economic impact derived from the renewable resources of the bays. CBBEP is constantly working to promote public/private partnerships as stated in the *Coastal Bend Bays Plan* to help achieve its educational goals.

Objective:

CBBEP will raise awareness of environmental issues by connecting with the Coastal Bend public through our websites and at community events and festivals. We will spread the CBBEP brand through promotional and educational materials, such as posters, reusable bags and other items. We expect to reach thousands of people at various community events.

In addition, CBBEP may participate in:

- Community events and festivals
- CBBEP may produce or purchase educational and promotional materials
- CBBEP will maintain a web site(s)
- CBBEP develop and provide electronic updates
- Other outreach opportunities

Project 1915 Padre Balli Pollinator Habitat

Performing Organization: Nueces County Coastal Parks
Total Project Funding: \$21,187 (\$13,000 In-kind from County)
CBBEF Bays Plan Actions: PEO-1, PEO-3, BTR-1, BTR-2

Background

Padre Balli Park, established in 1949, is part of the Nueces County Coastal Parks (NCCP) system. We strive towards addressing the social, recreational and conservational needs of our Corpus Christi communities and serve an estimated 45.2 percent of the 9.6 million visitors hosted by the Corpus Christi MSA, according to the Governor’s office of Tourism and Economic Development report for 2016. By collaborating with a broad range of constituents – including Corpus Christi residents, community groups, nonprofits, real estate developers and city leaders – NCCP’s efforts show a tangible difference in both the aesthetics and conservation of green spaces throughout our parks.

Our mission is to provide a quality recreational experience for both the present and future generations of residents, taxpayers, and visitors through responsible utilization and development of strategic Nueces County assets, the conservation and management of coastal natural resources and compatible public access, and providing for the changing recreational needs by optimizing use of partnerships and funding opportunities.

NCCP is conscious of the changing needs of our unique ecosystem on the Texas coast and we are committed to adapting our park to better serve those needs by implementing ecologically designed management plans and providing outreach educational opportunities for our communities.

In November of 2017, Padre Balli Park restored an otherwise unusable green space into habitat that is needed by our native and migratory pollinator species.

Objective

To install a human uses feature to the Padre Balli pollinator habitat. This feature would serve three core functions that are essential to our mission. First, the effort would empower communities by providing them tools and resources needed to improve the quality of our natural resources. Second, it would beautify and improve public green space. Third, it would strengthen residents’ sense of participation in conservation in their communities and personal green spaces.

Project 1916 Lamar Peninsula Whooping Crane Habitat Enhancements

Performing Organization: CBBEP
Total Project Funding: \$71,791 (\$43,074 CMP; \$28,717 Local)
CBBEP Bays Plan Actions: BD-1, HLR-1, HLR-2

Background:

In 2012, the Coastal Bend Bays & Estuaries Program (CBBEP) partnered with the Whooping Crane Conservation Association, Texas Parks and Wildlife Department, and The Nature Conservancy to purchase 178 acres of Whooping Crane habitat, including a 107-acre tract and a 71-acre tract, on the Lamar Peninsula in Aransas County. The properties, which have documented use by Whooping Cranes, contain valuable coastal habitats, including freshwater and estuarine wetlands, tidal mud flats, and saline uplands.

CBBEP is responsible for managing public access and enhancing habitat at the sites. Whooping Cranes are sensitive to human disturbance, and efforts are needed to minimize impacts, especially during the winter months. In CMP Cycle #23, the CBBEP will install bollards to restrict vehicular access to the 107-acre tract, conduct individual plant spray treatments on approximately 20 acres of shrub habitat to control the encroachment of mesquite; remove Hurricane Harvey debris (e.g., plastics, construction materials, boats/vehicles, etc.) from the properties to enhance the coastal marsh and tidal flat habitat; and install interpretive signage to educate the public about Whooping Cranes.

CBBEP will oversee all contractor work conducted at the sites. To minimize disturbance, bollard installation and plant treatment will not occur during whooping crane season (October – March). Debris removal may occur during this time but will cease upon sighting of a whooping crane. Project work will be limited to the 107-acre and 71-acre tracts of land, both of which are located within the Mission Aransas National Estuary Research Reserve (NERR). All required permits and environmental clearances will be obtained. Signage will be installed at the site acknowledging the use of CMP funding.

Objectives:

- To install 2,900 linear feet of bollards to help reduce vehicular traffic entering the property damaging sensitive habitats.
- To remove marine debris found on the property.
- To design and install interpretative signage educating the public about Whooping Cranes
- To treat approximately 20 acres of shrub habitat encroaching coastal marsh.

