

## 8. Environmental Restoration

This section discusses long-term redevelopment in relation to environmental restoration. The Environmental Restoration Technical Advisory Committee (TAC) is the lead implementing body for this section and it is responsible for working in coordination with relevant local and regional organizations and agencies. The TAC's mission is to restore natural resources after a disaster, prevent environmental degradation during redevelopment, and address concerns over contamination from debris and damaged industrial sites.

### 8.1 OVERVIEW

Hillsborough County contains natural aquatic, woodland, and wetland environments that provide numerous ecological benefits to their communities such as water filtration and pollution control, flood protection, and habitat for flora and fauna. These natural environments also support a host of industrial, commercial, and recreational activities. Maintaining ecosystem balance is critical to ensuring the future sustainability of these services. Major events such as a coastal storm and its related winds and storm surge, however, can damage or destroy these important natural areas. Navigational channels can become flooded, resulting in oil and hazardous substance spills that contaminate the port, shoreline, and connected watersheds; debris can accumulate in natural environments and destroy natural habitat; damaged trees can pose a threat to lives and property.

A Post-Disaster Redevelopment Plan (PDRP) lays out the strategy for a long-term environmental recovery and restoration from long-term hazard impacts. The Environmental Restoration TAC identified and prioritized the following list of issues, which are discussed in detail in **Section 8.4**:

1. Hazardous materials, debris contaminants;
2. Environmental review of temporary sites;
3. Waterway debris removal, pollution;
4. Wetland restoration;
5. Habitat restoration on conservation lands;
6. Urban forest restoration; and
7. Environmental review of housing sites/neighborhoods

The Hillsborough County Board of County Commissioners (BOCC) at a June 2009 Workshop supported further development of implementation strategies regarding these issues specifically in researching potential contamination. More information on the BOCC Workshop can be found in **Appendix B**.

### 8.2 VULNERABILITY

Damage to the environment poses a threat to people, flora, and fauna. The type of impact will determine who or what natural areas are most at risk. Assessing potential impacts to the environment during the pre-disaster phase helps to determine where resources and efforts should be directed to reduce the risk and better facilitate long-term

restoration. For example, identifying the most sensitive habitats in advance and how they could be potentially damaged will prioritize these areas during the cleanup stage of a disaster. This section focuses on major ecosystem vulnerabilities that decision makers should consider when directing pre- and post-disaster actions.

## **Vulnerable Ecosystems of Hillsborough County**

Hillsborough County is located on Tampa Bay – a bay that supports one of the world’s most productive natural systems and is designated as an Estuary of National Significance. Within the County, the estuary includes three major rivers – Hillsborough, Alafia, and Little Manatee and approximately 17,800 acres of salt marsh and mangrove wetlands (Hillsborough County Comprehensive Plan, 2008). One of the most pristine and biologically productive areas remaining in Tampa Bay is the Cockroach Bay Aquatic Preserve, located in south Hillsborough County (Hillsborough County Comprehensive Plan Coastal Management Element, 2008).

Other ecosystems throughout the County contain well-developed stream systems with natural springs, swamps, and marshes that support cypress and wetland vegetation, ancient beach terraces, uplands containing flatwoods, and urban forests and parklands. Hillsborough County also sits atop the largest and highest quality potable water aquifer in the State – the Floridian Aquifer. Natural or environmentally sensitive areas account for approximately 3% (3,975 acres) of the coastal planning area within unincorporated Hillsborough County. A full inventory of natural resources, environmental features, and sensitive areas is provided in the County and local Comprehensive Plans of Hillsborough County.

These ecosystems deliver myriad ecological benefits to the environment. Tidal wetlands provide prime habitat for a diverse group of marine wildlife; urban forests improve air quality and conserve energy by offsetting the urban island heat effect; riverine forests and adjacent freshwater wetlands provide habitat, filter and cleanse upland drainage before it enters the bay, and contribute organic matter and nutrients to other ecosystems; wetlands also enhance water quality, buffer the effects of erosion, flooding and storm surges.

Coastal development and related activities over the past decades, however, have threatened the health and resilience of some of these natural systems. Many miles of the urbanized shoreline have been bulk headed with vertical seawalls and rip-rap. Other activities such as dredging, unregulated discharging, stream channeling, and over pumping of groundwater have also resulted in coastal wetland loss. It is estimated that approximately 21% of Tampa Bay’s natural tidal wetlands were destroyed between 1950 and 1990 (Southwest Florida Water Management District, 1999). Coastal wetland losses have quickened the effects of shoreline erosion, degraded water quality, and increased habitat loss including declines in fisheries harvests and coastal wildlife populations. More than 40 animal species in the Tampa Bay watershed are currently listed as rare or endangered by the Florida Fish and Wildlife Conservation Commission (FWC). These animals span the range of bay habitats, from those that dwell in the bay or its major tributaries to those that reside in the marshes, tidal streams, freshwater wetlands, sandy beaches, and upland forests surrounding the bay proper (Tampa Bay Estuary Program, 2006).

The result of these activities decreases an ecosystem's resilience to natural hazards. Devastating effects from a coastal storm can further degrade habitats, cause chemical contamination in both coastal and inland environments, damage to trees, and disruption of the natural balance necessary for healthy ecosystem function.

### *Coastal Storms, Flooding, and Storm Surge*

A coastal storm in Hillsborough County can vary in intensity and impact on the environment. Natural ecosystems that are most vulnerable to coastal storms are those located in shoreline areas as identified in the Coastal High Hazard Area (CHHA) and hurricane vulnerability zone. The CHHA is the area defined in the most current regional hurricane evacuation study as requiring evacuation during a Category 1 hurricane. The hurricane vulnerability zone is defined as the area requiring evacuation in a Category 3 storm event. The CHHA is graphically represented in the County and local Comprehensive Plan(s); the hurricane vulnerability zone is shown graphically on the Tampa Bay Regional Planning Council Storm Tide Analysis.

Coastal ecosystems are also at highest risk to storm surge and flooding and will bear the brunt of associated debris pollution, chemical contamination, erosion, and related damage. Of particular concern are barrier islands, preservation areas, and environmentally sensitive lands located within the hurricane vulnerability zone and CHHA, which include aquatic preserves, essential wildlife habitat, Class I and II waters<sup>1</sup>, marine grassbeds, coastal strands, coastal marshes, and mangrove swamps.

Because of the configuration of Tampa Bay and the slope of the Gulf basin, Hillsborough County is also at risk for higher surges than those indicated in the generalized Saffir/Simpson Hurricane Scale (Hillsborough County Local Mitigation Strategy, 2004). Storm surge/evacuation areas are identified on maps created by the Hillsborough County Planning & Growth Management Department and are included in the Local Mitigation Strategy.

### *Erosion*

Erosion results from significant rain, increased wave action due to storm surge, flooding, and sea level rise. Increased wave action and erosion of sediment can undermine wetland vegetation, weakening its ability to recover. Areas of greatest risk to coastal and riverine erosion are identified within the applicable Local Government Comprehensive Plans as Coastal High Hazard Areas. These areas are found along the Hillsborough, Alafia, and Little Manatee Rivers, as well as associated tributaries and areas illustrated as being within the velocity zones on the Federal Insurance Rate Maps (Hillsborough County Local Mitigation Strategy, 2004).

Eroded beach lines also increase vulnerability to future storm surge and flooding. As the sea level rises, a storm surge from a hurricane builds on top of a higher base of water.

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<sup>1</sup> The Clean Water Act requires that the surface waters of each state be classified according to designated uses. Florida has five classes with associated designated uses, which are arranged in order of degree of protection required: Class I – Potable Water Supplies; Class II – Shellfish Propagation or Harvesting; Class III – Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife; Class IV – Agricultural Water Supplies; Class V – Navigation, Utility, and Industrial Use (Florida Department of Environmental Protection).

With less shoreline to absorb the initial impact of waves during a storm, the existing shoreline is more exposed. Loss of natural beaches and dunes reduces areas of critical habitat, and decreases protection of coastal development from storm waves.

### *Sea Level Rise*

Coastal wetlands, including salt marshes and mangroves, will be affected by rising sea level in different ways, and their ability to migrate will depend on slope, sediment availability and composition, the presence of inland barriers, and the rate at which sea level rise occurs (Erwin, 2009). United States Geological Survey (USGS) measurements suggest that mangroves have been replacing salt marsh and low-salinity coastal wetlands in a gradual northerly and landward direction in Tampa Bay for the past century. Factors favoring mangroves over salt marsh vegetation include a warming climate, freshwater diversions, and altered wetland hydrology (USGS, 2009). Rising sea level mean that mangroves will continue to expand inland and upriver where there are no barriers (e.g., berms or seawalls). Where there are barriers in place, migration will be restricted and habitat loss will increase. As mangroves out compete salt marshes, vegetation and species unique to salt marshes will continue to decline.

