

BH-1: Implement the Tampa Bay Habitat Master Plan

OBJECTIVE:

Implement the Tampa Bay Habitat Master Plan to restore and protect key bay habitats. Reevaluate the *Restoring the Balance* management paradigm, taking into account anticipated population growth, changing land use patterns and impacts of climate change and sea level rise. Support research and monitoring necessary to meet data and information gaps for priority habitats targets. Continue to encourage restoration and protection of priority habitats, through acquisition and restoration programs.

STATUS:

Ongoing. Strategy revised to incorporate new research, monitoring and recommendations from the Tampa Bay Habitat Master Plan update (Robison et al., 2010), the Freshwater Wetland Habitat Master Plan (Ries et al., 2014), the Tampa Bay Tidal Tributaries Habitat Initiative, the Critical Coastal Habitat Assessment Program, and others.

BACKGROUND:

The Tampa Bay Estuary Program and its partners have made significant progress in restoring and protecting key coastal habitats in Tampa Bay. This work is guided by the Tampa Bay Habitat Master Plan, and tracked in the Habitat Restoration and Protection Database (<http://www.tampabay.wateratlas.usf.edu/restoration/>)

The first Tampa Bay Habitat Master Plan (Lewis and Robison 1996) set targets for restoration and protection of mangrove forests, salt marsh, oligohaline (low-salinity) habitat in tidal tributaries, isolated small wetlands important as forage areas for estuarine-nesting birds such as white ibis, and salt barrens, and introduced the management paradigm of *Restoring the Balance*. This paradigm endeavors to restore priority coastal habitats to similar proportions as they occurred historically, in order to provide a full mosaic of habitats necessary to support fish and wildlife throughout their life cycles. It recognizes that some habitats have been lost in greater proportions than others and prioritizes their protection and restoration. Its implementation involves comparing historic habitat proportions in Tampa Bay (typically using a 1950s baseline) to current proportions and conducting change analysis. Restoration targets for each habitat type are then set through a collaborative process led by TBEP and its partners. The 1996 Habitat Master Plan was updated in 2010 (Robison et al., 2010) and will be updated again in 2016-17.

According to the 2010 Plan, priority natural habitats in Tampa Bay and its watershed include:

- Seagrass meadows
- Emergent tidal wetlands (Mangrove forests, Salt marshes, Salt barrens)
- Tidal flats
- Oyster reef/bars
- Hard bottom
- Tidal tributaries, creeks and rivers
- Coastal uplands
- Freshwater wetlands

Restoration and protection targets have been set for seagrass, mangroves, salt marsh, freshwater wetlands and salt barrens. Research is underway to better understand tidal creeks and the historic and current areal extents of tidal flats, oyster reefs and hard bottom habitats. New monitoring and mapping approaches and techniques to capture large- and small-scale changes in coastal marshes and mangrove forests are being

developed to better understand and potentially mitigate for climate change. Results from these ongoing projects will help managers set restoration and protection targets for tidal flats, oyster reef, hard bottom habitats and tidal tributaries and better evaluate and track progress toward achieving targets set for mangroves and coastal marshes.

Seagrass Meadows

Seagrasses are keystone species in Tampa Bay. Their lush meadows provide food, create habitat, stabilize bay bottom, filter nutrient pollution, and reduce wave action and coastal erosion. Seagrasses rely on sufficient water clarity to receive sunlight. In Tampa Bay, water clarity is mostly affected by the density of suspended microscopic algae, which in turn is directly related to the availability of the most limiting nutrient – nitrogen. Between the 1950s and early 1980s, Tampa Bay lost nearly 20,000 acres of seagrass, mainly due to nutrient pollution and dredging.

In 1995, Tampa Bay Estuary Program set a bay-wide restoration target of 38,000 acres for seagrasses and implemented a strategy (Tampa Bay Nitrogen Management Strategy) to improve water quality by reducing nitrogen inputs into the Bay. Since 1996, partners of the Tampa Bay Nitrogen Management Consortium, an innovative public-private partnership, have implemented more than 500 projects to reduce nitrogen loading. As a result, water quality has improved and seagrasses are recovering. In 2015, and for the first time since the 1950s, Tampa Bay achieved 40,295 acres of seagrass, surpassing its bay-wide target set in 1995.

Despite these momentous gains, seagrass communities remain vulnerable to environmental variability and human impacts. Continued biannual mapping of bay-wide seagrass coverage is necessary to identify and protect sensitive and impacted areas (BH-8). Several studies have been conducted to support development of a Tampa Bay Seagrass Restoration and Protection Masterplan, including a detailed analysis of historic seagrass change, species composition and condition throughout the bay, refined estimates of light requirements, estimates of wave energy and development of an initial bio-optical model. In addition, the relationship between longshore sand bars and seagrass has been studied and seagrass management areas have been established.

Emergent Tidal Wetlands (Mangrove forests, Salt marshes, Salt barrens)

Emergent tidal wetlands occur primarily along the intertidal perimeter of the bay and its tidal tributaries, and include mangrove forests, salt marshes and salt barrens. They provide food and habitat for hundreds of species of bay fish and wildlife, stabilize shoreline sediments and reduce erosion, and filter pollutants from runoff. Dominant threats to emergent tidal wetlands are dredge and fill activities, sea level rise, and modifications to bay hydrology.

