



This document contains overall and specific condition of the Tampa Bay Estuary Program from the National Estuary Program Coastal Condition Report. The entire report can be downloaded from <http://www.epa.gov/owow/oceans/nepccr/index.html>

National Estuary Program Coastal Condition Report

Chapter 5: Gulf of Mexico National Estuary Program Coastal Condition, Tampa Bay Estuary Program

June 2007

Tampa Bay Estuary Program



www.tbep.org



Background

Tampa Bay, Florida's largest open-water estuary, spans almost 400 mi² and drains 2,300 mi² of land (TBEP, 2003). The Tampa Bay watershed extends north of the Bay to the upper reaches of the Hillsborough River, east to the headwaters of the Alafia River, and south to the headwaters of the Manatee River. The Bay receives freshwater inflow from the Lake Tarpon Canal and the Hillsborough, Palm, Alafia, Little Manatee, and Manatee rivers. Tampa Bay empties into the Intracoastal Waterway via Boca Ciega Bay and into the Gulf of Mexico via the Southwest Channel and Passage Key Inlet.

Tampa Bay is an important nursery for young fish, shrimp, and crabs, and provides habitat for many other types of wildlife, including wading birds, dolphins, sea turtles, and manatees. In addition to its ecological diversity, Tampa Bay boasts three major seaports and contributes more than \$5 billion annually from trade, tourism, development, and fishing (TBEP, 2005). More than 100,000 boats are registered to anglers and sailing enthusiasts in the Tampa Bay area, and more than 2 million people live in the Bay's watershed, with the population expected to grow 10% to 20% during the

next 10 years (U.S. Census Bureau, 2001; TBEP, 2005). Developing a plan to deal with the region's growth and the associated pollution and stress on natural habitats is the primary mission of the Tampa Bay Estuary Program (TBEP) (TBEP, 2005).

Environmental Concerns

Habitat loss, declines in living resources, and the atmospheric deposition of nitrogen are major concerns for the TBEP. Since population growth began to soar in 1950, nearly half the Bay's marshes and 40% of its seagrass areas have disappeared (TBEP, 2005). Although the abundance of many Bay species has increased in recent years, populations of other native species have declined as their habitats have shrunk. For example, the destruction of vital seagrass meadows caused a rapid decline in spotted seatrout and other fish populations in the Bay from the early 1970s through the 1980s (Murphy, 2003). In addition, atmospheric deposition of total nitrogen directly to the surface of Tampa Bay accounts for about one-quarter of the nitrogen loadings to the Bay (about 780 tons/year) (Poor et al., 2001). This estimate does not include total nitrogen from atmospheric sources deposited in the watershed and washed to the estuary as stormwater. When both direct and indirect pathways are considered, more than half of the total nitrogen loading originates from atmospheric sources (Poe et al., 2005a). The prevention of future nitrogen loading to the Bay will continue to be a challenge because population growth in the Bay area is projected to continue at a high rate.



Rare white-phase reddish egret. Tampa Bay boasts about 60 nesting pairs of reddish egrets, the largest population in Florida (Gerold Morrison).

Population Pressures

The population of the 6 NOAA-designated coastal counties (Hillsborough, Manatee, Pasco, Pinellas, Polk, and Sarasota) coincident with the TBEP study area increased by more 190% during a 40-year period, from 1.2 million people in 1960 to 3.3 million people in 2000 (Figure 5-24) (U.S. Census Bureau, 1991; 2001). This rate of population growth for the TBEP study area exceeded the population growth rate of 133.3% for the collective NEP-coincident coastal counties of the Gulf Coast region and was the third-highest growth rate for all of the Gulf Coast NEPs. In 2000, these 6 counties had a population density of 640 persons/mi², more than double the density of 287 persons/mi² for the collective NEP-coincident coastal counties of the Gulf Coast region (U.S. Census Bureau, 2001). Development and population pressures are especially strong in NEP study areas that serve as major shipping centers for commercial and recreational activities.

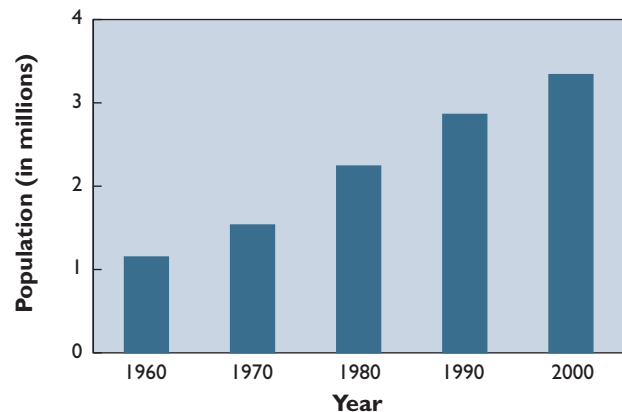


Figure 5-24. Population of NOAA-designated counties of the TBEP study area, 1960–2000 (U.S. Census Bureau, 1991; 2001).

NCA Indices of Estuarine Condition—Tampa Bay

The overall condition of Tampa Bay is rated fair based on three of the four indices of estuarine condition used by the NCA (Figure 5-25). The water quality index for Tampa Bay is rated fair, the sediment quality index is rated good, and the benthic index is rated poor; no data were available to calculate a fish tissue contaminants index for Tampa Bay. Figure 5-26 provides a summary of the percentage of estuarine area rated good, fair, poor, or missing for each parameter considered. This assessment is based on data collected by EMAP from 25 NCA stations sampled in the TBEP estuarine area in 2000. Please refer to Tables 1-24, 1-25, and 1-26 (Chapter 1) for a summary of the criteria used to develop the rating for each index and component indicator.