Similar predictions are made by the Sea Level Affecting Marshes Model (SLAMM), which simulates the dominant processes involved in wetland conversions and shoreline modifications during long-term sea level rise. The SLAMM 4.1 model shows that tidal flats around Tampa Bay are predicted to nearly disappear by the year 2100. The barrier islands around Tampa Bay – which include Egmont Key and Cockroach Bay in Hillsborough County – are also predicted to experience a loss of 10% to 16% of dry lands for the site. Some cypress swamp saturation is also predicted to occur. Under the SLAMM model, mangroves are predicted to roughly double or triple at the site, depending on which sea level rise scenario is evaluated.

Sea level rise will also increase the salinity levels of inland rivers and groundwater tables, changing fundamental characteristics of entire ecosystems throughout the County and the habitat it supports. Vegetation and threatened and endangered species relying on the delicate balance of salt and freshwater will be at highest risk.

### *Lightning and Wind*

Urban forests and forest-dominated parklands are vulnerable to storm damage resulting from wind, lightning strike, or saltwater exposure. Trees that may require years to mature can be devastated in minutes by defoliation, uprooting, splitting, or toppling. Tree damage also threatens the safety of people and property. There is no county-wide inventory of trees; however, the City of Tampa performed an Urban Ecological Assessment in 2007, which values the compensatory value of Tampa's urban forest and replacement value in the event of a major disaster at nearly \$1.5 billion.

Both lightning strikes and wind damage can also increase wildfire threat. Ecosystems in Hillsborough County that are most vulnerable to wildfire threat due to their fuel types are the Pine Flatwood, High Pine/Sandhill, and Swamp. Pine Flatwood has a high wildfire hazard rating; High Pine/Sandhill and Swamp ecosystems have a moderate wildfire hazard rating (Hillsborough County Local Mitigation Strategy, 2004). Vegetative debris from devastating storms contributes to the risk of wildfire by increasing fuel loads.

Wildfire risk also increases due to the increased potential for fires caused by disaster debris burning.

### *Oil and Hazardous Materials Spills*

There are two major seaport facilities in or near Hillsborough County: the Port of Tampa and Port Manatee. The Port of Tampa is the largest seaport in Florida, handling approximately 50 million tons of cargo annually. About half of the port facilities are owned and operated by the Tampa Port Authority; the other half are held by private companies. Port Manatee is also one of Florida's largest ports and it is the closest U.S. deepwater seaport to the Panama Canal.

These ports handle petroleum products and hazardous commodities, and are therefore the largest potential areas for oil and/or a hazardous materials spill in and around the Tampa Bay Region. Potential contaminants include ammonium nitrate, liquefied petroleum gas, jet fuel, ethanol, and anhydrous ammonia. Hillsborough County also holds some of the richest phosphate deposits in the world; major cargos frequently carry nutrient-rich fertilizer loads as well as perform onshore processing.

Spills, leaks, discharges, and/or releases of these materials can occur accidentally or during a high wind or storm surge event, resulting in contamination of surrounding wetlands, species, and shorelines. Contamination of inland ecosystems could also occur as contaminants travel through waterways and affect groundwater tables and wells. Potential sources include oil spills and petrochemical leaks, submerged vehicles draining gasoline into flooded areas, overwhelmed landfills leaching contaminants into the ground, or wastewater treatment facilities and other pumping systems backing up. Other sources of chemical contamination could occur on agricultural areas from large-scale fertilizer spills, affecting inland ecosystems and waterways.

Oil and hazardous materials will affect the environment in different ways, and will vary greatly in their impact depending on the extent of the spill. The spill, release, or discharge of hazardous materials is unique compared to an oil spill in that hazardous materials have a greater potential to impact human health. Hazardous substance spills can pose an immediate danger to humans when discharged in even the smallest quantities (U.S. Coast Guard [USCG], 2009).

In general, oil spills are of great concern due to their potential to cause long-term damage to the environment. Oil spills do not routinely pose an immediate threat to human life. The most sensitive ecosystems to oil spill impacts are marshes/mangroves – also the dominant feature of Tampa Bay's intertidal landscape (USCG Region IV Response Team, 2009). This makes the tidal wetlands particularly vulnerable to oil spills caused during storm surges or other damaging effects of a hurricane. Diving sea birds and fish species living in bays, estuaries, and other shallow environments are also at particular risk to oil spills.

Accidental intrusion of phosphates into the bay from spills or storms can result in high nitrogen levels, also disrupting ecosystem balance. For example, in a two-year period in the late 1990s when El Nino rains caused a dramatic upswing in bay nitrogen loadings from runoff, almost 2,000 acres of seagrass were lost baywide (Tampa Bay Estuary Program, 2006).

The quantity and variety of potential contaminants in Tampa Bay make this region uniquely vulnerable to the threat of a ‘toxic soup’ in the event that high winds or storm surge damages port facilities and vessels containing hazardous materials and cargo. The mixing of contaminants to create a ‘toxic soup’ of environmental pollution results in impacts which are not as well understood but threaten both the environment and public health. A ‘toxic soup’ poses a risk to residents, disaster crews, and the environment, and requires a level of cleanup and restoration relying on a high-level of specialized expertise and long-term monitoring.

Environmental damages from oil or hazardous spills will have larger ramifications for the County. Losses in facilities, fisheries, and tourism due to closures, even if temporary, will greatly impact the region’s economy. Chemical contamination in the port will also have an impact on critical facilities, housing, land uses, and the residents and businesses that are located in or depend on the services in these areas. These issues are discussed in other sections of the PDRP, as appropriate, as well as in the County’s Comprehensive Emergency Management Plan (CEMP) and Local Mitigation Strategy (LMS).

### 8.3 INSTITUTIONAL CAPACITY

An institutional capacity assessment was undertaken for each topic area of the PDRP by surveying the members of each technical advisory committee. The purpose of conducting these assessments was to document what is already in place to contribute to disaster recovery, determine the ability of Hillsborough County to implement this plan, and identify potential opportunities for establishing or enhancing specific redevelopment policies, programs, or projects. The following capacity discussion is specific to environmental restoration in Hillsborough County.

#### **Existing Capacity**

Due to the broad and comprehensive nature of post-disaster redevelopment, there are often many disparate resources that may provide a portion of the capacity needed for pre- or post-disaster implementation of the PDRP. In an effort to provide a list of resources that can be considered for use after a disaster, resources are divided into primary and secondary levels with secondary resources being less directly related to environmental restoration or less likely to be available.

#### *Organizations*

The organizations listed in **Table 8.1** are those that would be important to have represented on the Environmental Restoration TAC after a disaster as they are either critical for rapid post-disaster decision-making or may play a role in implementation. This list, however, is neither exhaustive nor is the participation of these organizations in the planning/implementation process mandatory. Additional stakeholders not listed in the table below attended TAC meetings during the PDRP planning process and, at the discretion of the TAC Chairs, these and other organizations can be invited to participate in the future.

**Table 8.1 Environmental Restoration Agencies and Organizations**

<b>Organization</b>	<b>Role or Expertise</b>
Army Corps of Engineers (ACOE) South Atlantic Division, Jacksonville District	Provide flood control and water management, navigation, shore protection and restoration, environmental restoration, hazardous, toxic and radioactive remediation, and emergency support
City of Tampa Parks and Recreation Department	Provide city conservation and park management expertise
City of Tampa Stormwater Department	Provide city stormwater infrastructure, flood mitigation, pollution control and water quality expertise
City of Temple Terrace Code Enforcement	Enforce city environmental codes
City of Temple Terrace Public Works Department	Ensure regulatory compliance, manage stormwater, water, and wastewater systems
Environmental Protection Commission (EPC) of Hillsborough County	Oversee environmental protection, permitting, remediation, and advocacy
Environmental Protection Agency (EPA) Region 4: Southeast	Provide permitting, enforcement and compliance assistance, environmental studies, research, and grant assistance
Florida Fish and Wildlife Conservation Commission (FWC)	Provide environmental protection/restoration on natural habitats
Florida Department of Environmental Protection (FDEP)	Restore and protect air, land, and water quality
Florida Division of Forestry	Provide wildfire mitigation, conservation, forestry expertise
Hillsborough County City-County Planning Commission	Provide environmental planning expertise across jurisdictions
Hillsborough County Department of Public Works - Engineering Division	Provide stormwater management requirements for unincorporated Hillsborough County
Hillsborough County Emergency Management Department	Provide hazard mitigation, emergency management, and recovery services
Hillsborough County Health Department - Environmental Health Services	Provide health, exposure, environmental data, and information to communities
Hillsborough County Parks, Recreation, and Conservation Department	Manage environmentally sensitive lands, including wildlife habitat and corridors
Hillsborough County Planning and Growth Management Department	Ensure hazard mitigation through environmental protection, planning, and coordinated growth management
Hillsborough County Solid Waste Management Department	Management of landfill, debris disposal, and related environmental services
National Oceanic and Atmospheric Administration (NOAA) Scientific Support Team	Protect coastal and marine resources, mitigate threats, reduce harm, and restore ecological function
Plant City Public Works Department	Ensure regulatory compliance, manage stormwater, water, and wastewater systems
Port Manatee	Oversee maritime commerce and marine infrastructure development, handle hazardous materials and petroleum products
Southwest Florida Water Management District (SWFWMD)	Ensure environmental protection and water conservation
Tampa Bay Estuary Program	Build partnerships, ensure environmental advocacy and protection
Tampa Bay Local Emergency Planning Committee (LEPC)	Support for public and emergency responders to address issues related to hazardous materials and public safety
Tampa Bay Water	Develop and deliver regional water supply
Tampa Port Authority	Oversee maritime commerce and marine infrastructure development for Tampa Bay and regional economies; handle hazardous materials and petroleum products
TECO Energy (Tampa Electric Company and Peoples Gas)	Responsible for the repair and mitigation of energy and gas infrastructure; restoration of electric and gas service to residents
U.S. Coast Guard, Sector St. Petersburg	Provide marine pollution and hazardous materials response