Between 1950-1990, almost 21 percent (4,984 acres) of emergent tidal wetlands were lost in Tampa Bay, with salt marshes and salt barrens showing the most disproportionate losses. Between 1995-2007, the areal extent of emergent tidal wetlands increased about 2% (433 acres), with mangroves showing the greatest increase (379 acres). Over time, the relative proportion of mangroves in the Bay has increased, while the proportions of salt marsh and salt barren have decreased (table from 2010 HMPU).

TBEP and its partners set restoration and protection targets for all three emergent tidal wetland habitats (table from 2010 HMPU). Since 2013, more than 1,050 acres and 1000 linear feet of coastal habitat have been restored through the TBERF.

Tidal Flats

Tidal flats are non-vegetated intertidal bay habitats composed of sand and organic sediments. They are found primarily along low-energy shorelines and sheltered backwaters. Tidal flats host dense assemblages of benthic invertebrates, which are an important food source for shorebirds and wading birds. SWFWMD has classified tidal flats as part of their biannual seagrass mapping work; however, this effort did not consistently distinguish tidal flats from other non-vegetated estuarine shorelines. In 2015, SWFWMD employed new standards for photo-interpreting and characterizing tidal flats. This improved approach is expected to yield more accurate estimates of the distribution and areal extent of tidal flats in Tampa Bay.

Hard Bottom Habitats and Oyster Reefs

Hard bottom habitats support a diverse assemblage of invertebrates and fish. Oyster reefs provide food and habitat, reduce erosion, stabilize shorelines and improve water quality. Together, these habitats are relatively rare and sparsely distributed in the Bay.

No comprehensive map of hard bottom habitats in Tampa Bay exist. In 2015, SWFWMD employed new, more accurate standards for interpreting hard bottom and oyster reefs from aerial photography, as well as new survey techniques including sidescan sonar and underwater video. This work will contribute important information for setting protection and restoration targets for hard bottom and oyster reef habitats in select portions of the Bay (BH-4). Expansion of hard bottom and oyster reef mapping bay-wide is needed.

Tidal Tributaries, Creeks and Rivers

Tidally influenced water bodies support fisheries production, nutrient cycling, wading bird foraging and flood prevention (BH-9). The Tampa Bay Watershed hosts about 1,400 linear miles of tributaries, creeks and rivers (Robison et al., 2010), however the extent of tidal reach in these water bodies is not comprehensively documented. Quantifying the total linear miles of tidally influenced waterbodies is important baseline research to better understand these tidally influenced habitats and how they will change with sea level rise and water- and land-use changes.

The Tampa Bay Tidal Tributaries Habitat Initiative was created to study the health and function of tidal tributaries. Highly variable environmental conditions among tributaries make setting a single optimum water quality criterion difficult. Instead, habitat status may be better characterized by the status of fish populations, or some other biological indicator (BH-9). A 2012 study funded by TBEP, identified hundreds of structures in tidal tributaries that potentially block or impede tidal flows and fish movement. Further work to develop biological criteria, monitor fish and wildlife, and prioritize tributaries for restoration is needed.

Coastal Uplands

Coastal Uplands occur just landward of emergent tidal wetlands, and include mesic flatwoods and hydric hammocks. They provide habitat for a variety of bay wildlife and are important buffers between tidal wetlands and urban and agricultural development.

Analysis of general land cover maps from 2007 indicate there were approximately 12,929 acres of coastal uplands in the Tampa Bay watershed; although this is likely an overestimate due to inclusion of managed agricultural and park lands (Robison et al., 2010). Improved quantitative assessments are needed to assess the current and historic benchmark areal extent of coastal upland habitat and develop restoration and protection targets for them.

Between 2007-2012, volunteers at Tampa Bay Estuary Program's "Give A Day For the Bay" planted 14,000 native plants at coastal and upland sites in the Tampa Bay watershed. Since 2013, 112 acres of coastal upland were restored in Tampa Bay through the TBERF.

Freshwater Wetlands

Freshwater wetlands support more than 80 species of terrestrial and aquatic fish and wildlife, filter pollutants including nitrogen, reduce flooding and erosion, and recharge groundwater. Over the past century, freshwater wetlands in the Tampa Bay watershed have been negatively impacted by urban development and agricultural production in the watershed.

Between 1950-2007, the Tampa Bay Area suffered a net loss of more than one third of its freshwater wetlands, amounting to more than 100,000 acres (Ries et al., 2014). Non-forested wetlands were disproportionately lost. These findings led TBEP partners to set a specific restoration and protection target of 18,703 acres of freshwater wetlands; with 17,088 acres of non-forested and 1,615 acres of forested wetlands.

The Freshwater Wetland Habitat Master Plan (Ries et al., 2014; BH-10) determined that these specific targets were achievable and best accomplished through a combination of publicly-funded restoration and privately-funded compensatory mitigation. Regulatory permitting agencies have committed to utilizing the Master Plan to identify and require mitigation of historic wetland conditions. There is a need to provide education and guidance to environmental professionals on how to best utilize the Plan's recommendations and tools. Pinellas County's Stormwater Manual provides an innovative model for incorporating wetlands into an integrated stormwater management plan.