Water Quality Index

The water quality index for Tampa Bay is rated fair (Figure 5-27). This index was developed using NCA data on five component indicators: DIN, DIP, chlorophyll *a*, water clarity, and dissolved oxygen. In NOAA's Estuarine Eutrophication Survey, Tampa Bay was listed as having medium-to-very-high chlorophyll *a* levels and medium-to-high DIN and DIP concentrations (NOAA, 1997). Results from the 2000 NCA survey show some improvements over the previous study, with low DIN, moderate DIP, and moderate chlorophyll *a* concentrations measured.

Dissolved Nitrogen and Phosphorus | Tampa Bay is rated good for DIN concentrations, with concentrations rated good throughout the TBEP estuarine area. Elevated DIN concentrations are not expected to occur during the summer in Gulf Coast waters because freshwater input is lower and dissolved nutrients are more rapidly utilized by phytoplankton during this season. Tampa Bay is rated fair for DIP concentrations, with 12% of the estuarine area rated poor for this component indicator, 72% of the area rated fair, and 16% of the area rated good.

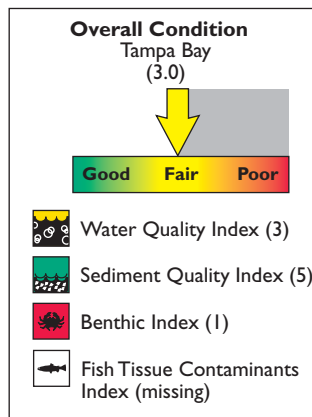


Figure 5-25. The overall condition of the TBEP estuarine area is fair (U.S. EPA/NCA).

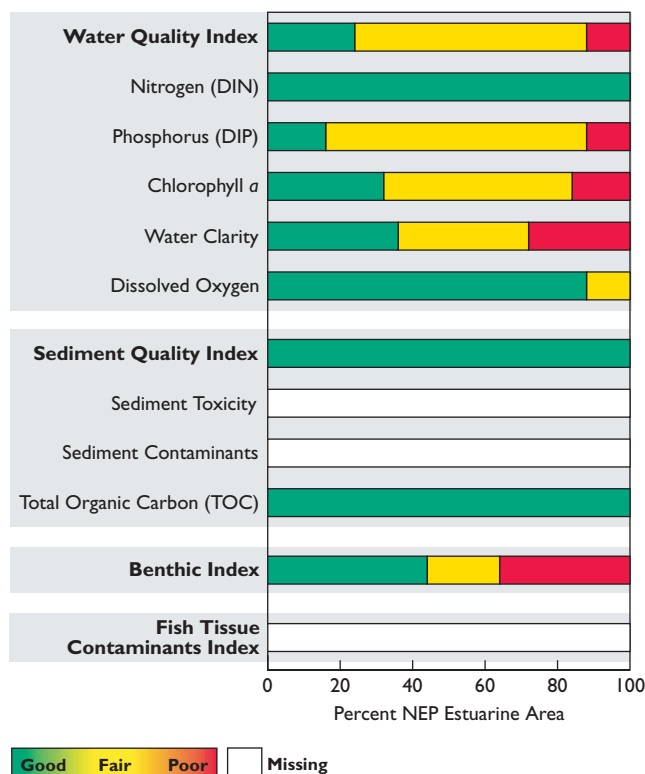


Figure 5-26. Percentage of NEP estuarine area achieving each rating for all indices and component indicators — Tampa Bay (U.S. EPA/NCA).

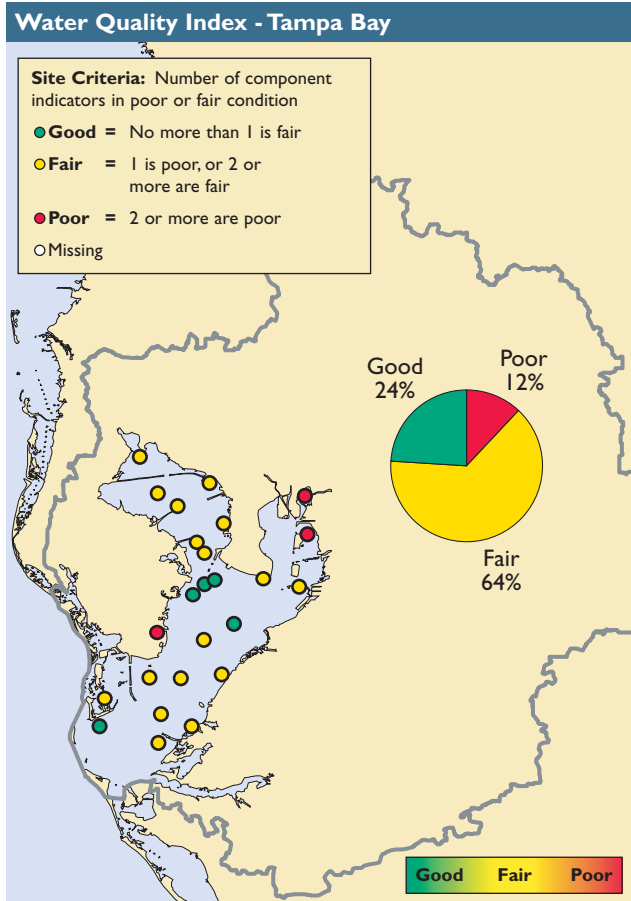


Figure 5-27. Water quality index data for Tampa Bay, 2000 (U.S. EPA/NCA).

Chlorophyll *a* | Tampa Bay is rated fair for chlorophyll *a* concentrations, with 16% of the estuarine area rated poor for this component indicator, 52% of the area rated fair, and 32% of the area rated good.

Water Clarity | Water clarity in Tampa Bay is rated poor. Water clarity was rated poor at a sampling site if light penetration at 1 meter was less than 20% of surface illumination. Expectations for water clarity are high because one of the TBEP’s goals is to re-establish SAV. Twenty-eight percent of the TBEP estuarine area was rated poor for water clarity, 36% of the area was rated good, and 36% of the area was rated fair.