Organization	Role or Expertise
United States Geological Survey (USGS)	Provide scientific research and assistance to resource managers to address/resolve environmental problems and/or resource conflicts
University of Florida – Florida Cooperative Fish and Wildlife Research Unit	Provide research and training on wetlands; coordinates with other research and government agencies
United States Fish and Wildlife Service (USFWS)	Provide environmental protection/restoration on natural habitats

### *Coordination Capacity*

Identifying existing networks and means of communication between relevant organizations is an important component of understanding the capacity for implementing the PDRP. **Section 2** of this plan documents the committee organizational structure that organizations will follow in implementing this plan. Existing networks and communication methods between organizations, if they exist, are useful in understanding to further facilitate communications and implementation.

### Emergency Support Functions

Hillsborough County has an Emergency Support Function (ESF) structure to align County response and recovery activities with those of the State. The following ESFs are relevant to the Environmental Restoration TAC during short-term recovery:

**ESF 3: Public Works and Engineering** – The purpose of this ESF is to provide public works and engineering support necessary to restore the community's infrastructure, including the areas of debris clearance and disposal, temporary construction of emergency access routes, restoration of critical public services, restoration of water and waste water systems, construction management and inspection, and emergency demolition or stabilization of damaged structures. The primary responsibility for coordinating public works and engineering activities rests with the Public Works Department. Supporting agencies include the Environmental Protection Commission, Facilities Management Division, Fleet Management, Health Department, Code Enforcement Department, Parks, Recreation and Conservation, Planning and Growth Management Department, Real Estate Department, Sheriff's Office, Solid Waste Management Department, Tampa Electric Company, Verizon, and Water Resource Services. Florida Department of Transportation (FDOT), District 7 may provide support as resources allow (Hillsborough County Emergency Planning Operations, 2006).

**ESF 10: Hazardous Materials** – This ESF responds to an actual or potential release of hazardous materials. The primary responsibility for coordinating hazardous materials during a county-declared state of emergency rests with Hillsborough County Fire Rescue. The municipal fire/fire rescue departments have the lead response role within their applicable jurisdictions during such circumstances. Other agencies with supporting roles include Sheriff's Office, municipal police departments, and the State Health Department (Hillsborough County Emergency Planning Operations, 2006).

Tampa Bay Local Emergency Planning Committee

Tampa Bay Local Emergency Planning Committee (LEPC) was created in 1988 to help the public and emergency responders address issues related to hazardous materials public safety issues. The committee is focused on planning, regional coordination, education, and awareness. The LEPC members are appointed by the State Emergency Response Commission for Hazardous Materials (SERC) and are charged with facilitating regional hazardous materials emergency response and compliance with hazardous materials reporting law. The LEPC works with the USCG, Sector St. Petersburg, in regards to spill contingency planning.

*Plans, Programs, and Procedures*

**Tables 8.2 and 8.3** provide a listing of local plans/ordinances, programs, and/or procedures that are relevant to environmental restoration during long-term recovery<sup>1</sup>. These tables serve as an inventory of the relevant plans, programs, and procedures for staff and TAC members to reference post-disaster as potential methods of implementation. Staff and financial capacity may be tied to plans and programs, so these can also be viewed as potential local fiscal resources.

**Table 8.2 Environmental Restoration Primary Plans, Programs, and Procedures**

<b>Plan / Program / Procedure</b>	<b>Purpose</b>	<b>Lead Entity</b>
Brownfields Community Redevelopment Program	Provide assistance and incentives to public and private property owners and businesses to facilitate the owner's environmental cleanup and reuse of contaminated urban property as part of the County's redevelopment and growth management strategy	Hillsborough County Planning and Growth Management Department
Comprehensive Plans – Hillsborough County, City of Tampa, City of Temple Terrace, City of Plant City	Environmental Element and Coastal Management Element identify resources and assets and provide guidance on future preservation, protection, and restoration	Hillsborough County City-County Planning Commission
Environmental Land Acquisition and Protection Program (ELAPP)	Preservation of environmentally sensitive lands	Hillsborough County Parks, Recreation, and Conservation Department
Hazardous Material Incident Cost Recovery Ordinance	Provide for unbudgeted costs with regards to hazard material clean-up following a disaster	Hillsborough County Code Enforcement
Hillsborough County Local Mitigation Strategy (LMS)	Identify potential hazards to Hillsborough County and cities of Tampa, Temple Terrace, and Plant City and possible mitigation actions	Hillsborough County LMS Working Group
Pollution Recovery Fund	Used for projects that will help restore polluted areas of the County, mitigate the effects of pollution, or otherwise enhance pollution control activities	Environmental Protection Commission of Hillsborough County
Comprehensive Conservation and Management Plan – Charting the Course	Tampa Bay Estuary Program's management blueprint for Tampa Bay; details progress in restoring and	Tampa Bay Estuary Program

<sup>1</sup> The programs listed were functional at the time that this plan was drafted. Future PDRP updates will include revising these tables to adjust for programmatic changes.

<b>Plan / Program / Procedure</b>	<b>Purpose</b>	<b>Lead Entity</b>
Brownfields Community Redevelopment Program	Provide assistance and incentives to public and private property owners and businesses to facilitate the owner's environmental cleanup and reuse of contaminated urban property as part of the County's redevelopment and growth management strategy	Hillsborough County Planning and Growth Management Department
Comprehensive Plans – Hillsborough County, City of Tampa, City of Temple Terrace, City of Plant City	Environmental Element and Coastal Management Element identify resources and assets and provide guidance on future preservation, protection, and restoration	Hillsborough County City-County Planning Commission
Environmental Land Acquisition and Protection Program (ELAPP)	Preservation of environmentally sensitive lands	Hillsborough County Parks, Recreation, and Conservation Department
Hazardous Material Incident Cost Recovery Ordinance	Provide for unbudgeted costs with regards to hazard material clean-up following a disaster	Hillsborough County Code Enforcement
Hillsborough County Local Mitigation Strategy (LMS)	Identify potential hazards to Hillsborough County and cities of Tampa, Temple Terrace, and Plant City and possible mitigation actions	Hillsborough County LMS Working Group
Pollution Recovery Fund	Used for projects that will help restore polluted areas of the County, mitigate the effects of pollution, or otherwise enhance pollution control activities	Environmental Protection Commission of Hillsborough County
	protecting Tampa Bay and advances strategies for continuing improvements in the future	
U.S. Coast Guard Area Contingency Plan	Addresses western central Florida oil and hazardous substances pollution	U.S. Coast Guard (USCG) Region IV Coastal Zone: Sector St. Petersburg

**Table 8.3 Environmental Restoration Secondary Plans, Programs, and Procedures**

<b>Plan / Program / Procedure</b>	<b>Purpose</b>	<b>Lead Entity</b>
Habitat Restoration Master Plan	Restore historic balance of coastal wetland habitats and preserve the bay's march and mangrove habitat	Tampa Bay Estuary Program
Hillsborough County Disaster Debris Management Plan	Addresses disaster debris removal on essential transportation routes and for coordinating the permanent removal and disposal of all debris from public property and rights-of-way within unincorporated Hillsborough County	Hillsborough County Public Works Department
Hillsborough County Disaster Temporary Housing Plan	Temporary housing and siting criteria	Disaster Temporary Housing Committee
Sediment Management Program	Assists citizens in restoring water bodies damaged by the accumulation of sediment (program is under development)	Hillsborough County Department of Public Works - Engineering Division
Seagrass Management Action Plan	Baywide seagrass protection and management strategies	Environmental Protection Commission of Hillsborough County
South Florida Information Access Website	Provides scientific information access in support of research, decision-making, and resource management for the South Florida ecosystem restoration effort	Sponsored by the USGS Priority Ecosystems Science Initiative