Climate Change and Sea Level Rise

The Tampa Bay Estuary Program evaluated and published potential impacts and management implications of climate change on Tampa Bay Estuary Critical Habitats (Sherwood and Greening, 2014). Modeled changes to increasing sea level showed that mangrove forests will dominate the overall proportions of future coastal habitats, whereas bay-wide proportions of salt marshes, salt barrens and coastal freshwater wetlands will decline. Recommendations include increasing resiliency to climate change and sea level rise by increasing vulnerable habitat proportions, identifying upslope refugia of existing priority habitats to allow migration with increasing sea levels, and reevaluating the *Restoring the Balance* paradigm for habitat restoration targets in light of anticipated climate change and sea level rise impacts

The Critical Coastal Habitat Assessment Program was developed by TBEP to develop long-term monitoring and assessment of the status, trends and function of coastal habitats to detect future changes that may occur as a result of sea level rise and climate change. The monitoring plan will incorporate a hierarchical approach to allow for multiple scales of inference to be made. Scales will include the "Bay Wide," "Bay Segment" and "Habitat Ecotone".

Land Acquisition and Protection

The 1996 Tampa Bay Habitat Master Plan identified 28 sites for acquisition, protection, management and/or restoration. Of those, 19 were purchased and 8 have undergone restoration activities. The 2010 Master Plan Update inventoried public and private parcels in the Tampa Bay watershed that should be prioritized for restoration efforts. Public sites included 12 in Pinellas County, 18 in Manatee County and 19 in Hillsborough County. The Plan recommended developing a federal-state-local-private partnership

to provide the framework for linking watershed-level planning goals for restoration with federal, state and local wetland compensatory mitigation.

STRATEGY:

Activity 1: Update the Habitat Master Plan to assess progress toward meeting targets for habitats for which targets are established and to set targets for remaining priority coastal habitats as foundational data becomes available. Reevaluate the *Restoring the Balance* management paradigm, taking into account anticipated population growth, changing land use patterns and impacts of climate change and sea level rise.

Develop a Habitat Restoration Best Management Practices document, incorporating lessons-learned and the historical evolution of restoration techniques in the Bay.

Coordinate with all restoration and protection partners in the Tampa Bay area to update the existing habitat restoration database on the Tampa Bay Water Atlas or a similar platform.

Responsible Parties: TBEP (lead), FWCC, SWFWMD

Timeframe: Habitat Master Plan update will be initiated in 2017, complete by 2019 (updated timetable)

Cost and potential funding sources: \$\$-\$\$\$; Section 320 funds

Location: Baywide

Benefit/Performance measure: Documented progress towards existing numeric targets for increased acres of seagrass, marsh, mangroves, salt barrens and freshwater wetlands.

Results: Ongoing evaluation of the *Restoring the Balance* paradigm will ensure that current restoration activities are resilient to anticipated changes in Tampa Bay and its watershed.

The Updated Tampa Bay Master Plan will provide updated draft numeric targets and management actions for seagrass, marsh, mangrove, salt barrens, and freshwater wetlands; and initial numeric targets for tidal creeks, hard bottom habitats and coastal uplands. The Updated Plan will include new Management Elements, including:

- A restoration and management plan for tidal creeks, further refining priority tributaries for hydrologic restoration, environmental indicators and criteria, and fisheries and benthic monitoring (BH-9).
- A restoration and management plan for seagrasses in Tampa Bay, incorporating nutrient management, physical impacts, and transplanting activities. Investigate opportunities to implement longshore bar features into areas that formerly exhibited natural underwater bars.
- A restoration and management plan for coastal uplands.
- A long-term monitoring program for wetland mitigation sites (see BH-2).
- An evaluation of the benefits of living shorelines to enhance habitat value along developed shorelines and provide resilience from climate change impacts

The Master Plan elements and targets will be adopted by the Tampa Bay community and used for restoration and protection planning by entities throughout the bay watershed.

A Habitat Restoration Best Management Practices document will capture institutional knowledge developed by TBEP Restoration Partners over the years and help inform development of future restoration projects. A centralized, comprehensive, up-to-date database of areal extents of priority habitat types is fundamental to adaptive management of *Restoring the Balance*, and for coordination of all future public and private restoration and protection efforts

Deliverables:

- Adopted updated Tampa Bay Habitat Master Plan.
- Updated numeric targets for bay and watershed habitats.
- New measureable targets for tidal creeks, coastal uplands and hard bottom habitats.
- Identification of high priority restoration areas throughout the bay
- Incorporation of implications of climate change to habitat restoration projections and targets. An evaluation of the benefits of living shorelines.
- A Habitat Restoration Best Management Practices Manual
- Updated centralized, comprehensive database on the Tampa Bay Water Atlas tracking estimated acreage and distribution, changes in extent, and restoration targets for priority habitat types in the Bay
- Identified research and monitoring necessary to meet data and information gaps

Activity 2: Implement the Critical Coastal Habitat Assessment Program, including monitoring necessary to meet data and information gaps for priority habitats targets and to assess progress toward meeting established habitat targets. Monitoring will monitor habitats at both large (baywide) and smaller (basin) scales.