Dissolved Oxygen | Dissolved oxygen conditions in Tampa Bay are rated good. NCA estimates for Tampa Bay show that none of the Bay’s bottom waters exhibited hypoxia in late summer. Twelve percent of the estuarine area was rated fair for dissolved oxygen concentrations, and 88% of the area was rated good.



Sediment Quality Index

The sediment quality index for Tampa Bay is rated good; however, this index is based on measurements of sediment TOC only (Figure 5-28). One-hundred percent of the TBEP estuarine area was rated good for sediment quality.

Sediment Toxicity | The NCA did not collect sediment toxicity data for Tampa Bay in 2000; therefore, sediment toxicity in the Bay has not been rated for this report.

Sediment Contaminants | The NCA did not collect sediment contaminants data for Tampa Bay in 2000; therefore, sediment contaminant concentrations in the Bay have not been rated for this report.

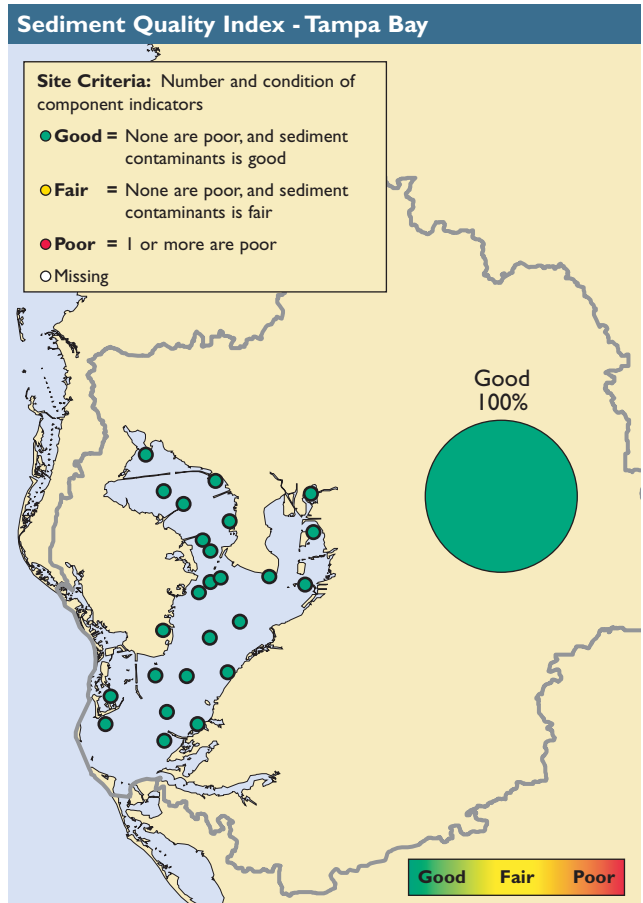


Figure 5-28. Sediment quality index data for Tampa Bay, 2000 (U.S. EPA/NCA).

Total Organic Carbon | TOC concentrations in Tampa Bay sediments were rated good throughout 100% of the TBEP estuarine area; therefore, Tampa Bay is rated good for sediment TOC.



Benthic Index

The condition of benthic invertebrate communities in Tampa Bay is rated poor, based on the Gulf Coast Benthic Index and data collected by the NCA. Benthic index estimates indicate that 36% of the estuarine area has degraded benthic resources (Figure 5-31).



Fish Tissue Contaminants Index

The NCA did not assess the level of fish tissue contaminants in the TBEP estuarine area in 2000; therefore, a fish tissue contaminants index for Tampa Bay was not developed for this report.

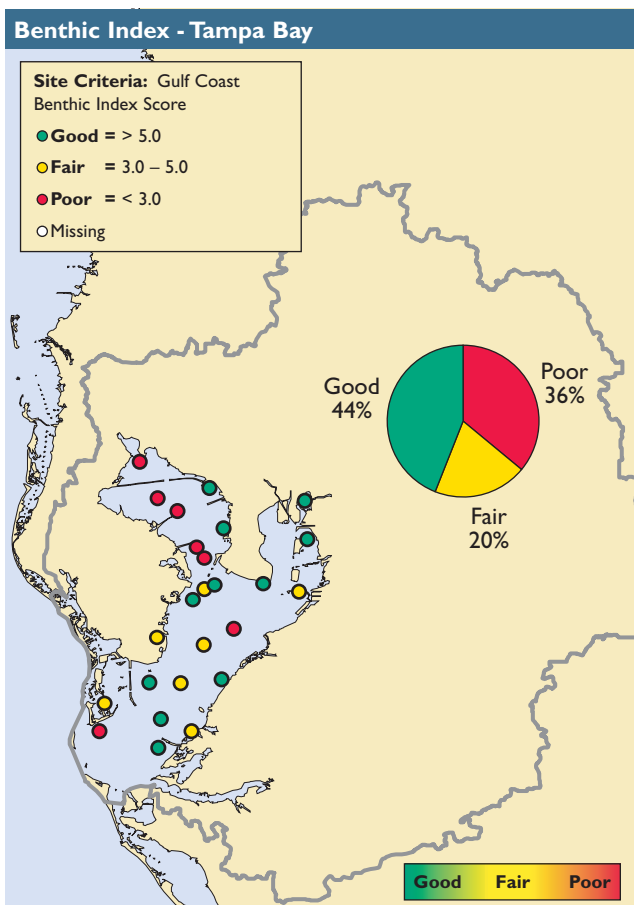


Figure 5-31. Benthic index data for Tampa Bay, 2000 (U.S. EPA/NCA).