Project 1917 Sourcing Native Live Oak-Redbay Community Plants for Post-Hurricane Harvey Restoration

Performing Organization: TBD
Total Project Funding: \$17,500
CBBEP Bays Plan Actions: HLR-1, HLR-2, HLR-4, HLR-10, PEO-1, PEO-5

Background:

The Texas Coastal Bend Live Oak-Redbay Forest is an imperiled plant community that occupies the maritime forest habitat of our coastal landscape. These woodlands, which are resistant to coastal winds and salt spray, stabilize the relict barrier island formations that protect our estuaries and provide important habitat for wildlife. While Hurricane Harvey had a significant impact on this habitat, the survival of a 1,000-year-old live oak, known as Big Tree, provided a symbol of strength and resilience within the hardest hit communities of the Coastal Bend. Just prior to Hurricane Harvey, the Coastal Bend Bays & Estuaries Program funded a project entitled Texas Coastal Bend Live Oak-Redbay Woodland Conservation Plan (Conservation Plan). The Conservation Plan will identify opportunities to conserve and restore this imperiled habitat, identify resources for landowners, and develop an educational brochure for the general public.

The Conservation Plan will identify areas in need of restoration and will promote the use of local native plant stocks, but the sources and availability of these stocks are limited, especially in the wake of the storm. If local native plant stocks are not readily available for restoration activities, people may turn to other sources with the potential to spread disease (e.g., oak wilt, laurel wilt) or choose exotic species over natives. If disturbed areas are not restored in a timely fashion, they risk becoming naturalized by invasive species, such as Guinea grass and Brazilian peppertree.

To fill this void, the project would source, collect, propagate, and distribute native plants for the restoration of public lands identified in the Conservation Plan, to local nurseries for retail sale to the general public, and to non-profit organizations that participate in education/outreach events which may include native plant sales. Plants will be marketed to the general public as locally sourced native plants in such a way that associates them with this project.

Objective:

The project would create a community-based partnership charged with developing and implementing a plan to source, collect, propagate, and distribute local native plants for post-hurricane restoration activities

Project 1918 Mapping Potential Habitat Restoration Sites to Restore Hydrologic Connectivity

Performing Organization: International Crane Foundation
Total Project Funding: \$15,000
CBBEP Bays Plan Actions: HLR-2, HLR-4, BTR-3

Background:

Historic wetland degradation has impacted the health and sustainability of coastal systems worldwide, and is a continuing issue in the Texas Coastal Bend. Restoration, enhancement, and creation initiatives that restore hydrologic connectivity are essential to recover the function and delicate balance within our Gulf Coast Prairies and Marshes Ecoregion. Early within the Coastal Bend Bays & Estuaries Program, the Habitat & Living Resources Team recognized the benefit of integrating stakeholder input and sound science approaches into site inventory planning, implementation, and monitoring of landscape-scale habitat restoration. Over the past twenty years, the use of a geographic information system (GIS) approach to identify and map areas has increased and provides a user-friendly catalog that also improves spatial analyses and uses multiple criteria layers. Within each of these reports, sites were identified with associated impacts and restoration options that, when implemented, would recover system function, value, and sustainability. We are promoting the use of these decision-support tools to identify projects where future projects would be beneficial to achieve the Habitat Objective of the Coastal Bend Bays Plans (CBBEP 1998) to “Preserve, create, and restore coastal habitats”.

All pertinent reports that identify hydrologic restoration sites in CBBEP will be reviewed to identify potential project sites. Additional input from stakeholders will be also be used to populate the database. Using ArcGIS, a point location will be defined where restoration would be implemented and metadata entered into the project attribute table describing type of restoration needed (removal of barrier, insertion of culverts, etc.), primary benefits to fish and wildlife, reduction of flooding, etc., potential partners, and information source. Sites will be organized by USGS Watershed Boundaries (Hydrologic Units HUC8 as default scale).

Objectives:

- Convene stakeholder meetings and compile and integrate of all potential restoration projects that would restore hydrologic connectivity within estuarine habitats and develop a spatial database in GIS
- Identify types of hydrologic restoration strategies that would be implemented at each site and identify potential partners
- Characterize collective benefits of completed projects at site-specific and regional scale

**Project 1919 Obtain Baseline Data for Restoration of the Port Aransas Nature Preserve
Following Hurricane Harvey**

Performing Organization: TBD
Total Project Funding: \$18,500
CBBEF Bays Plan Actions: HLR-2, HLR-4, BTR-3

Background:

This project would assess the damaged and rapidly disappearing critical habitat within the Port Aransas Nature Preserve (Preserve) boundaries. A Habitat Equivalency Analysis (HEA) will be conducted to measure damages to ecosystem services from Hurricane Harvey to critical habitat for overwintering Piping Plover and Whooping Cranes, foraging Reddish Egrets and Brown Pelicans, summer ground nesting Least Terns, Wilsons and Snowy Plovers. HEA is not limited in its application when the goal is to understand how habitats are currently functioning and what restoration is needed to increase the functionality of those habitats. The results of the assessment will be integrated into the planning and design of targeted restoration projects and can be used to help acquire funding from public grants as well as private and commercial industry. One additional use is that we not only understand the impacts of the storm but also how the ecosystem is functioning presently and will support scaling restoration to return the habitat to pre-storm conditions if not greater. The critical habitats within the Preserve include wind driven tidal mudflats, salt marsh, freshwater wetlands and Gulf Coast prairie. The wetlands act as a stop-over and wintering grounds for migrating birds and offer refuge for waterfowl. The predominant piece of property consists of 1,280 acres, and represents one of the largest contiguous tracts of undeveloped land in any coastal plain that has been preserved for environmental, ecological and historical purposes.

Harvey made landfall on August 25, 2017. The powerful storm caused the bulkhead and the revetment along the Corpus Christi Ship Channel to wash out in four separate areas adjacent to the Preserve. Cost estimates of the damage to the Preserve are approaching \$3.5 million dollars. The new cuts along the ship channel followed by extreme high tides have caused severe erosion of roughly 10 acres of upland and prairie habitats. These upland and prairie habitats had formerly protected sensitive algal flats within the Preserve boundaries. Minimal baseline data exists from the Nature Preserve, making it hard to identify what restoration should be done. A Habitat Equivalency Analysis would identify beneficial restoration projects, as well as provide greater justification for future restoration funding efforts.

The establishment of regularly monitored vegetation plots will assist in obtaining baseline vegetation data. The Texas Gulf Region Cooperative Weed Management Association has helped acquire funding for the removal of invasive Brazilian Peppertrees. Vegetation monitoring will help identify trends in invasive species control within the Preserve. The establishment of regularly monitored vegetation plots will also assist in obtaining baseline vegetation data and understanding the stresses potentially impacting the Preserve.

Objectives:

- Quantify ecosystem services by conducting a habitat equivalency analysis to help guide future restoration efforts.
- Monitor vegetation and disturbed land availability for invasive species. The invasion of non-native species into native habitats can alter both habitat structure and function, and disrupt or displace native species.
- Create a plan for future restoration and recovery.

Performing Organization: Texas A&M University – Corpus Christi
Total Project Funding: \$33,037
CBBEP Bays Plan Actions: HLR-1, PH-2, FW-1, FW-2

Background:

The purpose of the project is to assess how variation in freshwater inflow during floods affects the abundance of *Vibrio vulnificus* and *Perkinsus marinus* in oysters from St. Charles and Mission Bays. Punctuated flood events, such as those during Hurricane Harvey, bring large amounts of fresh water to oyster reefs which can have profound implications for oyster physiological stress and loading of harmful bacteria and parasites. A previous study has shown that a drought-induced increase in salinity eliminated *V. vulnificus* in oysters, and *P. marinus* infections are strongly linked to average salinities. However, the effects of salinity fluctuations associated with periodic pulses of storm runoff are unknown. Assessing links between inflows and *V. vulnificus* and *P. marinus* requires time series of salinity variations at the reef scale, which are often unavailable from instrumental monitoring. Fortunately, oyster shells themselves naturally record salinity fluctuations via stable isotope ratios of oxygen and carbon that are incorporated into shell growth increments. Thus, each oyster shell contains a record of the frequency, duration, and magnitude of salinity variability in response to flood events over the course of the oyster's life. Pairing this individual record of salinity stress with assessments of *V. vulnificus* and *P. marinus* abundance will be a powerful step forward in identifying the effects of inflow patterns on important estuarine resources.

Data identifying the impacts of floods on oysters are imperative to effectively manage this species that provides valuable ecosystem services as well as fishery resources to local communities. The degree to which floods alter oyster vulnerability to *V. vulnificus* is currently underappreciated yet important for human health risk assessments. Although links between average salinity and *P. marinus* infection rates have been investigated, the impacts of salinity variability and oyster stress histories have yet to be evaluated.

This work will take place in two locations with different salinity fluctuation dynamics: St. Charles Bay (an enclosed bay which is typically more stable in having low salinities) and Shellbank Reef in Copano Bay (which is subject to more variable salinities depending on inflow regime). Both of these locations are target sites for harvesting and reef restoration efforts. This project thus has relevance for ongoing reef restoration strategies in Texas.