Plan / Program / Procedure	Purpose	Lead Entity
Technical Report Buffers and Setbacks for Wetlands and Water	Ecological buffer usage for watersheds and wetlands	Environmental Protection Commission of Hillsborough County
Regional Contingency Plan	Models after the National Contingency Plan (NCP) to add information specific to region	USCG, Sector St. Petersburg Regional Response Team
Industry Response Plans – Vessel Response Plans and Facility Response Plans	Detail pollution response action plans for the specific vessel or facility handling oil as a cargo in sufficient quantity	Submitted to the USCG or Environmental Protection Agency for review and approval

### Recommendations for Expanding Capacity

In order to expand capacity in Hillsborough County, efforts to increase coordination procedures for responding to long-term contamination concerns after a disaster are necessary. Various federal and state statutes require facilities and vessels to develop emergency response plans to deal with their operations as well as potential off-site impacts. Few of these plans, however, outline tactical strategies to be followed during a hazardous materials response (USCG, Sector St. Petersburg: Area Contingency Plan, 2009 Revision). The number of potential chemicals and environmental situations that may be involved requires the establishment of more detailed action plans with input from appropriate local, regional, and state organizations as listed in **Table 8.1**. There is a current effort underway to address contamination issues in terms of identifying potential chemical contaminants and determine how Environmental Protection Agency (EPA) standards apply to clean up in the bay. This committee includes representatives from the USCG, EPA, and state and local government agencies. Much more work is necessary; however, this committee could provide valuable support to future actions regarding long-term post-disaster environmental restoration following chemical contamination in the bay.

The County and all three municipalities are signatories to the Statewide Mutual Aid Agreement (Hillsborough County Emergency Planning Operations, 2006). If resources within the County are insufficient for disaster response and recovery operations, mutual aid will be requested from the State Emergency Operations Center (EOC), or other local jurisdictions in the state. It should also be determined whether mutual aid agreements with other counties' departments are in place to support specific recovery operations. For example, parks and recreation staff and/or state forestry or parks staff could be useful in habitat restoration, urban forestry damage assessments, and determining needs for grant applications for recovery of impacted preservations.

## 8.4 ISSUES

The prioritized issues listed below are the most significant post-disaster redevelopment issues relevant to environmental restoration in Hillsborough County as determined by the Environmental Restoration TAC. Following each issue is a summary of the recommended strategy for implementation. Specific actions that correspond with each issue strategy are listed in **Appendices D** and **E** with pertinent information such as timeframe and responsibilities for implementation. Full details on the actions are found on the Environmental Restoration Action Forms, which can be obtained through the Hillsborough County PDRP web site ([www.hillsboroughcounty.org/pgm/pdrp](http://www.hillsboroughcounty.org/pgm/pdrp)).

## Issue #1: Hazardous materials, debris contaminants

A major storm can cause severe pollution by compromising hazardous materials storage facilities and through the scattering of contaminated debris by wind or floodwaters. In addition, debris and waste byproducts can potentially lead to a “toxic soup,” which poses a major threat to the community. Hillsborough County is particularly vulnerable to widespread contamination due to the presence and location of the Port of Tampa and Port Manatee. Contamination can lead to the degradation of water features, wetlands, and habitats as well as pose a significant public health threat.

### *Current Policy and Procedures*

Emergency management plans have been developed on the federal, regional, and local levels to address oil and hazardous materials spills. County level emergency response to hazardous materials is discussed in Annex J, Hazardous Materials, of the Hillsborough County CEMP. Of the four jurisdictions in the County, two operate a hazardous materials incident response team (HMRT). One team is operated by Tampa Fire Rescue and the other is operated by Hillsborough County Fire Rescue (Hillsborough County Emergency Planning Operations, 2006). The County LMS also discusses the County’s vulnerability to hazards, including technological hazards (e.g., Hazardous Materials Transportation, Hazardous Materials Fixed Facility), and current mitigation efforts being undertaken to reduce vulnerability.

The USCG’s Area Contingency Plan (ACP), prepared by the USCG Sector St. Petersburg Area Committee (AC), addresses hazardous materials incidents for the Tampa Bay region. The ACP is developed to be implemented in conjunction with the National Contingency Plan (NCP) and the Regional Contingency Plan (RCP) to address removal of oil and hazardous substances in Southwest Florida. The ACP defines roles, responsibilities, resources, and procedures necessary to respond to a myriad of spill response evolutions. The ACP was first completed in 1993; formal updates are required every five years, although revisions to individual sections occur more frequently as new information becomes available.

In 2001, the ACP became available in electronic format, including a geographic information system (GIS). The digital version allows spill planners to view maps online depicting sensitive ecological resources, public beaches and populations – or create custom maps to see what types of plants and animals might be affected by a potential spill. It also includes the Florida Marine Spill Analysis System (FMSAS) tool, which allows users to coordinate spill planning activities and manage response and mitigation efforts during an actual spill. FMSAS uses layers of geographic data, imagery, and specialized tools to provide spatial analysis that can be distributed quickly as maps, tables, and charts, enabling decision-makers to direct containment and cleanup operations and minimize ecological and economic loss.

The USCG Sector St. Petersburg in conjunction with the U.S. Fish and Wildlife Conservation Commission has produced a number of area response plan maps, see **Figure 8.1**. Each detailed map has a corresponding oil spill sensitive area report. These reports provide specific map and contact information, resources at risk (e.g., threatened species, habitat, and wildlife to be protected), response considerations (e.g., access and staging areas), and protection strategies. Other resources developed by the

USCG Sector St. Petersburg include the Environmental Sensitivity Index Atlas and the Tidal Inlet Protection Strategies.

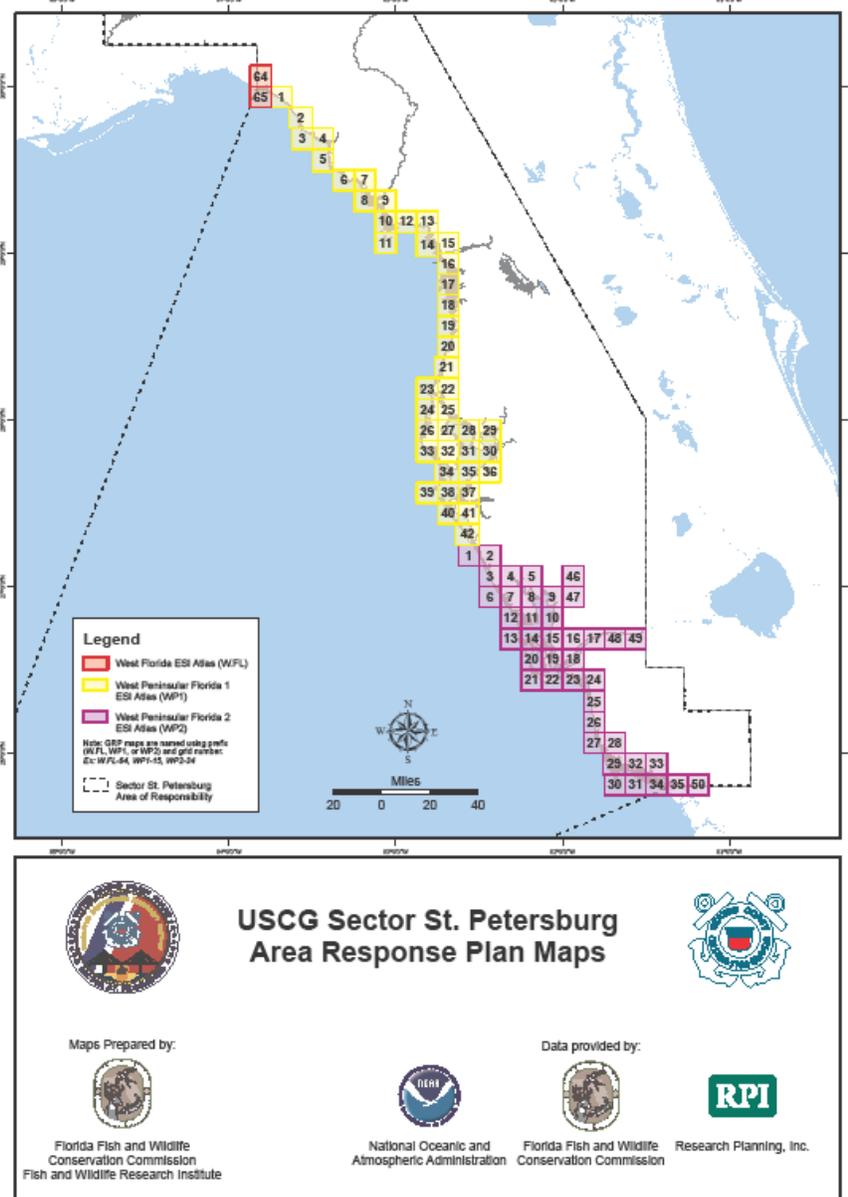


Figure 8.1 Sector St. Petersburg U.S. Coast Guard Area Response Plan Map

*Strategy*

As discussed above, a number of agencies have developed response protocols in the event of oil and/or hazardous materials spills. The USCG ACP, the County CEMP, and the County LMS provide valuable information on the vulnerability of coastal and inland environments to port contamination, response plans, and mitigation efforts. For instance, the USCG’s ACP Section 7000 Hazardous Materials identifies current

procedures, initial response actions, contact information, as well as recommendations to increase the effectiveness of planning and response. A better understanding of each these documents is a necessary starting point to inform additional pre- and post-disaster actions. A more in-depth analysis will help determine how much is known regarding the potential degree of harm to the environment; where chemicals could travel after a storm, including inland areas; and the availability of resources and tools (e.g., maps and databases) for future decisions.

