



Fisheries are a major component of the Tampa Bay Monitoring Program, which also tracks and analyzes trends in water quality, benthos/sediment quality, seagrass and atmospheric deposition.

Photo courtesy of the Florida Fish and Wildlife Conservation Commission.

# Research and Monitoring

---

## **MONITORING BAY IMPROVEMENT**

Effective monitoring is essential to a successful bay restoration effort because it allows communities to measure return on investment, assess progress and fine-tune priorities. The baywide monitoring program, initiated through a TBEP effort and based on EPA's EMAP statistical design, is implemented by several of the TBEP partners and builds upon existing monitoring data to more clearly assess progress in the bay's recovery. Rather than emphasizing compliance with rigid laboratory standards for water quality, the monitoring program for Tampa Bay seeks to measure instead the

health and diversity of bay habitats and the animals that inhabit them. Elements of the Tampa Bay Monitoring Program include water quality, benthos/sediment quality, fisheries, seagrass, and atmospheric deposition monitoring programs.

The baywide water quality monitoring program is not run by one agency, but is a combined effort of Manatee and Pinellas counties, Hillsborough's Environmental Protection Commission, the City of Tampa, the Florida Department of Environmental Protection, the Fish and Wildlife Research Institute and the Southwest Florida Water Management District.

This cooperative approach coordinated through TBEP has resulted in a much more comprehensive monitoring program than any of the partners would be capable of independently. All partners provide field collection efforts (using standardized techniques and methods), but each partner contributes specialized services and expertise to provide baywide analyses for a specific monitoring element.

Continuous coordination between the various local governments and agencies participating in this combined effort is essential. Coordination of the water quality element is accomplished through the Regional Ambient Monitoring Program (RAMP), which was initiated by TBEP in 1992, but is now coordinated by the local governments that run the monitoring programs. RAMP participants meet quarterly to collect water samples from a common container. Each program has its own laboratory run the samples for a core group of parameters (TN, nitrate+nitrite, ammonia, TSS, TP, orthophosphate, color, turbidity, and chlorophyll *a*), and the RAMP participants compare the results. To date, the RAMP participants have worked out differences between laboratories for several critical parameters (chlorophyll, TN, TP, TSS) and continue to work on others (color, for example).

An important step in the Baywide Environmental Monitoring Program was the agreement in 2001 by one of the partners, Pinellas County's Department of Environmental Management, to take the lead in providing statistical analyses of water quality and benthic data collected baywide using the EMAP-based algorithms currently being finalized for Tampa Bay by EPA's Gulf Breeze Laboratory. This effort completes the elements needed for long-term maintenance of a baywide monitoring plan, and builds upon the protocols developed by the Environmental Protection Commission of Hillsborough County for the benthic sample analyses; Manatee County's Department of Environmental Management for administering RAMP and baywide grain size analyses; the City of Tampa's Bay Study Group for analyses of baywide seagrass transect data; the Southwest Florida Water Management District for aerial photographs and GIS maps of seagrass extent; and the Florida Fish and Wildlife Commission's Fish and Wildlife Research Institute for baywide fisheries monitoring.

This successful coordination effort has recently been joined by monitoring programs in Charlotte, Sarasota, Lee and Polk counties, as well as the U. S. Geological Survey, and has been recognized by the State of Florida as a core group for inclusion in the developing statewide program.

## RESEARCH PRIORITIES FOR TAMPA BAY

Technical advisors to the Tampa Bay Estuary Program have identified several new research projects to be pursued as funding becomes available. These priorities reflect emerging issues and newly identified gaps in information.

### High Priority Projects

The following research needs have been assigned high priority status by TBEP's Technical Advisory Committee. An update on actions taken on these issues also is provided.

- Assess the water quality, sediment quality and habitat of tidal rivers, streams and creeks in Tampa Bay.

**Update:** TBEP and multiple partners have been awarded a PCEF/NFWF grant entitled Tampa Bay Tidal Tributaries Habitat Initiative. Work was initiated in summer 2005. The outcomes of the proposed project will be a concise set of management objectives (e.g., measurable natural resource restoration and protection targets for water and sediment quality, habitat structure, freshwater inflow and/or tidal exchange) and data to address natural resource issues such as the importance and contribution of tidal tributaries to estuarine fish production. The proposed project will provide empirical data to support necessary management actions for certain resources. In particular, data will indicate unique resources represented by tidal tributaries as compared to main-stem rivers or the open estuary (e.g., critical nursery habitat). A draft management plan, including recommended restoration and protection targets, will be developed based upon these data.

- Examine the effects of changes in offshore bars, ship wakes and wave energy on seagrass recovery.

**Update:** TBEP and multiple partners have been awarded several grants to conduct a pilot Longshore Bar Restoration Project, including funds from the Hillsborough County Pollution Recovery Trust Fund to examine wave energy effects; from FDEP to examine historical changes in offshore bars; and from the U.S. Fish and Wildlife Service to support engineering studies. In-kind services will be provided by USGS, the Tampa Port Authority, Mote Marine Lab and Coastal Resources Group, Inc. Work on this large project was initiated in early 2005, and is expected to result in construction of a demonstration longshore bar restoration project by 2008.