Objectives:

The objective of the project is to assess how variation in freshwater inflow during floods affects the abundance of *Vibrio vulnificus* and *Perkinsus marinus* in oysters from St. Charles and Mission Bays.

Project 1922

Serpulid Reef Communities in Baffin Bay as Critical Habitat for Black Drum Diet

Performing Organization: Texas A&M University – Corpus Christi
Total Project Funding: 30,000
CBBEF Bays Plan Actions: HLR-1, HLR-4

Background:

Baffin Bay is a well-known angler's paradise despite seemingly inhospitable conditions for marine life. Salinities in excess of 60 ppt and algal blooms are common in the bay, yet it persists as the top producer of Black Drum (*Pogonias cromis*) in the state. Previous studies indicate that prey resources for these fish are often scarce in the bay's mud-bottom habitat - but the key to Baffin's success may be in its unique 'rocks'. These large structures, familiar to many as superb fishing spots and/or destroyers of lower-units, were formed by colonial Serpulid worms and provide rare hard-substrate habitat for fishes and their prey. Preliminary exploration of these reefs has shown invertebrate (prey resource) densities 150 times greater than in Baffin's mud-bottom and 30 times greater than in the Laguna Madre's seagrass beds. Baseline dietary analysis indicates that these reef-resident organisms could play a large role in the diet of Black Drum.

Serpulid reefs are very rare world-wide and are only found scattered around the Baffin Bay system along the US Gulf coast. Although Serpulid reefs in Baffin Bay represent favored fishing grounds, their ecological role is not well understood. Past studies have shown the importance of Serpulid reefs as habitat for fish and invertebrate species. Because the Serpulid reefs of Baffin Bay are degrading in size and distribution compared to historic levels, it is critical to better understand their ecological role to support conservation efforts. The health of the Baffin Bay system may depend heavily on the success of its rare Serpulid reefs. An understanding of the ecological role of Serpulid reef communities, in particular as a prey resource, will improve fishery resource management, enhance our ability to predict how this system will respond to environmental disturbance, and inform conservation measures.

Objective:

The major objective will be a current and comprehensive understanding of the habitat value of serpulid reefs and how they are incorporated into Black Drum Diet relative to soft-sediment fauna. A secondary objective will be the determination of any temporal changes in habitat and diet in both reef and soft-sediment communities.

Performing Organization: TBD
Total Project Funding: \$60,000
CBBEP Bays Plan Actions: HLR-1, HLR-2

Background:

In May 2018, CBBEP received notification of funding from CCA Texas & Building Conservation Trust to address hard substrate habitat loss in Nueces Bay. This effort will serve as a baseline indicator of the ability to construct and enhance existing oyster reefs within the Nueces Bay system. In addition, it will provide community outreach through education by involving local students in oyster bagging events and shell placement.

Oyster reefs are an important habitat which serve as a nursery ground for economically and recreationally important fish species, habitat for migratory bird species, shoreline stabilization, and a filter for contaminants. Oyster reefs were once very abundant in Nueces Bay but due to extensive shell dredging in the 1930s and 1940s many of the reefs have disappeared or have significantly been reduced in size. Oyster reefs (American oyster (*Crassostrea virginica*)) in Nueces Bay are prone to fluctuating cycles in productivity due to freshwater inflows from the Nueces River resulting in large sediment loads that bury the oyster reefs and suffocate the oysters and hyper saline conditions in Nueces Bay from lack of freshwater inflow that may hinder reproduction.

Objective:

To restore and/or enhance hard substrate habitats for oysters and other beneficial marine organisms and species in Nueces Bay.

Performing Organization: CBBEP
Total Project Funding: \$46,500
CBBEP Bays Plan Actions: HLR-1, HLR-2

Background:

The Laguna Madre is one of the most important coastal wetland complexes for birds in the Western Hemisphere. Much of the value of this system for birds is based on the diversity of tidal flats and seagrass beds spread over a very large geography – extending from the Corpus Christi area down to La Pesca, in Tamaulipas, Mexico.

While CBBEP's Coastal Bird Program has conducted extensive management efforts focused on the Upper Laguna Madre within the CBBEP program area, virtually no management activity has been directed towards important sites in the Lower Laguna Madre which is nearly the same size.

The Coastal Bird Program has conducted some management activity in that area in the past, and is well acquainted with the area and the management needs of the islands. There are substantial opportunities to successfully manage these sites for the benefit of colonial nesting species.