Analysis of these documents would also create a better understanding of local, state, and federal agency roles and responsibilities regarding post-disaster contamination response and cleanup. The USCG has primary responsibility over discharges and releases in navigable waters from vessels and waterfront facilities. EPA has primary responsibility for discharges and releases that occur on land. These federal agencies, however, interact with state and local government agencies depending on the extent of contamination. It would be helpful to create a chart or table to show potential contamination (i.e., types, sources, and locations) linked to agency responsibilities, including environmental groups who been involved with restoration efforts which may be affected by potential contamination.

In addition, understanding where and how debris contaminants or other pollutants could enter surface and groundwater enables decision-makers to anticipate and prioritize cleanup efforts. Familiarization with response clean up options ensures short-term emergency management response actions are compatible with regional environmental restoration goals. For example, shoreline cleanup methods for oil spills can be intensive activities that adversely affect sensitive environments (e.g., wetlands, tidal flats, etc.). One method, natural recovery, can be the least harmful way of removing oil but generally takes much longer than methods involving intense human intervention (EPA, 2009). Pre-disaster coordination between environmental protection or conservation agencies (e.g., Environmental Protection Commission [EPC], Hillsborough County Parks, Recreation, and Conservation Department) with emergency managers can prioritize which cleanup methods are most desirable in a post-disaster situation.

Large-scale contamination is likely to be trans-boundary, and should therefore involve bordering counties to create inter-county collaborative mechanisms within the Tampa-St. Petersburg-Clearwater Metropolitan Statistical Area (MSA). Current coordination efforts underway, such as those discussed in the previous sections, should be followed as plans are updated and contamination standards are reviewed. The USCG Sector St. Petersburg and other agencies could provide support for those contamination issues affecting post-disaster decisions related to environmental restoration.

### Facilities Relocation

There are several facilities in Hillsborough County that could potentially pollute the environment during or after a major storm. For example, a coastal storm could cause a wastewater treatment plant to flood and spill raw sewage in the port, contaminating other facilities and the environment. If damage occurs to such facilities, long-term redevelopment decisions could reflect rebuilding in other areas with a lower risk to environmentally-sensitive areas. The County's CEMP and LMS discuss vulnerable locations; the relocation of County facilities to less vulnerable locations is also discussed in **Section 3**. The Hillsborough County Planning and Growth Management Department

and County and City Public Works Departments will be key agencies in discussions involving the potential relocation of facilities.

### Disposal

Hazardous waste cannot be disposed of on or in the ground, or in local landfills, septic tanks, or injection wells (USCG: Area Contingency Plan, 2009 Revision). The generator of hazardous waste is responsible for the waste; in the case of large-scale contamination from a storm it may be extremely difficult to determine who is responsible for cleanup and disposal. A lead agency, such as the EPC or Florida Department of Environmental Protection (FDEP), should be identified to further discuss the potential ramifications of this issue.

Ultimate disposal of hazardous waste may be made only at a permitted Resource Conservation & Recovery Act (RCRA) facility and there are none in the State of Florida (USCG: Area Contingency Plan, 2009 Revision). A licensed hazardous waste disposal contractor must be used to transport the material to an approved facility. Within the Tampa Bay Area, there are Household Hazardous Waste Collection Centers that may be used to deposit small amounts of hazardous materials, and the County takes responsibility for ultimate disposal of these substances. Contact information is provided in the USCG's ACP Section 7350 Disposal (2009 Revision). Identification of licensed contractors should be done in the pre-disaster period to expedite the process later.

Residents may also need to dispose of damaged household waste and debris contaminants, including appliances and electronics. The FDEP and EPC of Hillsborough County could work with the USEPA to establish a pre-approved method for recycling waste. For example, following Hurricane Katrina, EPA coordinated recycling efforts for damaged refrigerators and other appliances (referred to as "white goods") to remove chlorofluorocarbons and other refrigerants harmful to the environment from 380,000 abandoned refrigerators, freezers, and air conditioners. In addition, EPA helped collect and recycle over 660,000 units of electronic waste and removed and safely disposed of almost 5 million household hazardous waste containers, such as paint cans and propane tanks (U.S. Government Accountability Office, 2008). In the wake of a disaster where debris contaminants are known to be present, or suspected, cleanup and recycling programs involving volunteers will require special training.

### Monitoring

Monitoring and review will play a critical role in ensuring environmental safety and easing public anxiety. A post-disaster monitoring program ensures air and water quality standards are maintained – for example, installing outdoor air monitors to conduct emissions monitoring at demolition sites and in neighborhoods with substantial demolition and renovation activities. Potential contamination of the shallow aquifer system- underlying Hillsborough County, a major source of the County's drinking water, will also require long-term monitoring following any potential chemical contamination. Safe reentry for residents is discussed in Issue #7.

## **Issue #2: Environmental review of temporary sites**

After a disaster, sites are often needed for temporary housing, business, and debris storage as well as other recovery staging activities. These temporary uses will leave

varying degrees of impacts on the sites. For instance, temporary housing sites will need water, sewer, and power facility hookups if they are not already there. Additionally, temporary housing units, such as trailers, require adequate time to off-gas formaldehyde and other chemicals. Environmental professionals will be needed to ensure that these sites are safe for residents displaced during a disaster.

Debris management sites can require clearing an area for temporary storage of debris during transport or processing. Depending on the type of debris being handled at a particular site, there could be issues of soil contamination. Often, many of the sites available for temporary use after a disaster are vacant public landholdings or recreational properties. Through advanced planning, the long-term environmental impacts of these temporary sites may be managed and the negative impacts minimized.

### *Current Policy and Procedures*

The EPC of Hillsborough County coordinates with the Solid Waste Management Department on debris disposal sites for the County in the post-disaster period. Detailed debris management operations are contained in the Solid Waste Management Department Emergency Plan and the County Public Works Disaster Preparedness Plan. Local city governments are responsible for planning and conducting debris removal and disposal operations for their respective cities after a disaster. Their efforts are coordinated with County Public Works and Solid Waste Management Departments. Necessary environmental permits and clearances are requested through the EPC.

Staging areas must be approved by the FDEP in order for the owner/operator of the staging area to receive Public Assistance funds from the Federal Emergency Management Agency (FEMA). Field authorizations for staging areas by the FDEP may be issued prior to or following a site inspection by Department personnel for staging areas to be used for temporary storage and processing of hurricane-generated debris. Field authorizations for debris staging areas may only be issued by the FDEP subsequent to an Executive Order by the Governor declaring a state of emergency or an Emergency Final Order by the Secretary of the Department authorizing debris staging areas (FDEP, 2005).

The FDEP has developed guidance for the establishment, operation, and closure of staging areas for hurricane-generated debris. Only construction and demolition debris, land clearing debris, yard trash, vegetative waste, or Class III waste may be stored at designated staging areas. Before any temporary staging area can be closed, the FDEP may require at least one soil sample and one groundwater monitoring well sample if areas show significant visible staining or are believed to be impacted by staged waste or ash. Unless otherwise approved by the FDEP, these samples are typically analyzed for total Resources Conservation and Recovery Act (RCRA) metals and volatile organic compounds by using approved EPA methods.<sup>1</sup> The FDEP may require other environmental sampling approaches at staging areas on a case-by-case basis (FDEP, 2005).

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<sup>1</sup> The Resources Conservation and Recovery Act (RCRA) is administered through the EPA and regulates the identification, transportation, storage, and disposal of solid and hazardous wastes. This includes the regulation of municipal solid waste landfill criteria, land disposal restrictions, and treatment, storage, and disposal facilities.