Tampa Bay Estuary Program Indicators of Estuarine Condition

The Tampa Bay resource management community has developed monitoring programs and environmental indicators to measure progress towards adopted measurable goals for three major areas of concern: (1) water and sediment quality; (2) habitat restoration and protection; and (3) fish and wildlife protection. In many cases, the TBEP also uses target indicators to help assess progress towards these goals. Although some of these indicators are similar to those evaluated by the NCA, other indicators have been customized to suit the ecology and ecosystems that are unique to Tampa Bay. The TBEP’s major indicators are chlorophyll *a* concentrations, water clarity, nitrogen loading (tons/year), acres of seagrass, and habitat restoration and protection (acres of oligohaline/brackish habitat). The TBEP also monitors other indicators, including bacteria; metals; organochlorine pesticides and other organic chemicals; benthic resources; boater compliance with posted speed zones; and trends in fishery stocks.



Local high school students plant marsh grass as part of a habitat restoration project coordinated by Tampa Bay Watch (Tampa Bay Watch).

Water and Sediment Quality

Chlorophyll *a* concentrations and light attenuation data help the TBEP track its progress toward improving water clarity to meet seagrass habitat goals for Tampa Bay. The TBEP calculates that sufficient water clarity will be maintained for the desired level of seagrass recovery if average annual chlorophyll *a* concentrations can be maintained at levels adequate to support seagrass recovery to depths observed in 1950 and equal to those measured between 1992 and 1994 (TBEP, 2003; Greening and Janicki, 2006). Similarly, light attenuation (a measure of water clarity) goals that are needed to maintain a minimum of 20% light to target depths have been adopted for seagrass recovery. Although this is the same light attenuation level used by the NCA, the TBEP uses the average annual estimate from monthly measurements taken throughout the year rather than the summertime index period used by the NCA. Based on the most recent assessment by the TBEP, all four

major Bay segments met target levels for chlorophyll *a* concentrations in 1999 through 2002, and three of four segments met these targets in 2003 and 2004; however, none of the segments met chlorophyll *a* targets during the El Niño year (1998). Figure 5-29 shows that mean annual chlorophyll *a* concentrations in the Bay have generally declined during the past 20 years. From 1998 to 2001, light attenuation did not meet target levels in three of the four major Bay segments (Figure 5-30). This indicates that particles in the water, including non-chlorophyll particles, were preventing enough light from reaching seagrass growing on the Bay's floor, likely hindering the growth and expansion of seagrass beds (Poe et al., 2005b). These data correlate well with the NCA component indicator ratings of poor for water clarity and fair for chlorophyll *a* concentrations. The TBEP has been able to track the trends in these conditions because the program collects data from multiple seasons and for multiple years, rather than the snapshot approach used by the NCA.

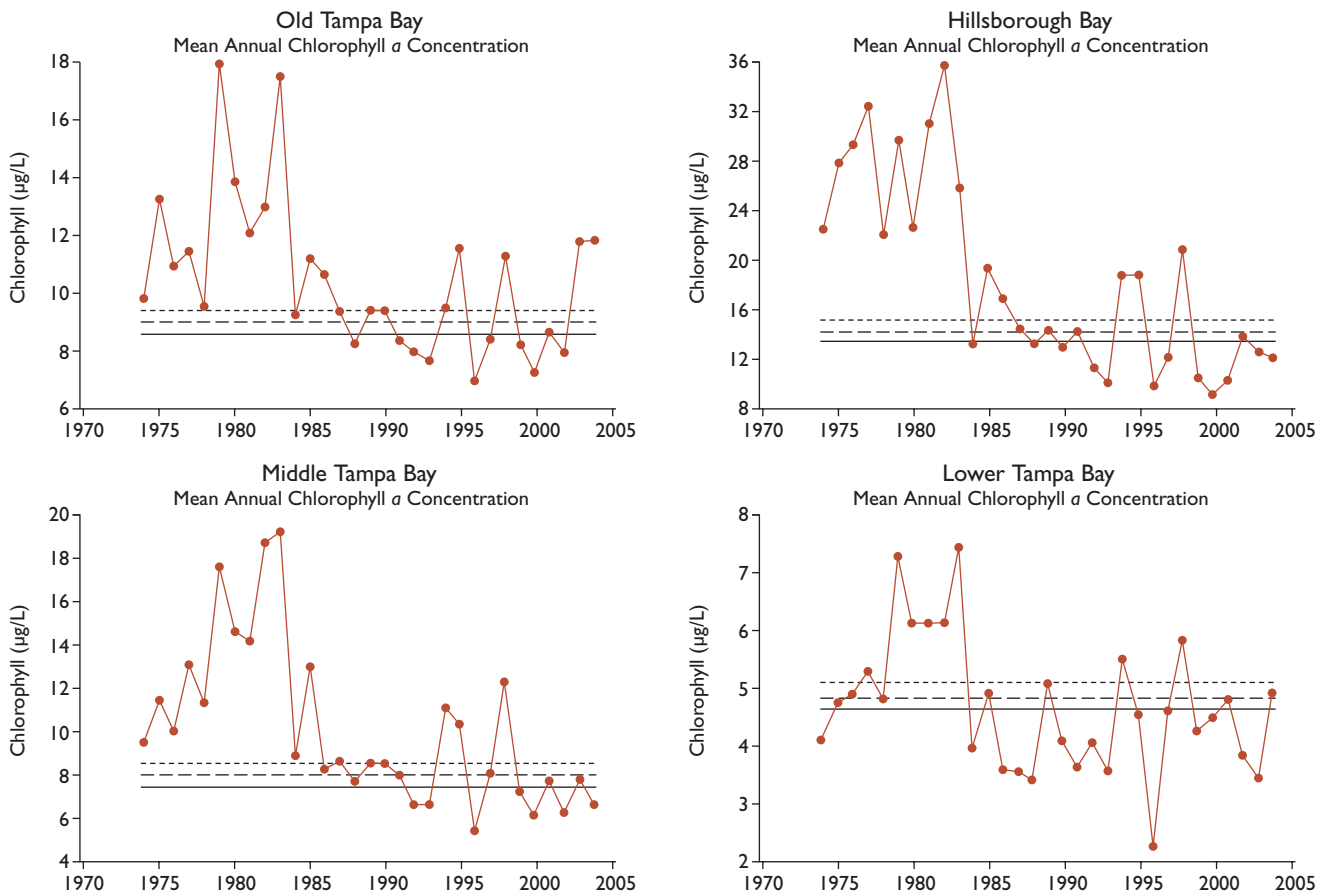


Figure 5-29. Mean annual chlorophyll *a* concentrations have generally declined over the past 20 years. The solid line indicates adopted target levels, with ± 1 and ± 2 standard deviation (dashed lines) (Poe et al., 2005b).