This project will allow the Coastal Bird Program to initiate a slate of management actions at island sites throughout the Lower Laguna Madre, and establish a more permanent presence in the lagoon system and the surrounding communities. This will be accomplished by hiring one additional staff person who will work in conjunction with the current Bird Program staff. This expansion will allow the smooth transfer of knowledge and management methods that have been developed over years of the program's activities in the central coast.

The expansion will also allow the Coastal Bird Program to engage more directly with partners in coastal conservation on the Mexican portion of the Laguna Madre by offering training and assistance with management planning and implementation.

Objectives:

- Improve colonial nesting waterbird populations in the Lower Laguna Madre by addressing proximate causes of nest failure such as predation, lack of suitable nesting substrate, and human disturbance.
- Implement monitoring efforts on shorebird populations to identify potential conservation actions.
- Engage volunteers and communities in coastal bird conservation efforts through the coastal portion of the Rio Grande Valley.

Project 1925 Indian Point Peninsula Shoreline Stabilization and Habitat Protection

Performing Organization: To Be Determined
Total Project Funding: \$2,180,000
CBBEP *Bays Plan* Actions: HLR-1, HLR-2

Background:

Indian Point Peninsula supports the section of U.S. Highway 181 that crosses Nueces Bay and separates it from Corpus Christi Bay. The peninsula is within the City of Portland city limits and provides recreational opportunities to the community and many visitors. CBBEP and the City of Portland have worked together to document losses of approximately 300 acres of salt marsh, partly due to construction of the highway in the 1940's and subsequent erosion since then. Continuing erosion due to wind waves, tidal currents, ship traffic, and storms is undermining the stability of the shoreline that protects this crucial infrastructure and habitat including facilities associated with Indian Point pier. In fact, ongoing erosion has led to the recent demolition (for safety concerns) of an elevated walkway historically used by park visitors for fishing and bird-watching.

To offset documented habitat loss and protect valuable habitat and infrastructure, CBBEP, The City of Portland and their partners have already restored approximately 160 acres of marsh habitat along the northwest side of the peninsula. In 2013 CBBEP developed and implemented plans to protect the new marsh complex, adjacent habitat, and back-lying infrastructure along the peninsula with a 4,300 foot rock breakwater.

Indian Point Park, on the southeast side of the peninsula, has an access road, parking lot, bathroom facilities, and public fishing pier. The park also contains a wetlands complex that provides great wildlife habitat and ecotourism benefits. CBBEP began constructing a series of breakwater segments and revetment along the southeast side of the peninsula, but due to funding constraints was only able to construct half of the planned project. This project will use the plans and specifications previously developed for the area and complete the effort which involves construction of six limestone breakwater structures that will provide protection of important shoreline and marsh habitat in addition to protecting the only vehicular access to the these recreational facilities at Indian Point Park.

Objectives:

- Review final design, specifications and permitting for all planned protection structures.
- Construct remainder protection structures to complete the second and final phase of the project.

Performing Organization: American Conservation Experience

Total Project Funding: \$31,244

CBBEP Bays Plan Actions: HLR-1, HLR-2, HLR-10

Background:

The purpose of this task order is to remove invasive, non-native vegetation including Brazilian peppertree (*Schinus terebinthifolius*), White lead tree (*Leucaena leucocephala*), and Giant reed (*Arundo donax*) at Naval Air Station (NAS) Corpus Christi, Texas. Suppression and control of invasive plant species at NAS Corpus Christi will support the long-term sustainment and ecological integrity of the facility as well as the strand and shoreline habitat vital to listed species such as the Red knot (*Calidris canutus rufa*) and Piping plover (*Charadrius melodus*). Invasive plant species can out-compete native species and form near monocultures, diminishing the value of native habitats and interrupting natural processes. Active intervention by use of herbicides or other control methods to suppress existing stands of invasive plant species assists in preventing reproduction and spread, which helps prevent more extreme infestations. The natural resources on NAS Corpus Christi are important to rare, threatened, and endangered species, non-game wildlife, and water quality.

Objective:

Management by cutting and treating with selected herbicide targeted invasive plants. This effort will involve the removal of individual invasive trees, patches of trees that will cover 15 acres of invasive vegetation infested property across several areas of the NAS Corpus Christi facility which, in turn, will enhance the native plant communities.

Project 1928 Gulf Coast Conservation Initiative (Phase 6)

Performing Organization: CBBEP
Total Project Funding: \$180,000
CBBEP Bays Plan Actions: BTR-3, SM-3, HLR-1, HLR-2

Background:

The Gulf Coast Conservation Initiative (GCCCI)'s purpose is to protect, enhance, and/or restore habitat for whooping cranes, northern Aplomado falcons, Attwater's prairie chickens, Sprague's pipit and associated migratory bird species.