Responsible Parties: TBEP (lead for initial monitoring), FWC, SWFWMD; potential implementing partners for future monitoring include FWC, SWFWMD, Hillsborough, Manatee or Pinellas counties, Tampa Bay Watch.

Timeframe: Initial monitoring ongoing, to be complete in 2016. Monitoring is scheduled to be repeated every 5 years, starting in 2021.

Cost and potential funding sources: \$\$; CWA Section 320 funds for 2016 monitoring. Potential funding sources for future monitoring include SWFWMD Cooperative Funding, TBERF and other grants, or other funds.

Location: Baywide

Benefit/Performance measure: Evaluation of change in habitat extent and quality over time.

Results: Enhanced management decisions for critical bay habitats, including changes due to effects from climate change, land use changes and other factors.

Deliverables:

- Final report from initial monitoring event, including consistent design for future use.
- Reports from future monitoring events evaluating changes observed every 5 years.

Activity 3 Continue to encourage restoration and protection of priority habitats, through acquisition and restoration programs.

Responsible parties: Implementing partners include TBEP, SWFWMD, environmental land acquisition programs of Hillsborough County, Manatee County and Pinellas County, the State of Florida. Other potential implementing entities include local and national land trusts, such as Trust for Public Lands, Tampa Bay Conservancy and The Nature Conservancy.

Timeframe: Ongoing

Cost and potential funding sources: \$\$-\$\$\$\$, dependent upon cost of land acquired or size of restoration project. Potential funding sources include state or federal funds; local government land acquisition funds; grants; donations to trust funds.

Location: Baywide and watershed

Benefit/Performance measure: Restored and/or protected habitat used by fish and wildlife and for recreational opportunities.

Results: Increased quality and quantity of habitats in Tampa Bay and its watershed

Deliverables:

- Annual GPRA reporting for protected and restored habitat.
- Creation and maintenance of database of habitat restoration and protection projects in the Tampa Bay watershed

CCMP Milestones for BH-1

BH-1 Implement the Tampa Bay Master Plan for Coastal Habitats

Revised Action. Formerly *Implement the Tampa Bay master plan to habitat restoration and protection.*

1996-2006

Action Title: *Implement the Tampa Bay master plan to habitat restoration and protection.*

TBEP played a role in the following:

- Conducted several background assessments of habitat types in the Tampa Bay watershed, including
 - Oligohaline areas in Tampa Bay tributaries: spatial extent and species lists. *TBNEP Technical Report #04-92.*
 - Seagrass restoration and protection targets for Tampa Bay. *TBNEP Technical Report #07-93.*
 - Physical impacts to habitats in Tampa Bay. *TBNEP Technical Report #03-93.*
 - Exotic/invasive species control manual for mangrove forest areas. *TBNEP Technical Report #05-95.*
 - Identified and mapped publicly-owned land in the Tampa Bay watershed. *TBNEP Technical Report #01-96.*
 - A summary of emergent vegetation habitat coverage for Tampa Bay. *TBEP Technical Report #08-00.*
- Funded the first Tampa Bay Habitat Masterplan. Targets for coastal habitat types were developed and adopted, based on restoring the historic balance of habitats to 1950s levels. *TBNEP Technical Report #09-95.*
- Funded an evaluation of the importance of freshwater wetlands for coastal-nesting white ibis on Tampa Bay. White ibis feed their young on freshwater prey from wetlands within 9 miles of their nests. *TBEP Technical Report #11-99.*
- Funded several habitat restoration projects through EPA Early Action Demonstration Projects and other sources, including
 - The Diamondback Track Shoreline Restoration. *TBNEP Technical Report #18-96.*
 - Demonstration of littoral zone habitat restoration alternatives adjacent to an industrial waterway. *TBNEP Technical Report #17-96.*
 - Alafia River oyster bar restoration demonstration project. *TBEP Technical Report #01-99.*

2006-2016

Action Title: *Implement the Tampa Bay master plan to habitat restoration and protection.*

TBEP played a role in the following:

- The **Tampa Bay Tidal Tributaries Habitat Initiative** was finalized in 2008 (see BH-9). The objectives of the TBEP study were to improve protection and management of these minor, tidally-influenced systems in the Tampa Bay estuary by: 1) characterizing the fisheries resources of Tampa Bay tidal tributaries; 2) determining the effects of various habitat parameters (e.g., watershed condition, water quality, structural habitat, etc.) on fisheries resources in tidal tributaries; 3) developing measurable goals and management recommendations from these characterizations and analyses that will lead to the development of a Tidal Tributary Management Strategy, and 4) ultimately communicating the results and recommendations to managers and the public to support informed decision-making regarding the preservation or restoration of tidal tributaries. A **public summary document** is an important implementation element of the communications strategy developed through this project.
- Funded and coordinated the 2010 Habitat Master Plan Update. Recommendations included forming a partnership for a coordinated watershed approach linking regulatory and resource management programs to support attainment of Tampa Bay wetland restoration and protection goals. Updated goals were adopted by the TBEP Policy Board, August 2010. *TBEP Technical Report #06-09.*
- The **Habitat Restoration and Protection Database**, available on the Tampa Bay Estuary Atlas website <http://www.tampabay.wateratlas.usf.edu/>, was developed in 2010 to compile and track the thousands of acres of established, enhanced, or protected habitat in the Tampa Bay watershed. It was compiled using various data and includes projects involving more than 30 agencies. It currently contains ~250 “complete” entries. The database was developed in Microsoft Access® and allows agencies to specify the exact acreage (or linear feet) of habitat restored per habitat type and activity. This provides an effective way to catalogue habitat “mosaic” projects without losing any detail. This also enables scientist and citizen users to search for projects using various fields, including location, acreage (or linear feet), habitat type restored or activity. Since 1971, more than 5,000 acres of habitat have been established or enhanced in the Tampa Bay watershed.
- The Feather Sound Seagrass Recovery Project was finalized in 2007. A large, multi-partner assessment of potential impacts to seagrass recovery in Old Tampa Bay, specifically in the Feather Sound area was initiated in 2005 and finalized in 2007. The Project Team suggested that improving the system will require a broad-based management approach for nutrients, sediments, pulsed freshwater inputs, and toxics. The

team also recommended maximizing the ability of mangroves and marshes to absorb nutrients from nonpoint sources that drain into western Old Tampa Bay. *TBEP Technical Report #03-07.*

- Several studies were completed to **support development of the Tampa Bay Seagrass Restoration and Protection Masterplan**, including detailed analysis of historic seagrass change, species composition and condition throughout the bay, and development of seagrass management areas. Light requirements of seagrass in Tampa Bay were further refined, wave energy estimated, and an initial bio-optical model for Tampa Bay seagrasses was developed. *TBEP Technical Reports #03-05; #07-06; #06-07; #04-08; #09-09; #08-09; #03-09; #06-11; #06-13; #06-15.*
- The concept that longshore bars encourage seagrass recovery was tested through design and construction of a Longshore Bar at the MacDill Peninsula. The Tampa Bay Longshore Bar Seagrass Recovery Project represents the culmination of nearly ten years of research on the relationship between longshore sand bars and seagrass in Tampa Bay. The project objective was to determine whether the construction of an artificial longshore bar will encourage volunteer seagrass recovery in a portion of Tampa Bay. Completed studies supporting the Longshore Bar project concept during this PE period included an examination of wave energy and seagrass. *TBEP Technical Report #06-13.*
- An alternative hypothesis to the role of Longshore Bars presence for seagrass recovery was also tested. **Large units of manatee grass (*Syringodium filiforme*) were transplanted adjacent to the Longshore Bar project**, to evaluate the hypothesis that the presence of seagrass enhanced the formation of longshore bars, rather than the other way around as is being tested by the longshore bar project.
- TBEP's "Give A Day" volunteer team has removed 28 tons of Brazilian pepper and other invasive plants at area parks and preserves from 2007 through 2012. The volunteers have planted 14,000 native plants at coastal and upland sites throughout the watershed from 2007 through 2012.
- With funds from EPA CRE, developed and printed a Gulf Coast Community Handbook: Case studies from Gulf of Mexico Communities for incorporating climate change resiliency into habitat planning and protection. *TBEP Technical Report #01-14.*
- With support of an EPA Wetland Development Grant, TBEP funded two projects designed to address the mitigation recommendations from the 2010 Habitat Master Plan:
 - An assessment of the freshwater wetland changes between 1950 and 2007 indicated that, for the Tampa Bay watershed, non-forested wetlands had been lost in larger proportions than forested wetlands. *TBEP Technical Report #10-12.*
 - Master Plan for the protection and restoration of freshwater wetlands encouraged permitting agencies to allow permit applicants to consider mitigation that would assist in meeting the freshwater wetland targets for Tampa Bay. *TBEP Technical Report #05-14.*

- Evaluated and published potential impacts and management implications of climate change on Tampa Bay Estuary Critical Coastal Habitats. Modeled changes show mangroves will dominate with increased SLR, while saltmarshes, salt barrens and coastal freshwater wetlands will be reduced. Recommendations include increasing habitat mosaics to increase resiliency to change; identifying refugia areas upslope of existing natural and restored habitat to allow migration over time; and the need to re-evaluate the current 'restore the balance' paradigm for habitat restoration targets moving in the future. *TBEP Technical Report #07-14*; Sherwood and Greening 2014. *Environmental Management* 53(2); 401-415.

Support habitat restoration projects through the Tampa Bay Environmental Restoration Fund.

To date (2013-2015), TBERF projects will result in

- more than 1,050 acres and 1,000 linear feet of coastal habitat restoration;
- more than 15,000 square feet of oyster reefs;
- 466 acres of freshwater wetland restoration;
- 200 acres of seagrass;
- 112 acres of coastal uplands.