### *Strategy*

Temporary sites need to be evaluated to ensure that they are non-hazardous before their use, and that they are being maintained in an environmentally responsible way. Contaminants found in the environment following the closure of temporary staging sites may affect the future redevelopment of areas or the pace of restoration efforts.

Area response plan maps and the Environmental Sensitivity Index Atlas developed by the USCG Sector St. Petersburg and the FWC Fish and Wildlife Research Institute provide detailed information that could be used for evaluating temporary sites prior to their designation. Although this information has been developed for oil spill responses, information such as sensitive habitat and wildlife locations is applicable to this issue. Other resources to assist in the management and review of temporary sites include the Hillsborough County Disaster Debris Management Plan and the Disaster Temporary Housing Plan.

### Environmental Testing

As the County identifies potential temporary site designation for temporary housing, business, or other uses that place humans or other restoration efforts at greater risk, it should coordinate with FDEP and EPA to conduct testing to determine the presence of chemicals of potential concern. Sampling in the pre-disaster phase will establish baseline data to be used for comparison with a) soil results to ensure that a site has not been contaminated before a temporary site is officially designated in the post-disaster period, and b) cleanup results following the closure of a temporary site to ensure it is brought back to its original standard. The information will better prepare the County for assuring citizens and interest groups of any potential post-disaster contamination issues before designating temporary sites.

### **Issue #3: Waterway debris removal, pollution**

Following a storm, water pollution could be a large-scale problem affecting human health, threatening animal and plant species, and hindering the ability of the tourism industry to rebound. Removal of waterway debris is important for navigation and will require different expertise than normal land debris removal operations.

### *Current Policy and Procedures*

There are a number of agencies that play a role in waterway debris removal. Specifically, FEMA and the Army Corps of Engineers (ACOE) oversee and monitor removal operations during natural disasters. The actual removal, storage, and disposal of debris is performed by local governments or by contractors selected by those governmental entities. The ACOE (Mobile District) is responsible for removing debris from federally designated, navigable channels and turning basins in Hillsborough County. The Natural Resources Conservation Service (NRCS) assists in removing debris from creeks, streams, non-federally designated navigable and non-navigable canals. The USCG broadcasts notices to mariners regarding any wrecked vessels obstructing watercourse or creating hazards to navigation within the Intracoastal Waterway and other primary navigable waterways. The FWC oversees lost and abandoned vessels located at or below the high water mark within Florida waters (other

than those on private property). The FDEP approves debris staging areas for temporary storage and processing of hurricane-generated debris (FDEP, 2009).

### *Strategy*

Much of the strategy for Issue #1: *Hazardous materials, debris contaminants* and Issue #2: *Environmental review of temporary sites*, above, also applies to waterway debris removal and pollution. Some aspects, however, require different expertise. For example, the cleanup process of boats washed ashore during a hurricane will require different expertise than land debris removal operations. Pre-disaster actions should include identifying qualified cleanup crews in advance to handle shoreline debris. This will enable FEMA and the NRCS to coordinate with local crews, and expedite the debris removal process and funding. It is also helpful to consider in advance where debris is likely to occur to ensure post-disaster temporary staging areas for debris are located nearby.

An additional reference tool to be used for this issue is the Tampa Bay Water Atlas. This is an online resource developed through the City of Tampa by University of South Florida researchers. It provides citizens, scientists, professionals, and planners with comprehensive and current water quality, hydrologic, and ecological data, as well as information about recreational opportunities and a library of scientific and educational materials on water resource issues. The Tampa Bay Water Atlas includes water quality sampling sites for Hillsborough Bay. This information could be used as a starting point for future 'baseline' information associated with suspected post-disaster contamination and pollution to ensure that cleanup meets previous water quality standards (Tampa Bay Water Atlas, 2009).

### **Issue #4: Wetland restoration**

Tidal wetlands make up a significant portion of Tampa Bay and may be heavily impacted from coastal storms. Wave action and erosion of sediment may undermine wetland vegetation and weaken its ability to recover. Wetlands provide many environmental services to bay water quality, act as a buffer for coastal flooding, and provide prime habitat for many important bird and estuarine species. Debris and contamination from coastal storms may degrade this important ecosystem. Accelerated sea level rise will further threaten wetland ecosystems through inundation, increased salinity levels, and increased exposure to storm surge.

### *Current Policy and Procedures*

Significant efforts have already been underway to restore Tampa Bay's wetlands. Beginning three decades ago, an informal coastal management program was initiated by citizen groups. This effort was formalized in 1991 when Tampa Bay National Estuary Program (TBNEP) was established as a partnership with Hillsborough, Manatee, and Pinellas Counties; the cities of Tampa, St. Petersburg, and Clearwater; the Southwest Florida Water Management District; the FDEP; and the USEPA, and led to the completion of the Comprehensive Conservation and Management (CCMP) for Tampa, which addressed the Bay's most pressing environmental problems.

The TBNEP is now known simply as the Tampa Bay Estuary Program (TBEP) and continues to coordinate the overall protection and restoration of the bay with assistance and support from its partners. Regular reports are produced to monitor progress in achieving the goals of the CCMP. In 2006, TBEP released the first revision of Charting the Course (TBEP, 2009). The Plan includes separate action plans on water and sediment quality, bay habitats, fish and wildlife, and spill prevention and response.

Research efforts include the USGS Tampa Bay Study, which provides reports, maps, and other study results used to compile biological and water resource data for the Tampa Bay ecosystem. Decision-makers can use this information for coastal planning and management of the wetland areas within the Tampa Bay ecosystem study area. Detailed models have also been developed for Tampa Bay by using the SLAMM model. SLAMM provides detailed coverage of processes that affect wetland fate under different sea level rise scenarios: inundation, erosion, overwash, and saturation. A publicly available 2006 report (based on a previous SLAMM version) includes a case study of Tampa Bay.

Other reports pertaining to wetlands include County and Local Comprehensive Plan Coastal Management Elements, the Conservation and Aquifer Recharge Elements, and the Sea Level Rise in the Tampa Bay Region, prepared by the Tampa Bay Regional Planning Council (2006). The Comprehensive Plans identify coastal and inland wetlands, and the Sea Level Rise Study discusses predicted wetland loss associated with sea level rise. Additional information on wetlands in Florida is provided online through the FDEP's Florida Wetland Restoration Information Center. This web portal describes current and proposed restoration projects, policies, programs, and tools for restoration guidance of wetlands and their associated uplands.

### *Strategy*

In the aftermath of a storm, restoring wetlands as close as possible to pre-storm conditions will enable the ecosystem to continue providing its essential ecological services. It will also ensure their ability to buffer against future storm impacts and slow the effects of sea level rise on unprotected areas. Current restoration efforts have greatly increased the resiliency of the coastal wetlands to natural and man-made hazards. Storm damages and sea level rise impacts, however, will challenge coastal wetland restoration and conservation efforts, and will require short and long-term support on large-scale wetlands restoration efforts. Inland wetlands will also require restoration efforts to recover from post-disaster flooding or contamination impacts.

FDEP is the primary agency which handles wetlands issues including shoreline alterations, wetland impacts, dredge and fill. Strategies and actions should be coordinated with this agency.

### Erosion Stabilization

Erosion stabilization measures taken now to protect existing wetlands along the coastline will increase the ability of the ecosystem to recover in the event of post-disaster damage. Developing a "Living Shorelines" program or similar shoreline management practice will provide erosion control benefits and maintain coastal processes. Living shoreline treatments reduce sediment and nutrients by stabilizing

shorelines in low and medium wave energy areas and establish vital habitats that help sustain plant communities and fauna. Shoreline treatments use techniques such as marsh plantings, supplementary beach nourishment, and strategically placed structural and organic materials (e.g., plants, stone, and sand fill).

Additional efforts that can be taken to protect wetlands include: establishing set back lines from existing wetlands to ensure new structures are built back from the shore according to the average erosion rate; and, conducting managed retreat of structures threatened by shoreline erosion which have the potential of being threatened and/or impacted in the future. These actions should be coordinated with the County's Planning and Growth Management Department, Parks, Recreation and Conservation Department, and other departments as applicable regarding future land use decisions.

#### Sea Level Rise Impacts on the Coastal Landscape

In order to make long-term coastal development decisions related to sea level rise and existing shorelines, detailed investigations of expected local sea level rise impacts, including expected vegetation losses, are necessary. The current SLAMM could be used as a starting point to determine potential long-term actions, such as the establishment of zones for habitat and critical species to inwardly migrate. The model could also be analyzed in conjunction with an inventory of non-critical infrastructure to designate a long-term removal plan to existing barriers. In the event that infrastructure or barriers are destroyed or severely damaged during a disaster, Hillsborough County's Planning and Growth Management Department could consider a policy which limits rebuilding in areas critical for wetlands migration and/or re-establishment. The Tampa Bay Regional Planning Council's Sea Level Rise Study (2006) also contains protection scenarios and maps which will aid land use and redevelopment decisions pertaining to wetlands.