The Aplomado Falcon, Attwater's Prairie Chicken, and Whooping Crane are endangered species that occur in coastal Texas, and whose ranges overlap to varying degrees with one another, as well as with many migratory birds which have experienced long-term, broad-scale declines across much of their ranges. These species can neither recover nor be sustained unless habitat sufficient to support viable populations is conserved. Habitat for these species has been degraded by the production of food and fiber, and is being lost to development and rising sea-levels. Protecting, enhancing, and restoring habitat for these species from development will in this area reduce or avoid impacts from recreational uses, protect and preserve functional sensitive natural habitat types, preserve open space, and restore degraded habitats in the GCCCI priority area.

Since 2002, CBBEP has worked to acquire either fee simple title or conservation easements for more than 12,000 acres of freshwater marsh, forested wetlands, mudflats, riparian corridors, and native upland habitat for conservation management. CBBEP has coordinated with U.S. Fish & Wildlife Service, Natural Resources Conservation Services, and The Nature Conservancy to develop and implement management plans and restoration actions throughout this protected habitat. CBBEP has also coordinated worked with other property owners (such as Aransas National Wildlife Refuge, Texas Parks and Wildlife Department, City of Corpus Christi, South Texas Botanical Gardens and Nature Center, and private property owners) to develop and implement restoration actions on their property.

CBBEP will coordinate with USFWS, Grazing Lands Coalition, TNC, USDA-NRCS, and other conservation organizations to identify and implement restoration actions that benefit a minimum of 500 acres of habitat for Aplomado Falcons, Attwater's Prairie Chickens, and/or Whooping Cranes, as well as associated focal migratory birds' habitats. For projects on private lands CBBEP or a designated project partner will develop written 10-year long agreements with landowners.

Objective:

Identify and implement restoration actions that benefit a minimum of 500 acres of habitat for Aplomado Falcons, Attwater's Prairie Chickens, and Whooping Cranes.

Project 1929 Caring for Our Coast – Nueces Delta Preserve: Education and Habitat Restoration

Performing Organization: CBBEP
Total Project Funding: \$30,000
CBBEP Bays Plan Actions: PEO-3, HLR-1, HLR-2

Background:

This project, sponsored by CITGO's Caring for Our Coast initiative is designed to support the activities and habitats at the Nueces Delta Preserve. The CBBEP Nueces Delta Preserve is located 3 miles from the City of Odem and 20 miles from downtown Corpus Christi. The CBBEP Nueces Delta Preserve consists of approximately 10,500 acres in San Patricio and Nueces Counties that are owned and managed by CBBEP as a conservation site for the purpose of preserving natural habitat, function and species diversity in the Nueces River delta. The preserve is rich in diversity that can be characterized by Tamaulipan thorn scrub, grasslands, lomas, freshwater wetlands, riparian habitat, brackish wetlands, tidal mud flats and estuarine shoreline. CBBEP's secondary goal for the preserve is for the property to be used for a variety of educational and research opportunities.

The funds provided by the project support the activities of the CBBEP Delta Discovery Program and also provide funding to enhance coastal grassland habitats through the treatment of encroaching brush within the boundaries of the Preserve. The project will additionally engage the community through conducting a large scale volunteer event to be held at the CBBEP Kate's Hole Preserve at Packery Flats on Mustang Island. This event will focus on cleaning debris from barrier island habitats on Mustang Island

Objectives:

- To educate area youth through the implementation of nature based educational field trips.
- To restore and enhance habitats in the Nueces Delta Preserve.
- To hold a volunteer event on Mustang Island and clean debris from Packery Flats.

IX. Program Administration

CBBEP administrative staff (6 FTE's) will provide organizational and logistical support for Estuary Council and subcommittee meetings, and coordinate/communicate as necessary with appropriate groups, including stakeholder groups, state and federal agencies, local governments, and professional groups relevant to CCMP implementation. Staff will:

1. Acquire, manage, and disperse funds to implement the *Bays Plan*;
2. Monitor, track, and report on implementation performance by implementing partners, and work to maintain implementation commitments;
3. Develop a prioritized biennial work plan and budget for Estuary Council review and approval;
4. Coordinate the periodic update of the *Bays Plan*, the *State of the Bay* report, the *Implementation Strategy*, and other key documents of the program;
5. Provide logistical support for all meetings, workshops, symposia, and special events related to program mission;
6. Provide outreach to the public through local and regional media;
7. Develop strategies for seeking funding sources;
8. Provide for overall program coordination with EPA Region 6 and TCEQ.
9. Participate in regional, state, and national conferences and meetings relevant to estuarine management.
10. Develop and implement policies and procedures for an emergency contingency plan which will include: protecting financial records, office equipment, computers, and other vital records and equipment; employee responsibilities; backup and storage of data; and recovery actions.
11. Continued implementation of a management system to track and assess Quality Assurance Project Plans (QAPPs) and determine required corrective actions and follow-up to be completed on date determined by TCEQ.