The following habitat restoration projects have been funded and are ongoing:

2013 TBERF Projects

- Newman Branch Creek Fisheries Habitat Restoration Phase III (\$60,000); Ecosphere Restoration Institute
- McKay Bay Oyster Reef Creation and Enhancement (\$80,000); Tampa Bay Watch
- Rock Ponds Ecosystem Restoration (\$200,000); SWFWMD
- East McKay Bay Habitat Restoration and Water Quality (\$100,000); SWFWMD

2014 TBERF Projects

- Safety Harbor Waterfront Park Habitat Restoration (\$70,000); City of Safety Harbor
- Rock Ponds Coastal Ecosystem Restoration (\$60,000); Tampa Bay Watch
- Oyster Bar Restoration at Robinson Preserve (\$53,000); Manatee County
- Duette Preserve Hydrologic Restoration (\$87,260); Manatee County
- MacDill Air Force Base Living Shoreline (\$41,000); Tampa Bay Watch

2015 TBERF Projects

- Ft DeSoto Ecological Enhancement/Recirculation (\$168,500); Pinellas County
- Terra Ceia Huber and Frog Creek Upland Project (\$71,170); SWFWMD
- Fantasy Island Living Shoreline Stabilization (\$80,000); Tampa Bay Watch

BH-2 Establish and Implement Mitigation Criteria

OBJECTIVES:

Support progress toward habitat restoration goals by implementing mitigation criteria specific to Tampa Bay. Identify priority sites for mitigation banks and off-site mitigation and ~~pursue rule revisions~~ that help to achieve adopted targets for critical coastal habitats, including seagrasses, saltwater wetlands, freshwater wetlands and hard-bottom habitats. Collaborate with private sector to evaluate and improve mitigation; establish long-term monitoring of mitigation sites across multiple habitats.

STATUS:

Ongoing. Action expanded to include recommendations for on- and off-site mitigation developed through the Mitigation Criteria Working Group. Freshwater wetland master plan includes tools for directing future mitigation where most ecologically beneficial and to disproportionately impacted freshwater wetland habitats. Evaluations of mitigation success can provide a framework to improve permitting and monitoring programs across multiple habitats, with recommendations incorporated into the next update of the Tampa Bay Habitat Master Plan.

BACKGROUND:

Mitigation involves restoring, enhancing, preserving or creating habitats to offset development-related impacts to wetlands, streams, seagrasses and other aquatic resources.

Unlike restoration or preservation done primarily to enhance or maintain habitat quantity and quality, mitigation is required for permitted ~~unavoidable~~ impacts that damage or destroy wetlands and other aquatic habitats. Mitigation activities are regulated by federal, state, regional and local agencies.

Mitigation can be achieved using three mechanisms:

- Mitigation banks (Large mitigation ~~restoration~~ areas that offer “credits” for impacts. Banks must demonstrate successful restoration prior to releasing or selling credits.)
- In-lieu fee programs (Monetary contributions ~~Payments made~~ to another entity to implement an identified large mitigation project for restoration.)
- Permittee-responsible mitigation (The permit applicant conducts the mitigation activity.)

Specific guidelines govern how, where and what type of mitigation must be conducted, and monitoring of project success. Mitigation may involve creation, enhancement, restoration, or preservation of habitats. It can occur on the same site as the development activities, if space allows; off-site at an appropriate location; or at a mitigation bank.

Regulatory agencies generally prefer mitigation banking or use of in-lieu fees because the larger scale and scope of these tools maximizes habitat benefits – especially when mitigation for smaller wetland mitigation projects (less than a few 5 acres) can be bundled into larger parcels.

There are multiple existing and planned mitigation banks in the bay watershed, for both private and public development and infrastructure activities. The majority offer freshwater mitigation credits. Only one private mitigation bank currently exists in the bay watershed, the Tampa Bay Mitigation Bank near Cockroach Bay. This bank serves the entire coastal basin, so applicants impacting wetlands at locations many miles away are still preferentially sent to this bank. A mitigation bank also is maintained for public transportation projects by FDOT in Hillsborough County. Several mitigation banks are currently under review by regulatory agencies have been explored but are not yet approved to release credits. Service areas for permitted mitigation banks generally encompass an entire watershed; applicants may choose to use credits from a bank in the same watershed to fulfill mitigation requirements.

Long-term success of mitigation projects is variable and highly dependent upon the location, size, type of habitat created and maintenance provided. Mitigation for forested wetlands, for example, may take substantially longer than for non-forested wetlands because of the longer time needed for tree canopy to mature.

The Environmental Protection Commission of Hillsborough County, in association with the University of South Florida and other regional partners, is evaluating the success of freshwater wetland mitigation projects it permitted in Hillsborough County since 1987. (Brown 2015)(need specific citation for this report) The review compares the original mitigation designs to current status, using standardized wetland assessment methods, monitoring reports and other documentation with current status, using standardized wetland assessment methods to estimate acreage and functionality. Preliminary findings Initial results show a 38% loss in wetland acreage over the 63 representative sites assessed.

Other findings suggest that mitigation for forested wetlands appeared to be less successful than for non-forested (grassy) wetlands, and takes longer to mature. The ecological function or quality of the wetlands visited in the study is also lower than expected, especially in non-forested freshwater wetlands. In some cases, development surrounding the mitigation sites has increased pollutant loading and reduced connections with other natural areas. Researchers also found a correlation between wetland size and health; Importantly, larger wetlands generally provided more ecosystem services and were performing better than smaller wetlands surrounded by urban land uses.