Another starting point for determining pre- and post-disaster actions is following up on the Coastal Management Element of Hillsborough County's Comprehensive Plan (2008). This Element contains a number of objectives related to sea level rise issues. Research on the current status of these objectives can inform implementation strategies related to wetlands.

Finally, limiting and monitoring other stresses, such as pollution, dredging, and channeling, will increase wetlands' ability to adapt to climate change. Important activities to ensure the resiliency of wetland ecosystems include maintaining hydrology, and protecting wetland biological diversity and existing habitat from further development. This topic requires comprehensive study and a holistic approach to ecosystem management. Mangrove expansion, for instance, has other implications for restoration. Long-term, freshwater wetlands and low-elevation coastal forests will require greater protection as they are squeezed between seaward mangrove expansion and inland urban expansion. Groups already involved with restoration efforts, such as the TBEP, can be resources for discussing wetland restoration to better determine pre- and post-disaster actions which may best ensure long-term sustainability of the wetlands as it relates to climate change threats.

## **Issue #5: Habitat restoration on conservation lands**

The Hillsborough County Comprehensive Plan and other County and city regulations include initiatives to conserve the delicate habitats of numerous endangered and threatened species. Many conservation properties also provide passive recreation and environmental education opportunities for County residents. A natural disaster can devastate these areas, and it may be in the best interests of the public for the agencies managing them to predetermine restoration actions that will be needed to restore or recover from these events.

### *Current Policy and Procedures*

Hillsborough County's Conservation Services Section manages environmentally sensitive wildlife habitat and corridors acquired through the Environmental Lands Acquisition and Protection Program (ELAPP). This program is publically supported and approved by voters. Since 1988 Hillsborough County has purchased over 40,000 acres that are now in public ownership. Management responsibilities include prescribed burning, invasive species control, wildlife inventory, and habitat improvements for endangered and threatened species of plants and animals. The Conservation Services Section also provides administrative operations and guides the land acquisition process which includes site assessments and rankings of publically nominated sites.

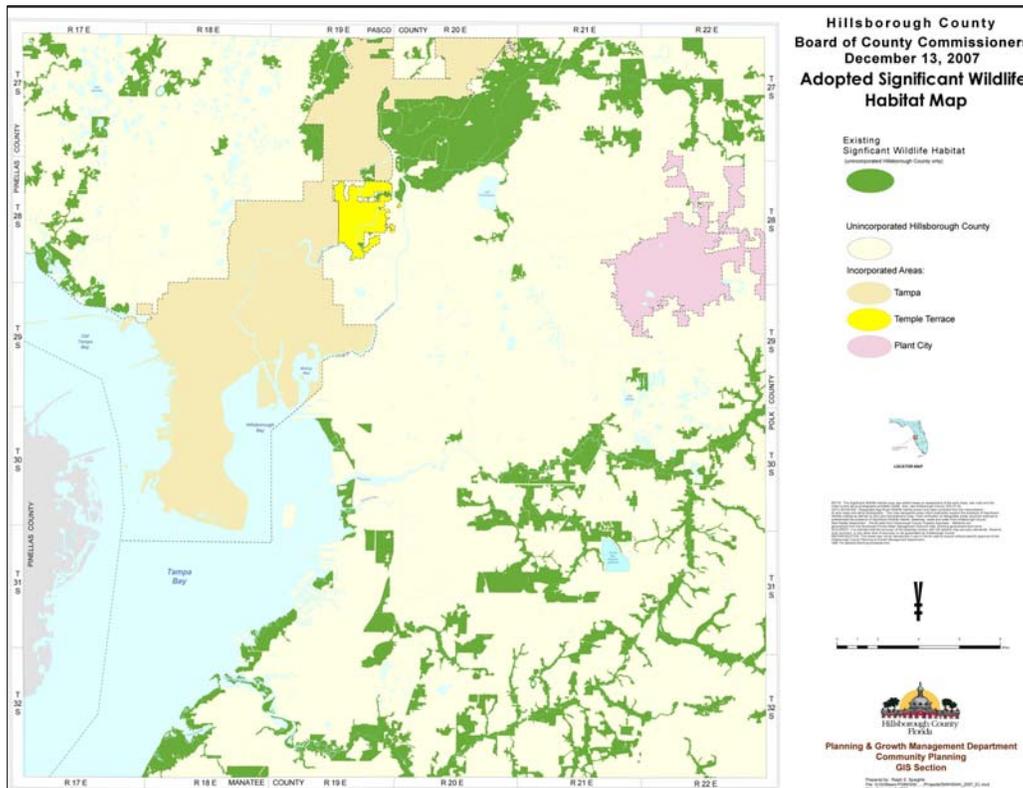
The Tampa Bay Habitat Restoration Master Plan contains actions to guide long-term coastal habitat restoration and protection. This plan was responsible for securing sites for bay habitat protection to be managed or restored as necessary, either through direct purchase or other means such as conservation easements on private property. As a result, 11,494 acres of estuarine habitat was preserved through acquisition of these top-priority sites by TBEP partners between 1996 and 2003.

The TBEP, as highlighted in Issue #4 *Wetland restoration*, includes research and actions related to bay habitat restoration. The most recent action plans were updated in 2006. Another existing resource related to the TBEP is the TBEP 1999 Atlas which was produced by the FWC. The Atlas features maps of the bay showing various layers of information, including seagrass recovery, habitat restoration sites, bathymetry, drainage basins, bird nesting colonies and manatee deaths (USGS: Tampa Bay Study, 1999). Other resources available through the Tampa Bay Water Atlas include the Tampa Bay Habitat Restoration Database, developed to compile and track the thousands of acres of enhanced, established, or protected habitat in the Tampa Bay watershed. The Water Atlas also includes a map of the Hillsborough Bay Watershed which identifies TBEP restoration sites. Although locations are primarily coastal, inland projects are also included.

### *Strategy*

Existing models and reports can be used to anticipate how coastal storms may affect vulnerable ecosystems of Hillsborough County. Vulnerable areas include those areas formally designated for protection, such as the Cockroach Bay Aquatic Preserve, areas with endangered and/or threatened species, and sensitive or critical habitat. Existing resources, as discussed above, such as species inventories compiled by the Conservation Services Section, can be used to identify vulnerable areas. Other

resources include the Conservation and Hillsborough County Coastal Management Preservation Areas as defined in the Conservation and Aquifer Recharge Element (CARE) and the Coastal Management and Port Element (CME). Another visual aid to be used is Hillsborough County's adopted Significant Wildlife Habitat Map (December 2007). **Figure 8.2** represents areas which potentially support the presence of Significant Wildlife Habitat as defined by the land development code. Finally, the Tampa Bay Water Atlas' Tampa Bay Habitat Restoration Database identifies areas in Hillsborough County undergoing current habitat restoration efforts.



**Figure 8.2 Hillsborough County Adopted Significant Wildlife Habitat Map**

New maps may be required to merge existing information, such as the location of the coastal high hazard area with environmentally sensitive areas. Current maps and vulnerability analyses in the LMS focus on the probability of damage to people and property, but there is a gap in available information on how species and habitat may be impacted. Future maps can also designate appropriate locations for new habitat restoration areas based on potential impacts from flooding, storm surge, wildfire, contamination, and other disasters on critical habitat. A list of potential conservation areas could guide future land conservation acquisitions. Actions should also direct short and long-term restoration efforts to priority areas (i.e., those areas labeled as the most sensitive). Field verification of future conservation areas may be required to substantiate the presence of habitat.

Many of the current resources focus on coastal habitats. Developing an inland habitat restoration strategy to match efforts performed in coastal areas, as addressed in the Tampa Bay Habitat Restoration Master Plan, will ensure the future sustainability of

inland areas. Partnerships between both private and public organizations (e.g., Fish and Wildlife Conservation Commission, EPA, EPC, landscape ecologists, and the Tampa Bay Estuary Program) could provide written strategies to advance ecological restoration and encourage strategic land acquisition. Funding sources to consider include state and federal restoration grants, ELAPP lands, and the Parks and Recreation Department.

Any efforts regarding habitat restoration in wetlands should be coordinated with the strategy discussed in Issue #4: *Wetland restoration*, to link efforts which protect, restore, and enhance natural shoreline habitat.

## **Issue #6: Urban forest restoration**

Urban forests are a valuable asset to a community and after a major wind or fire event they could be severely damaged. Air quality, urban heat effects, and simply the aesthetic quality of the urban areas of Hillsborough County would be impacted by a massive loss of mature trees, which serve a wealth of benefits to neighborhoods and communities through the reduction of energy consumption; the removal of pollutants from the air and water; recharge of aquifers; and habitat for the conservation of regional biodiversity. Restoring the urban canopy also will be an important symbol of recovery and return to normalcy for residents and tourists.