Tampa Bay Estuary Program

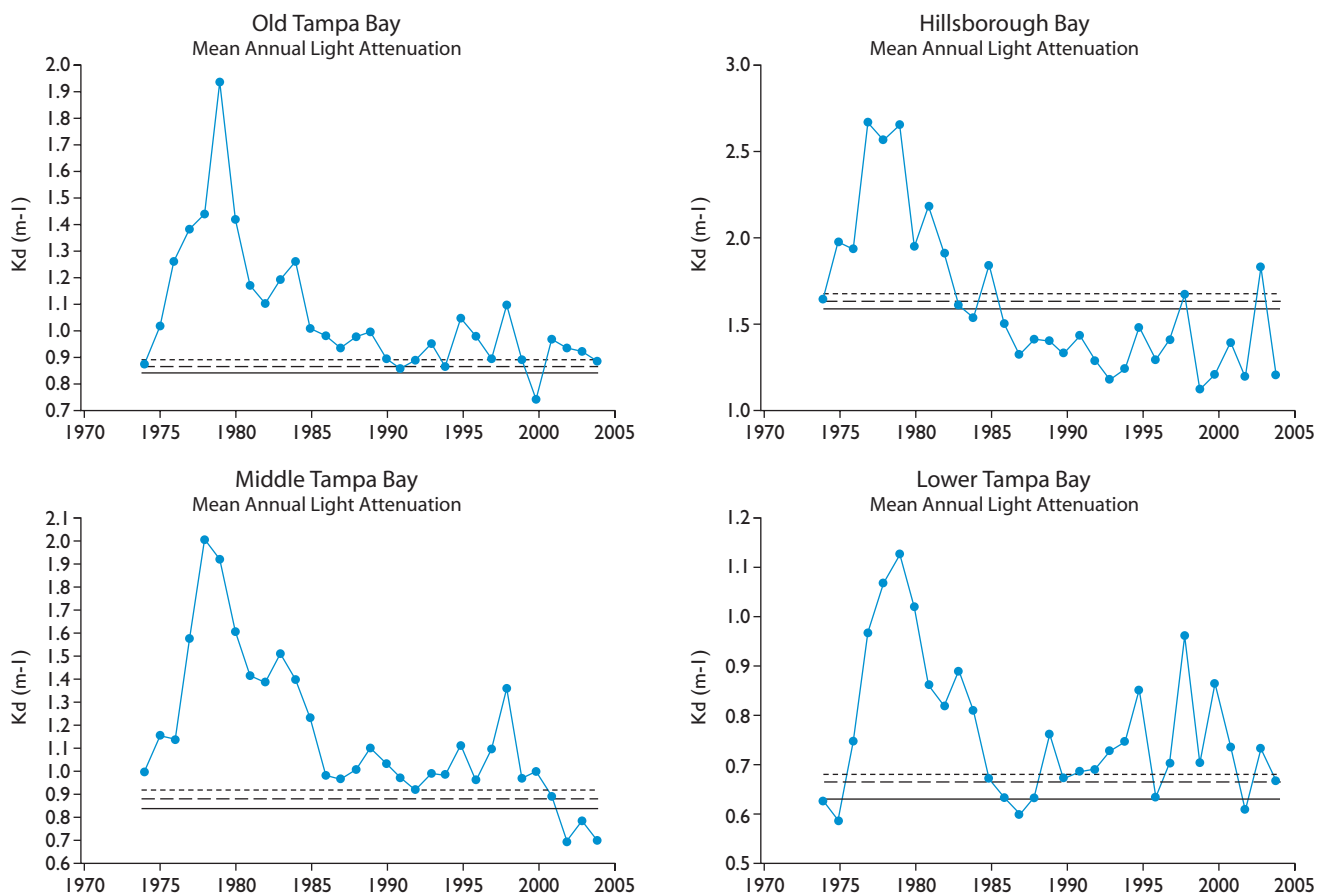


Figure 5-30. Light attenuation indicators met target levels only in one major Bay segment (Middle Tampa Bay). The solid line indicates light attenuation targets for each major Bay segment; dashed lines indicate 1 and 2 standard deviation (Poe et al., 2005b).

The TBEP uses nitrogen loading as an indicator of overall water quality because excess nitrogen can lead to algal blooms and decreased water clarity. The TBEP’s goal is to prevent increases in the Bay’s nitrogen loading to maintain levels measured between 1992 and 1994. The TBEP’s estimates showed that nitrogen loading from 1995 to 2003 was higher than for the previous period (1985–1994), primarily due to heavy rains and runoff associated with El Niño in 1997–1998; however, when adjusted for rainfall, nitrogen loadings showed no change since 1985 (Poe et al., 2005a).