TBEP's Master Plan for the Protection and Restoration of Freshwater Wetlands in the Tampa Bay, Florida Watershed (*TBEP Technical Report #05-14, see Action BH-10*) also examined mitigation of freshwater wetlands. Both the EPC study and the freshwater master plan reinforce

the need for more rigorous mitigation criteria to prevent deterioration of wetland quality and quantity in the bay watershed. Among the issues in need of clarification and consensus:

- Concerns that mitigation banks or in-lieu fee programs will be preferentially established where land is cheaper, even though these areas may be far removed from the actual wetland impacts. This is of particular concern in urban areas, where land costs are higher. land costs. Currently, mitigation outside the impacted watershed is rarely approved, within the same basin is preferred, but is not always prohibited required. However, mitigation within the same sub-basin is not required, potentially creating wetland deficits in some areas.
- Loss of small isolated wetlands (less than ½-acre) for which mitigation is not required. These “frog ponds” are especially important for amphibians and the wading birds that feed on them.
- Whether private entities should be allowed to conduct mitigation activities on public lands.
- Whether public agencies should purchase large tracts of land specifically for future mitigation purposes.
- Whether monitoring criteria is stringent enough to adequately assess long-term success.
- Whether the current system, which utilizes “credits” based on type and quality of impacted and restored habitats, adequately compensates for wetland losses.
- Potential indirect impacts to natural wetlands adjacent to development, such as changes in water quantity and quality. For example, increased runoff into a freshwater marsh may alter hydrology, drowning native vegetation or creating artificial “ponded” wetlands dominated by nuisance plants like cattails and primrose willow that do not provide the same ecological benefits. Research is needed to examine and quantify these impacts.

Although existing mitigation criteria focuses on freshwater wetlands, improvements also are needed in mitigation of impacts to estuarine habitats such as seagrasses, marshes, mangroves and hard-bottom.

Opportunities for seagrass mitigation, in particular, are currently limited to transplanting, often at high cost and with varying success (*see Action BH-3*). Since the vast majority of the bay’s seagrass gains are a result of increased water clarity from reduced nitrogen loadings, port authorities and other entities have requested use of pollution-reduction projects (such as stormwater or wastewater treatment) as mitigation for seagrass impacts in lieu of transplanting. This alternative is ~~has~~ generally not ~~been~~ permitted; however, a recent project to remove manmade causeways blocking tidal circulation at Fort De Soto Park serves as a successful model. The project, sponsored by SWFWMD, DOT and Pinellas County, resulted in improved water quality and seagrass expansion in the interior waters of the park. Seagrass mitigation credits were allowed for this work.

Mitigation criteria for other sensitive habitats, including hardbottom and live bottom, have not been established. TBEP will develop protection and restoration targets for hard bottom by 2019; appropriate mitigation strategies could be incorporated into those targets. Monitoring of mitigation associated with ship channel expansion and natural gas pipeline construction projects suggests that recreating structural hard bottom, such as limestone or rock reefs or outcroppings,

is much simpler and more successful than transplanting the soft corals and sponges that grow on the hard substrates.

STRATEGY:

Activity 1 Complete evaluation of long-term success of constructed freshwater wetlands in Hillsborough County. Incorporate recommendations into future permitting guidance.

Responsible parties: EPCHC (lead), SWFWMD, USF, USGS, FDEP, USACOE

Timeframe: Study to be completed in 2016. Recommendations to be implemented beginning in 2017.

Location: Baywide

Cost and potential funding sources: \$\$ Work funded by EPC through an EPA Region IV Wetland Development Grant

Benefit/Performance Measure: Increase percentage of freshwater wetland mitigation deemed successful through development and implementation of recommendations to improve long-term ecological viability.

Results: Improved long-term mitigation to achieve adopted targets for restoration and protection of freshwater wetlands, especially for non-forested freshwater wetlands which have been lost in greater proportion in the bay watershed.

Deliverables:

Summary report of long-term success of constructed freshwater wetlands, including recommendations for improvement.

Activity 2 Establish a long-term monitoring program to evaluate mitigation success of freshwater wetlands, estuarine wetlands, hard bottom and other habitat types. Incorporate applicable methodologies from EPC's freshwater wetland mitigation assessment. Utilize EPC's freshwater wetland mitigation assessment as a framework to evaluate the effectiveness of mitigation criteria for estuarine wetlands and other habitat types. Explore rule revisions to enhance success. Identify funding sources and partners. Conduct monitoring, encompassing on- and off-site mitigation activities across multiple habitat types and mitigation strategies (restoration, enhancement, etc.)

Responsible parties: TBEP's TAC (lead on monitoring design); potential pilot implementing partners include EPCHC, SWFWMD, FDEP, FDOT

Timeframe: Develop monitoring protocols as part of the 2017-2019 Habitat Master Plan Update. Conduct initial pilot project by 2020

Location: Baywide

Cost and potential funding sources: \$-\$\$ Section 320 funds for Habitat Master Plan.. Potential funding sources to conduct pilot monitoring include external grants such as EPA Region IV Wetland Development Grant, TBERF or other research funds.