### *Current Policy and Procedures*

Current tools include the *Storm Damage Assessment Protocol for Florida Hurricanes*, which is software developed for determining post-storm street tree debris estimates. Another resource is the 2007 Urban Ecological Assessment produced by the City of Tampa. This assessment inventories the number of trees and percentage of canopy cover for the City of Tampa and northern Hillsborough County, and its associated functional values. A summary of the results identify over 21,000 acres of tree canopy that comprised 29% of the City's land area.

### *Strategy*

Treatment, removal, and recovery are important aspects to discuss concerning urban forests. To aid these efforts, the TAC proposed the establishment of a Hurricane Reforestation Task Force (HRTF), to consist of urban foresters, arborists, utility foresters, and Cooperative Extension Service personnel. The HRTF would be the primary group responsible for long-term efforts such as creating a master plan for re-establishment of the urban forest. The HRTF would also lead the development of educational materials and programs to guide communities on the proper post-storm care of damaged trees and shrubs, as well as replanting guidelines.

### Pre-Disaster Inventory, Assessment, and Mitigation

Existing inventories, tools, and resources can be collected in the pre-disaster stage to aid actions required following storm damage. Familiarization with resources will provide baseline information for re-planting plans and enable decision makers to more quickly make damage assessments to increase recovery funds. It can also be used as the basis for a post-disaster urban replanting plan, and support the request for tree care

funding. The County and local jurisdictions may seek to expand the existing tree inventories to better understand those urban tree resources on a larger scale.

Other pre-disaster strategies can be aimed at identifying vulnerable areas of the urban forest. The type of species, planting methods, and maintenance practices can all contribute to trees' ability to withstand damages. Native tree species fare better from hurricane wind conditions than non-native species. Pruning and maintenance methods, such as strengthening wide-spreading tree crowns with flexible cabling, can also reduce damages from wind or lightning. On the other hand, tree topping and other improper pruning results in new limbs that are poorly anchored. Employing a professional arborist to recognize vulnerabilities early can reduce damages later. In addition, educating citizens on species selection, planting methods, and pruning can prevent or mitigate the amount of replanting that may be required following a storm.

#### Post-Disaster Damage Assessment, Cleanup and Removal

During the short-term post-disaster recovery period, activities related to the urban forest will include a damage assessment, immediate treatment, cleanup, and debris removal. Many of these activities will require coordination among a designated urban forestry team, debris removal contractors, and other recovery crews. For example, identifying salvageable trees by professional teams should be performed before or during cleanup to avoid unnecessary removal of trees. In addition, vegetation distress from uprooting, overexposure to saltwater (either through storm surge or from wind-borne salt spray), or other means will require quick treatment to avoid further vegetation losses.

#### Post-Disaster Long-term Canopy Restoration and Maintenance

Long-term redevelopment of the urban forest requires professional care as well as citizen education. Re-planting trees quickly without a broader strategy can result in an even-aged stand of trees which lacks different heights and size.

### **Issue #7: Environmental review of housing sites/neighborhoods**

Before residents return to their neighborhoods and start to rebuild, comprehensive environmental reviews need to be conducted to ensure that property is safe for occupancy.

#### *Current Policy and Procedures*

As stated in Hillsborough County's CEMP, the Emergency Policy Group (EPG) is vested with the authority to allow reentry to evacuated areas of the County and to declare a termination of a state of emergency. In all damaged areas, reentry will not be allowed until the area has been deemed safe. In those damaged areas, the County Administrator will make recommendations to the EPG on when the areas are safe as determined by County and municipal agencies. Teams made up of representatives from the appropriate agencies (i.e., law enforcement, fire, building, utilities, and health) will advise the County Administrator when an area is considered safe for reentry. These teams will be headed by the applicable law enforcement agency (i.e., Sheriff's Office in the unincorporated County and municipal police departments in the cities). Each local jurisdiction (i.e., City of Plant City, City of Tampa, and City of Temple Terrace) will control re-entry into their jurisdiction.

Key federal agencies with responsibilities for supporting and implementing state and local recovery efforts regarding cleanup are FEMA, the EPA, the USCG, and the USACE. Under the Superfund law, EPA conducts short-term cleanups to address immediate threats to communities from actual or potential releases of hazardous substances and conducts or oversees long-term cleanups of the nation's Superfund sites. The EPA is responsible for enforcing federal environmental laws to govern the cleanup process. In the case of extraordinary circumstances, such as Hurricane Katrina, enforcement of environmental laws such as the Clean Air Act emissions standards for asbestos were relaxed to allow for the huge amount of debris generated by government-ordered demolition of homes. These emissions standards generally do not apply to the demolition or renovation of homes by or for individual homeowners.

In the event of asbestos contamination in Hillsborough County, Annex C of the CEMP should be followed. This states that the EPC should be contacted for consultation and guidance regarding federal, state, and local requirements or emergency orders for asbestos abatement prior to demolition.

### *Strategy*

In all likelihood, reentry will be a gradual process depending on the extent of damage in various areas of the County. Safe reentry needs to be coordinated by those agencies that oversee environmental reviews, including the EPC, FDEP, and EPA. These agencies are responsible for ensuring that there is no environmental risk to public health and safety. This strategy will overlap with Issue #1.

### Environmental Review

A study to determine what types of chemical contamination may occur in residential areas, particularly those neighborhoods at highest risk to chemical contamination near existing facilities or the port, will help decision makers discuss options for reentry and redevelopment. This will require an understanding of potential contaminants, their risks to the public, and safe levels which allow residents to return to their homes. The FDEP and EPA have guidelines for acceptable levels of soil sampling results and sampling methods. Under extreme circumstances, such as Hurricane Katrina, guidelines have been altered. Based on lessons learned from that experience, it is therefore important in advance to agree upon (1) what constitutes a contaminated site, (2) what level of contamination would prevent immediate return to neighborhoods and houses, (3) what types of sampling and testing methods should be used that will ensure safety standards are met.

In the aftermath of Katrina, EPA conducted environmental assessments and published results in publicly available environmental summaries. These summaries, however, did not disclose an important EPA assumption—that the results of sediment samples from streets and other outdoor public access areas can be extrapolated to private properties, such as yards and the inside of homes. Environmental contamination levels inside buildings, however, can be significantly higher than and different from the contamination outside, potentially causing more adverse health effects (Government Accountability Office, 2007). Understanding how testing methods will be implemented by other agencies and how these results will be interpreted will be a central issue for the FDEP and EPC of Hillsborough County. In the pre-disaster period, these agencies could also

work with pre-selected vendors (approved to perform environmental inspections) to ensure that methods will be consistent, and explore ways in which post-disaster testing can be expedited to ensure a safe return as soon as possible.

Post-disaster contamination of areas will prevent immediate redevelopment and likely require long-term environmental remediation efforts. Short-term steps can ensure that areas are properly reviewed prior to any redevelopment, potentially saving significant costs later. If during cleanup efforts, chemical levels are found to exceed safety levels, the County's building permitting process can be used to regulate the timeline and amount of construction taking place throughout the County. The Planning and Growth Management Department may prepare a modification to the land development code, Ordinance 93-20, or other code to establish criteria to regulate unincorporated areas affected by chemical contamination following a major disaster. Cities may elect to do a comparable action for their respective incorporated areas. Criteria can include adequate time to assess conditions before future construction is approved. More information on permitting reconstruction can be found in **Section 5**.

Another key policy issue that should be discussed is whether reconstruction should include cleanup of pre-hurricane contamination. For example, many of the soil samples taken following Hurricane Katrina revealed that some isolated contaminant levels were not caused by the storm (Bureau of National Affairs, 2006). Local residents and other groups, however, were demanding that the soil be safe regardless of the cause or who pays. The question that the City of New Orleans faced was whether individuals might be willing to delay their return to their properties, and support governmental decisions about which neighborhoods might be rebuilt, based on the levels of chemicals in the sediment or soil, even if these levels are the same or reduced from the levels that existed prior to Hurricane Katrina.

#### Communicating with the Public

Timeliness of public communication will be key in ensuring successful and safe return. For example, communications about the potential health risks from environmental contamination following Hurricane Katrina were released about 3, 6, and 11 months after the hurricane, limiting their usefulness to residents who would have benefited from more timely information about the environmental health risks they could face when returning home (GAO, 2007). After residents are allowed to return to their homes, they should also be aware of potential environmental safety issues to ensure caution is taken with personal health and safety. Pre-recorded public service announcements, web information, or flyers can be prepared in advance to provide information on topics such as hazardous materials, mold, gas leaks, asbestos, and flood water. Products can be based on existing tools such as those available from EPA. Returning residents should also be educated to look for signs of contamination which may have not existed before (e.g., mold, residual levels of chemicals in floodwater sediment and soil).