Elevated levels of bacteria in Tampa Bay waters can result from septic system malfunctions and stormwater runoff, especially during rainfall events. These elevated levels are a potential public health concern to people who use Tampa Bay for recreational swimming and

boating activities. In 2000, the Healthy Beaches Tampa Bay one-year survey showed that the human health risk from bacterial contamination was low throughout the Bay; however, samples from 2 of the 22 sites around the Bay and its beaches consistently exceeded suggested guidelines for human health (Rose et al., 2001). Although the TBEP has not yet finalized specific indicators for tracking changes in bacterial contamination levels, it is considering several indicators, including fecal coliform bacteria and *Enterococci*. For areas where identifying the source of contamination is important, the TBEP is considering conducting multiple antibiotic resistance (MAR) tests for fecal coliform bacteria. Bacteria develop patterns of resistance to antibiotics that they are exposed to by their host organisms, and MAR tests can identify the source of the bacteria based on

these patterns of resistance. When the source of contamination is known, it becomes easier to target specific areas for cleanup and pollution prevention.

To improve sediment quality, the TBEP's goal is to reduce toxic chemicals in contaminated sediments and to protect clean areas. Despite the input of chemical contaminants, including metals, organochlorine pesticides, and the organic chemicals PCBs and PAHs, TBEP data show that the overall benthic condition of the Bay is good, with elevated contaminant levels typically found in only a few areas (TBEP, 2003). NCA data on sediment contaminants and sediment toxicity were not collected for Tampa Bay.

Both the TBEP and NCA collected monitoring data on the condition of benthic resources. During the past 10 years, TBEP partners and a national advisory group have worked together to implement a probabilistic benthic monitoring program based on EPA's EMAP design and to develop narrative and numerical sediment quality targets for key indicators of sediment quality. The newly developed Tampa Bay Benthic Index (TBBI) classifies sediments as healthy or degraded based on the diversity and abundance of the observed benthos. Using the TBBI, "hot spots" of contaminated sediments have been found to occur in relatively concentrated areas around large marinas, ports, and urban stormwater outfalls (Malloy et al., in press) (Figure 5-32). No trends in sediment quality have been observed since monitoring was initiated in 1993 (Karlen, 2003). Although the TBEP collected more sediment samples than the NCA, both programs used the same benthic index method to determine the health of the benthic community.

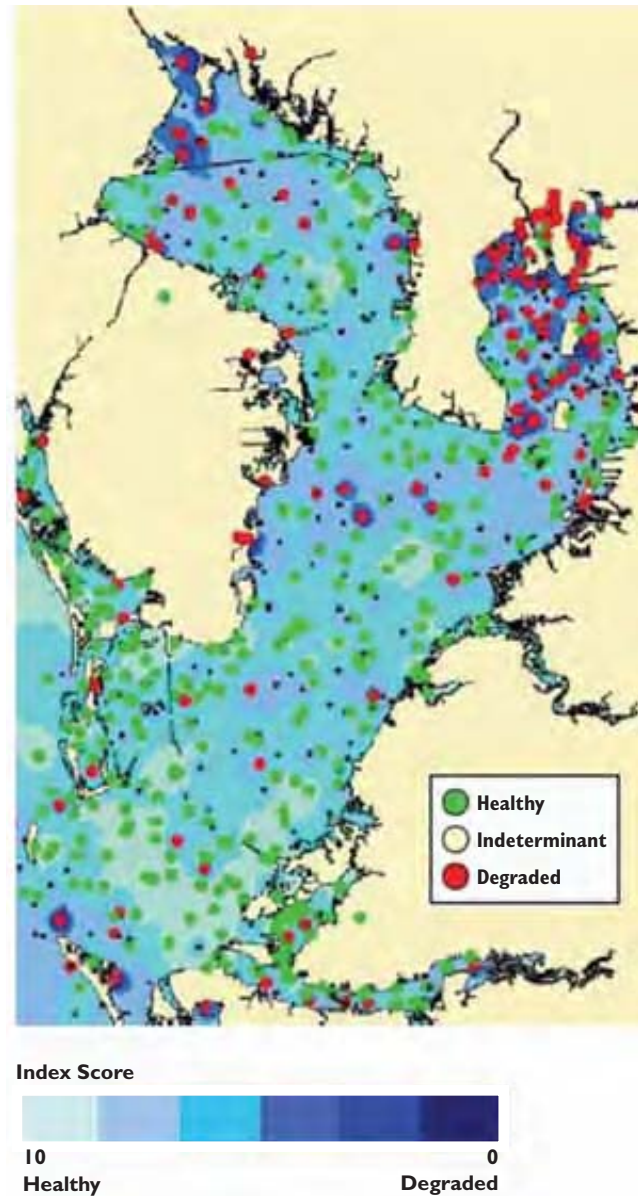


Figure 5-32. Tampa Bay Benthic Index classification (David Wade, Janicki Environmental, Inc.).

HIGHLIGHT

Summary: Tampa Bay Habitat Restoration/Protection Master Plan

TBEP participants have agreed to the implementation of a watershed strategy for coastal habitat restoration and protection, with a focus on preventing habitat “bottlenecks” for the survival and growth of estuarine-dependent fauna. Since the 1950s, more than 20% of Tampa Bay’s saltwater marsh and mangrove habitat has been lost to development, and more than 50% of the shoreline has been altered by seawalls, dredge-and-fill, or other hardening activities (Lewis and Robison, 1995).

Step 1: Identify Estuarine-dependent “Indicator” Faunal Guilds

Although the TBEP Technical Advisory Committee (TAC) attempted to identify indicator species and their habitat requirements, the group was not comfortable with selecting individual species to drive this process. A total of 38 species were identified as potential indicators, ranging from filter-feeding zooplankton species to manatees—an unmanageable number for determining specific habitat requirements. Each species was considered to be a critical indicator by at least one TAC member, and determining the relative importance of one species over another proved an impossible task within the group (Lewis and Robison, 1995).