X. Project Management and Implementation

CBBEP Project Management staff (10 FTE's) will coordinate/communicate as necessary with appropriate groups, including stakeholder groups, state and federal agencies, local governments, and professional groups relevant to *Bays Plan* implementation. Staff will:

1. Develop and implement partnership projects with local governments, state, and federal agencies, and private organizations;
2. Monitor, track, and report on implementation performance by implementing partners, and work to maintain implementation commitments;
3. Provide communication and coordination with the Texas Coastal Management Program and the Coastal Coordination Council, the Gulf of Mexico Program, the Texas Commission for Environmental Quality (TCEQ), and other relevant coastal/watershed programs;
4. Coordinate the review of proposed actions of federal, state, and local projects in an open process for consistency with the *Bays Plan*;
5. Develop a prioritized biennial work plan and budget for Estuary Council review and approval;
6. Provide for overall program coordination, including quality control/quality assurance procedures with EPA Region 6 and TCEQ.
7. Participate in regional, state, and national conferences and meetings relevant to estuarine management.

XI. Program Expenses

CBBEP funds will be used to support continued program implementation, evaluation, and reporting. Funds are also necessary to provide logistical support for the Bays Council and subcommittee meetings. Expense categories are as follows:

1. Travel – allows Program staff to attend state, regional and national meetings, workshops, and conferences;
2. Supplies – as needed, for the day-to-day operations of the Program;
3. Equipment – purchase of items over \$1,000, i.e. computers;
4. Other – copier rental, temporary staff, postage, communication services, accounting services, printing, etc.

XII. Working Capital

The CBBEP Board of Directors has established working capital out of local funding. The funds will be set aside for possible future projects, matching funds and/or emergency funding.

XIII. Summary

On September 1, 2018, the Coastal Bend Bays & Estuaries Program will begin Year 21 of implementing the *Coastal Bend Bays Plan*. This FY 2019 Work Plan describes the proposed work to be initiated during FY 2019. Of the total funds identified in the Work Plan budget, \$600,000 are new (FY 2019) EPA federal funds; \$734,230 are new (FY 2019) TCEQ funds; \$2,678,496 are new (FY 2019) project-specific funds; and \$672,513 are new (FY 2019) local partner/federal court interest funds; and \$83,801 are from local reserve funds. The total budget for this FY 2019 Work Plan is \$4,769,040.

TABLE 1: FY 2019 COMPREHENSIVE ANNUAL WORK PLAN OUTLINE

PROJECT #	PROJECT TITLE	ACTION ITEM(S)	PERFORMING PARTY	EPA FY19 CWA 320	TCEQ FY19 & 604b	LOCAL/ COURT INTEREST	TGLO	MISC GRANTS	USFWS	NFWF	TOTAL CBBEP FUNDING
1901	Coastal Waterbird Management	HLR-1, HLR-4	CBBEP	91,311				37,754		145,461	\$274,526
1902	Delta Discovery	BTR-1, PEO-2, PEO-3, PEO-5	CBBEP	168,866		41,853		27,500			\$238,219
1903	Coastal Bend Fertilizers & Pesticides Monitoring Program	WSQ-1, HLR-9, NPS-1, PEO-4, PEO-5	City of Corpus Christi	37,048							\$37,048
1904	Connecting Communities in the Oso Bay/Oso Creek Watershed	WSQ-1, WSQ-5, FW-1, PH-1, PEO-5	Center for Coastal Studies, TAMU-CC			3,500					\$3,500
1905	Installation of a Full-Range Streamflow, Temperature & Salinity Gauging Station at NR Hwy 37	WSQ-1, WSQ-3, WSQ-4, WSQ-5, FW-1, FW-2, FW-3, FW-4	US Geological Survey		45,000						\$45,000
1906	Outdoor Classrooms	PEO-3, PEO-5	CBBEP & USFWS						10,000		\$10,000
1907	Riparian Evaluation for Baffin Bay Tributaries	WSQ-1, WSQ-3, HLR-1, PEO-5	Nueces River Authority		40,812						\$40,812
1908	CBBEP Community Outreach Partnerships	PEO-1, PEO-2, PEO-3, PEO-4, PEO-5	Coastal Bend Bays Foundation		7,000	23,000					\$30,000