Benefit/Performance Measure: Increase percentage of successful mitigation activities for coastal wetland habitats and other aquatic resources, such as seagrasses, mangroves,

and salt marshes.

Results: Enhanced mitigation success contributing to achievement of protection and restoration targets.

Deliverables:

Recommendations for long-term monitoring protocols for wetland and hard bottom mitigation sites.

Reports evaluating monitoring program.

~~Activity 3 Establish a long-term monitoring program for wetland and hard bottom mitigation sites. Identify funding sources and partners. Conduct one or more monitoring events, encompassing on- and off-site mitigation activities across multiple habitat types and mitigation strategies (restoration, enhancement, etc).~~ Merged with Activity 2

Activity 3 Evaluate impacts to natural wetlands adjacent to development, considering changes to hydrology, vegetation and water quality. Develop monitoring protocols to track changes in function and quality. Design, implement and evaluate a pilot project.

Responsible parties: TBEP's TAC (for monitoring protocols); potential pilot implementing partners include EPCHC, SWFWMD, FDEP, local cities and counties.

Timeframe: Develop monitoring protocols in 2020. Conduct pilot project by 2021.

Location: Baywide

Cost and potential funding sources: \$\$-\$\$\$ CWA Section funds; potential external grants, such as EPA Regional Wetland Development grant

Benefit/Performance Measure: Development of monitoring protocols. Completion of pilot project.

Results: Enhanced understanding of impacts to wetlands from adjacent development.

Deliverables:

Recommendations for monitoring of development-related impacts to adjacent wetlands.

Report evaluating pilot project and recommendations for next steps.

Activity 4 Host a workshop with local environmental managers and mitigation bankers to explore locations and opportunities for mitigation banks and/or regional off-site mitigation areas, especially in areas with impaired waters. Create incentives such as streamlined permitting for smaller mitigation banks.

Responsible parties: ABM (lead); participants may include SWFWMD, FDEP, EPCHC, USACOE, Pinellas County, Manatee County, Hillsborough County, mitigation bankers, land trusts, non-profit restoration agencies

Timeframe: Workshop in 2018; recommendations for rule revisions following.

Location: Baywide

Cost and potential funding sources: \$ Potential funding sources for workshop could include planning grants.

Benefit/Performance Measure: Identification of potential new mitigation banks and/or regional off-site mitigation areas throughout the bay watershed

Results: Improved coordination among publicly- and privately-funded mitigation sponsors leading to achievement of protection and restoration targets.

Deliverables:

Priority list of suitable sites for mitigation banks and/or regional off-site mitigation areas

Activity 5 Examine the use of water quality improvement ~~nutrient reduction~~ projects in lieu of transplanting to mitigate development-related seagrass impacts. Using the Fort De Soto re-circulation project as a model, develop guidelines, considerations and incentives for acceptable use of water quality enhancement ~~nitrogen reduction~~ projects as a mitigation tool.

Responsible parties: Tampa Bay NMC (lead), permitting agencies

Timeframe: 2018

Location: Baywide

Cost and potential funding sources: \$ Section 320 funds for TBEP staff time. In-kind staff support from permitting agencies.

Benefit/Performance Measure: Regulatory flexibility in allowing water quality improvement projects as mitigation to offset seagrass impacts, where feasible and appropriate

Results: Reduced nitrogen loading leading to natural recruitment and recovery of seagrasses

Deliverables:

Guidelines for appropriate use and incentives for utilizing ~~nitrogen reduction~~ water quality projects as a seagrass mitigation tool.

CCMP Milestones for BH-2

BH-2 Establish and Implement Mitigation Criteria

1996-2006

Action Title: *Establish and implement mitigation criteria for Tampa Bay, and identify priority sites for mitigation.*

TBEP played a role in the following:

- Requested ABM convene a Mitigation Criteria Working Group to develop recommendations for mitigation criteria for Tampa Bay. The Working Group developed recommendations for on- and off-site mitigation; safeguards to protect productive native upland habitats from conversion to wetlands; bank siting, management and associated cost issues; and whether mitigation conducted by local governments and private developers should count toward overall habitat restoration goals established for the bay. *TBEP Technical Report #06-99.*

2006-2016

Action Title: *Establish and implement mitigation criteria for Tampa Bay, and identify priority sites for mitigation.*

TBEP played a role in the following:

- Mitigation issues were reviewed and criteria recommendations were included in the 2010 Habitat Master Plan. Recommendations included forming a partnership for a coordinated watershed approach linking regulatory and resource management programs to support attainment of Tampa Bay wetland restoration and protection goals. *TBEP Technical Report #06-09.*

- With support of an EPA Wetland Development Grant, TBEP funded two projects designed to address the mitigation recommendations from the 2010 Habitat Master Plan:
 - An assessment of the freshwater wetland changes between 1950 and 2007 indicated that, for the Tampa Bay watershed, non-forested wetlands had been lost in larger proportions than forested wetlands. *TBEP Technical Report #10-12.*
 - Master Plan for the protection and restoration of freshwater wetlands encouraged permitting agencies to allow permit applicants to consider mitigation that would assist in meeting the freshwater wetland targets for Tampa Bay. *TBEP Technical Report #05-14.*

DRAFT