To address this problem, members of the TAC agreed on 10 faunal guilds (based roughly on trophic guilds and taxonomic groups) in which all the potential indicator species could be grouped. Several species were separated into different guilds, depending upon life stage. For example, larvae of some fish may be classified as open-water filter feeders, but then reclassified as shallow-water forage fish as they mature. The 10 adopted Tampa Bay guilds were the following:

- Open-water filter feeders
- Shallow-water forage fish
- Recreational/commercial finfish and shellfish
- Subtidal invertebrates
- Intertidal invertebrates
- Estuarine mollusks
- Estuarine-dependent birds
- Estuarine-dependent birds requiring freshwater forage areas
- Estuarine reptiles
- Marine mammals (Lewis and Robison, 1995).

Step 2: Identify Habitats Critical to Support Guilds

Based on the habitat requirements of each of the 10 guilds, 6 habitat types were identified as critical to support the full suite of guilds:

- Open estuarine water
- Oligohaline (low-salinity) marsh
- Mangrove/*Spartina*
- Salt barrens
- Associated uplands
- Freshwater “frogponds” (Lewis and Robison, 1995).

Step 3: Compare Historic and Existing Extent of Habitats

In 1950, Tampa Bay coastal areas were flown to collect aerial photographs to examine the potential for draining coastal wetlands with mosquito ditches to combat an ongoing malaria epidemic at that time. Using these historic aerial photographs, the areal extents of each of three target habitat types (mangrove/marsh, oligohaline marsh, and salt barren) in 1950 were estimated. Current areal estimates for each of these habitat types were similarly constructed using 1995 aerial photographs (Lewis and Robison, 1995).

Change in Acres of Mangrove/Marsh, Oligohaline Marsh, and Salt Barren Habitat between 1950 and 1995 (Lewis and Robison, 1995)						
Habitat Type	1950 Acres	1950 Percent	1995 Acres	1995 Percent	Net Change (Acres)	Net Change (Percent)
Mangrove/marsh	15,894	67%	13,764	73%	-2,130	-13%
Oligohaline marsh	6,621	28%	4,117	22%	-2,504	-38%
Salt barren	1,371	5%	877	5%	-494	-36%
Total	23,886	100%	18,758	100%	-5,128	-21%

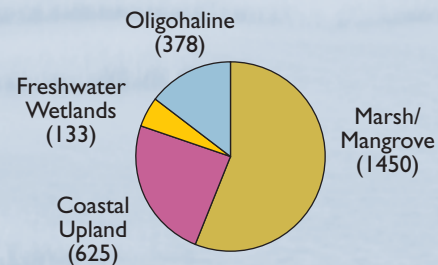
The table compares the acreage of these three target habitats in 1950 and 1995. Although a total of 21% of the total acreage for these three habitats was lost between 1950 and 1995, oligohaline habitat and salt barren acreage losses were approximately 38% and 36% of the 1950s acreage, respectively. Marsh and mangrove acreage loss was approximately 13% of the 1950s acreage. If mangrove/marsh habitat acreage remains constant, an increase of 1,800 acres of oligohaline habitat would be necessary to restore the historic balance of coastal habitats to support estuarine-dependent faunal guilds in Tampa Bay (Lewis and Robison, 1995).

Step 4: Focus Efforts on Restoring the Balance

Existing habitat-restoration efforts by agencies and local governments in Tampa Bay from 1990 to 1995 were successful in procuring funds for the restoration of 86 acres of coastal habitat. It was expected in 1995 that some additional funds would be available through 2005. Based on the results of this analyses and the recognized need for a reasonable expectation of funding sources, a target of restoring 100 acres of oligohaline habitat every five years was considered equivalent to the current rate of restoration. Thus, it was not assumed

that additional funds would be available, but rather that funds be directed toward oligohaline marsh where possible. Mangrove/marsh habitat restoration has continued on an opportunity basis when appropriate sites are available and public support and funding exist (Lewis and Robison, 1995).

Between 1995 and 2003, the TBEP partners met and exceeded the adopted goal to restore at least 100 acres of oligohaline habitat every five years. A total of 2,357 acres of estuarine habitat was restored through 2003, including 378 acres of oligohaline habitat (see figure) (Greening et al., 2005).



Total acres of Tampa Bay estuarine habitat restored between 1995 and 2003 (Greening et al., 2005).

Tampa Bay Estuary Program

Habitat Quality

The TBEP monitors Bay acreage and changes in acreage over time to assess the quality of coastal wetland, salt marsh, and mangrove and seagrass habitats in the study area. The preservation of salt marsh and mangrove habitats in Tampa Bay is focused on 28 priority sites. These 28 sites were given the highest priority for Florida’s Save Our Rivers and Preservation 2000 land-acquisition programs conducted by the SWFWMD. A total of 11,494 acres of estuarine habitat was preserved through direct land acquisitions between 1996 and 2003 (Figure 5-33) (Greening et al., 2005).

The area of historical seagrass coverage in Tampa Bay has been reduced as a result of excessive nitrogen loading and dredge-and-fill activities. To track and quantify changes in the seagrass beds, aerial photographs and mapping have been conducted every two years since 1988 to assess recovery trends. As shown in Figure 5-34, seagrass acreage in Tampa Bay declined between 1950 and 1982. Figure 5-35 illustrates the areas of seagrass cover lost between 1950 and 1990. Since 1992, overall seagrass acreage in the Bay has been increasing at a average rate of about 500 acres per year. Data from the 2004 survey show an increase in Bay-wide seagrass coverage by 2,183 acres between 1999 and 2004 (Tomasko et al., 2005c). One exception is the Old Tampa Bay area, which has experienced a 24% loss of seagrass during this time period and sustained previous losses between 1994 and 1996, suggesting a more serious condition could exist in this area. In addition to aerial photography and interpretation every two years, the Seagrass Condition Monitoring Program (70 transects Bay-wide) is conducted to better assess seagrass changes in the Bay (Avery and Johansson, 2004).