PROJECT #	PROJECT TITLE	ACTION ITEM(S)	PERFORMING PARTY	EPA FY19 CWA 320	TCEQ FY19 & 604b	LOCAL/ COURT INTEREST	TGLO	MISC GRANTS	USFWS	NFWF	TOTAL CBBEP FUNDING
1909	CBBEP Property Management	HLR-1	CBBEP			105,000					\$105,000
1910	Assessment of Organic Pollutants in NB Petroleum Brine Impacted Sediments	WSQ-5, NPS-1	Texas A&M University Corpus Christi		48,290						\$48,290
1911	Nueces Delta Environmental Monitoring	FW-1, FW-2, FW-3, FW-4	Conrad Blucher Institute		58,877						\$58,877
1912	City of Port Aransas Nature Preserve New Trail Connection/ Boardwalk/Tower	HLR-1, PEO-1, BD-1, FW-1	City of Port Aransas		30,000						\$30,000
1913	Volunteer Water Quality Monitoring Program in Baffin Bay	WSQ-3	Texas A&M University- Corpus Christi					50,000			\$50,000
1914	CBBEP Public Outreach Events & Activities	PEO-1, PEO-2, PEO-3, PEO-4, PEO-5, BTR-1	CBBEP			35,000					\$35,000
1915	Padre Bali Pollinator Habitat	PEO-1, PEO-3, BTR-1, BTR-2	Nueces County Coastal Parks			21,187					\$21,187
1916	Lamar Peninsula Whooping Crane Habitat Enhancements	BD-1, HLR-1, HLR-2	CBBEP				43,074	28,717			\$71,791
1917	Sourcing Native Live Oak-Redbay Community Plants for Post-Hurricane Harvey Restoration	HLR-1, HLR-2, HLR-4, HLR-10, PEO-1, PEO-5	TBD		12,376	5,124					\$17,500

PROJECT #	PROJECT TITLE	ACTION ITEM(S)	PERFORMING PARTY	EPA FY19 CWA 320	TCEQ FY19 & 604b	LOCAL/ COURT INTEREST	TGLO	MISC GRANTS	USFWS	NFWF	TOTAL CBBEP FUNDING
1918	Mapping Potential Habitat Restoration to Restore Hydrological Connectivity	HLR-2, HLR-4, BTR-3	International Crane Foundation			15,000					\$15,000
1919	Obtain Baseline Data for Restoration of the PA Nature Preserve After Hurricane Harvey	HLR-2, HLR-4, BTR-3	TBD			18,500					\$18,500
1920	Oyster Flood Tracker Project: Reconstructing Inflows to Reefs & Effects on Vibrio Vulnificus Abundance	HLR-1, PH-2, FW-1, FW-2	Texas A&M University-Corpus Christi		33,037						\$33,037
1921	Not Used										\$0
1922	Serpulid Reef Communities in Baffin Bay in Relation to Black Drum Diet	HLR-1, HLR-4	Texas A&M University-Corpus Christi			30,000					\$30,000
1923	Nueces Bay Oyster Reef Demonstration/ Research Project	HLR-1, HLR-2	TBD					60,000			\$60,000
1924	Lower Laguna Madre Bird Conservation	HLR-1, HLR-2	CBBEP					46,500			\$46,500
1925	Indian Point Shoreline Stabilization & Habitat Protection Project	HLR-1, HLR-2	TBD				2,175,060				\$2,175,060
1926	NAS Invasive Vegetation Management	HLR-1, HLR-2, HLR-10	American Conservation Experience					31,244			\$31,244

PROJECT #	PROJECT TITLE	ACTION ITEM(S)	PERFORMING PARTY	EPA FY19 CWA 320	TCEQ FY19 & 604b	LOCAL/ COURT INTEREST	TGLO	MISC GRANTS	USFWS	NFWF	TOTAL CBBEP FUNDING
1927	Not Used										\$0
1928	Gulf Coast Conservation Initiative Phase 6	BTR-3, SM-3, HLR-1, HLR-2	CBBEP						180,000		\$180,000
1929	Caring for Our Coast – Delta Discovery and Habitat Protection/ Enhancement Activities	PEO-3, HLR-1, HLR-2	CBBEP					30,000			\$30,000
	TOTAL PROJECT FUNDS			297,225	275,392	298,164	2,218,134	311,715	190,000	145,000	3,736,091
	Administrative / Travel		CBBEP	302,775	458,838	266,396	4,940	0	0	0	\$1,032,949
	TOTAL FUNDING			\$600,000	\$734,230	\$564,560	\$2,223,074	\$311,715	\$190,000	\$145,461	\$4,769,040