- Identify and map the location of historic hard bottom and oyster bar communities.

**Update:** TBEP and USFWS are funding a GIS-based examination of historic and existing oyster bars in Tampa Bay, to be completed by FWRI in 2005. TBEP will be examining how to identify and map deeper-water hard bottom substrate over the following year.

- Evaluate the ecological effects of artificial hard bottom habitat installed in the bay, including reef balls, oyster reefs, and artificial reefs. The potential effect of artificial hard bottom habitats on the spread of invasive species such as the Asian green mussel will be an important aspect of this effort.

**Update:** TBEP has contracted with Delta Seven, Inc. to conduct a pilot program to compare and contrast the faunal inhabitants of artificial reefs to those of natural hard bottom in Tampa Bay. The results from the evaluation will be used to assist in the design of a large-scale project for the restoration of hard bottom habitats. Results of the pilot project are expected in early 2006.

- Determine the important resources affected by changes in freshwater inflow.

**Update:** The Tidal Tributaries Habitat Initiative will include an evaluation of salinity “targets” for small tidal streams communities, including fishes and invertebrates.

- Assess the comparative success and viability of various seagrass restoration or mitigation techniques and scar reduction methods.

**Update:** FWRI has recently completed a four-year evaluation of the effectiveness of various seagrass planting techniques in Tampa Bay (Penny Hall, PI). Initial results indicate that, if environmental conditions are adequate to support seagrass recovery (i.e., adequate light, appropriate sediment conditions, protection from wave energy, etc), most planting techniques can be moderately successful. Costs of the various techniques vary, as does the appropriate scale of the plantings.

Adoption of slow speed zones for manatee protection may also help to reduce scarring of seagrass meadows, but this has not yet been evaluated.

- Mine existing data sources to examine effects of freshwater inflow changes on fisheries and other biological resources. Develop new databases of fisheries information (recruitment, etc.) linked to circulation and freshwater inflow.

**Update:** Ongoing studies funded by SWFWMD to support development of Minimum Flows and Levels for major Tampa Bay tributaries will include evaluations of various freshwater inflow scenarios on fisheries and other biological resources.

- Quantify ungauged streamflow and groundwater flow to Tampa Bay, and develop estimates of surface and groundwater flux to Tampa Bay.

**Update:** USGS is conducting a number of studies on groundwater and streamflow in Tampa Bay, as part of their Tampa Bay Pilot Integrated Science Project.

## Medium Priority

The following research needs have been assigned medium priority status by TBEP's Technical Advisory Committee:

- Assess the effects of intensity of boat use and seagrass scarring on degradation of habitat.
- Collect data and develop information for smaller tributaries in Tampa Bay.
- Provide more emphasis on shallow water monitoring.
- Deploy additional continuous water quality and flow monitors in the Bay, considering new instruments.
- Assess potential effects of Minimum Flows and Levels determinations on existing and potential oligohaline habitat (water column and vegetation).
- Further develop habitat suitability models, and link them to circulation and streamflow.
- Conduct research on the basic ecology of oysters and oyster bars in Tampa Bay.
- Develop and implement a monitoring program to track habitat quantity and quality in coastal marshes and mangrove forests, oligohaline habitats and isolated freshwater wetlands, and associated uplands, including natural, restored or created habitats.
- Evaluate the effects of land use changes on groundwater and surface water flows.
- Conduct research on the basic ecology of freshwater vegetation species in the Tampa Bay watershed.
- Develop better hydrodynamic models for shallow waters.
- Evaluate how productivity of marsh and mangrove systems is related to freshwater inflow.
- Use aerial photographs and imagery for use in evaluating biological changes.
- Coordinate water quality and Submerged Aquatic Vegetation restoration efforts.
- Provide seasonal tracking of natural seagrass beds.
- Collect adequate salinity and current data to support models.
- Identify causes of seagrass recovery slowdown or seagrass loss in “problem

areas” representing at least 10% of a bay segment.

- Initiate and support work to better understand seagrass ecology and biology.
- Identify and quantify how changes in freshwater inflow impact seagrasses and macroalgae.
- Conduct long-term monitoring of restoration, including relevant reference sites and sufficient funding.
- Use experimental transplants of submerged aquatic vegetation in tidal rivers to evaluate effects of freshwater inflow.
- Consider ecological implications of seagrass fragmentation.
- Develop a structured synthesis/storyline of information about Tampa Bay.
- Investigate seagrass “halos” near discharges.
- Identify critical water quality levels for seagrass recolonization and sustainable populations.
- Undertake a comprehensive benthic survey of Tampa Bay in order to map the current (and if possible, historic) distribution of natural hard bottom communities, including oyster reefs and rocky limestone outcroppings.
- Examine the differences, benefits and issues related to natural recovery of seagrasses versus planting efforts.
- Examine food web impacts of introducing artificial hard bottom substrates (i.e., reef balls or other materials) into areas that historically do not have hard substrates.
- Coordinate data collection efforts for simultaneous biology/chemical/physical parameters.