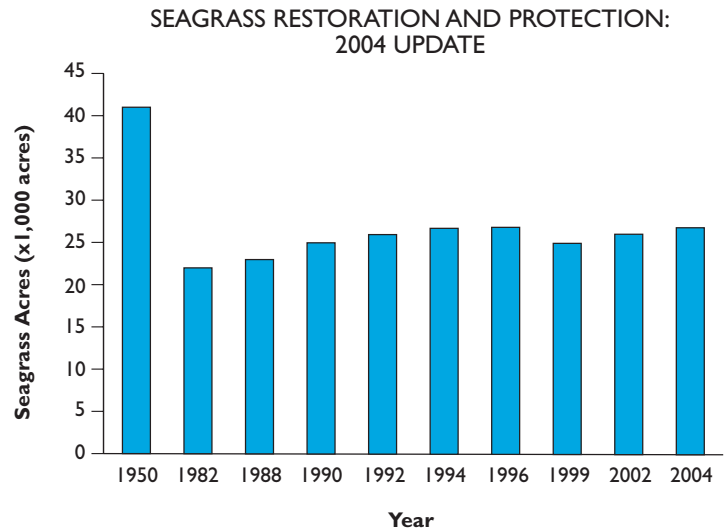


Figure 5-34. Decline in seagrass acreage in Tampa Bay between 1950 and 1982 and restoration after 1982 (Tomasko et al., 2005c).



Figure 5-35. Seagrass cover lost between 1950 and 1990 in Tampa Bay (Janicki et al., 1994).

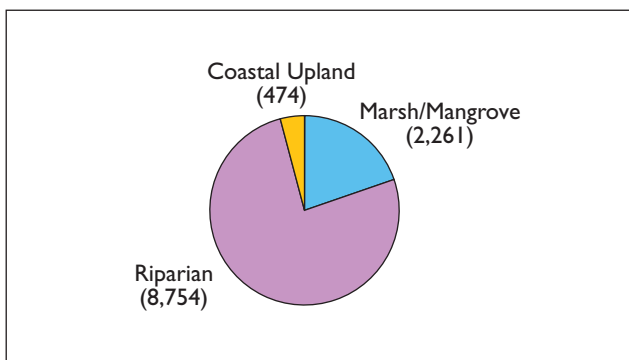


Figure 5-33. Total acres of habitat acquired through land acquisitions from 1996–2003 (Greening et al., 2005).

Living Resources

The TBEP has been working to protect manatees and ensure healthy fishing stocks in Tampa Bay. The program uses boater compliance with posted speed zones and trends in fishery stocks as indicators for monitoring the success of these activities.

Manatees, which graze on seagrass beds, are often injured or killed by power boats in shallow areas of Tampa Bay. Boater-education efforts and a number of different manatee-protection efforts, such as signs marking mandatory and voluntary “go slow” areas, may reduce the number of manatee deaths each year. The TBEP’s Manatee Awareness Coalition (MAC) has developed intensive boater-education programs aimed at protecting manatees and the seagrass habitats they depend upon. The MAC has also assisted in the development of federal, state, and local boating speed zones in Tampa Bay. The success of these efforts is being assessed by monitoring the numbers of boaters complying with posted speed zones, including both voluntary and mandatory compliance.

The TBEP is also interested in ensuring that healthy fishery stocks are maintained in the Bay. Although no target population levels have been designated, fish and shellfish population estimates, as measured by the Florida Wildlife Commission’s Fisheries Independent Monitoring Program, have shown species-specific patterns in fish abundance since 1989. The results of monitoring efforts have documented the Bay’s yearly fluctuations in major fish species and have not recorded any overall declining trends in the fishery stocks of Tampa Bay (Matheson et al., 2005).

Current Projects, Accomplishments, and Future Goals

Since the Tampa Bay master plan was first adopted in 1996, the TBEP has made aggressive strides toward defining goals and taking actions for the restoration and protection of Tampa Bay. The program has set goals for water quality, habitat restoration and protection, and fish and wildlife.

The TBEP’s goals for water quality are to reduce nitrogen loadings, improve water quality in the Bay for recreation, and improve water clarity for the protection

of seagrass habitat. The TBEP is measuring its progress toward these goals through the monitoring of water clarity and bacteria, chlorophyll *a*, and nitrogen concentrations. The TBEP also aims to gain a better understanding of atmospheric deposition and to identify sources of air pollution that are adding excess nitrogen to the Bay (Poor et al., 2001). To learn more, the TBEP plans to continue supporting the careful monitoring needed to identify and track any changes in atmospheric deposition to the Bay.

Habitat restoration and protection goals for Tampa Bay are directed primarily toward restoring the historic balance of coastal wetland habitats, preserving the Bay’s salt marsh and mangrove acreage, and protecting and restoring the Bay’s seagrass beds. The primary indicators of success toward these goals involve tracking the acreage of each habitat and the changes in acreage over time. In some cases, the TBEP has set specific goals for habitat preservation. For example, one of the program’s estuarine habitat protection goals is to preserve the Bay’s 18,800 acres of salt marsh and mangrove habitat (TBEP, 2003).

Fish and wildlife goals for Tampa Bay are directed primarily toward developing recommendations for local manatee protection zones and improving on-water enforcement of fishing and environmental regulations. The improvement of on-water enforcement was greatly facilitated by the merger of the Florida Fish and Wildlife Commission and the Florida Game and Freshwater Fish Commission. This merger increased the on-water presence in Tampa Bay.

Conclusion

The overall condition of Tampa Bay is rated fair based on three indices of estuarine condition used by the NCA. The TBEP has taken strong actions to establish short- and long-term goals for the protection and restoration of this estuary. NCA and TBEP monitoring data show that many aspects of environmental quality in the Bay are improving, such as nitrogen load and chlorophyll *a* levels and seagrass coverage. Attaining the TBEP’s ambitious goals will require continued strong scientific involvement through monitoring, research, and pollution management, as well as the cooperation and dedication of a wide spectrum of stakeholders, including the public.