WQ-1

Water and Sediment Quality

Tampa Bay is among the most well-studied estuaries in the world, thanks to the cooperative efforts of the multiple governments and agencies engaged in research and sampling of the bay's water quality, bottom sediments, fisheries and wildlife.

Photo courtesy of the Florida Fish and Wildlife Conservation Commission

Implement the Nitrogen Management Strategy for Tampa Bay

ACTION:

Implement the Nitrogen Management Strategy for Tampa Bay to facilitate recovery of seagrasses.

STATUS:

Ongoing.

BACKGROUND:

Controlling the bay's nitrogen intake as a means to regain vital underwater seagrass beds has been one of the most prominent initiatives of the Tampa Bay Estuary Program. Seagrasses were selected as a yardstick by which efforts to improve the bay are measured because of their overall importance as a bay habitat and nursery, and because they are an important barometer of their environment, signaling changes in water quality trends. Excess nitrogen fuels algal growth, robbing underwater grass flats of the light they need to survive.

A Nitrogen Management Consortium was established in 1996 to address long-term nitrogen management. The voluntary group, including electric utility, industry and agricultural representatives along with local governments and regulatory agencies, has gained national acclaim for its efforts to reduce nitrogen loadings to the bay, above and beyond requirements of individual entities. In fact, the process has been so effective that it satisfies state and federal requirements for establishing a Total Maximum Daily Load or TMDL for the bay, thereby achieving through consensus what otherwise would require additional command-and-control regulation.

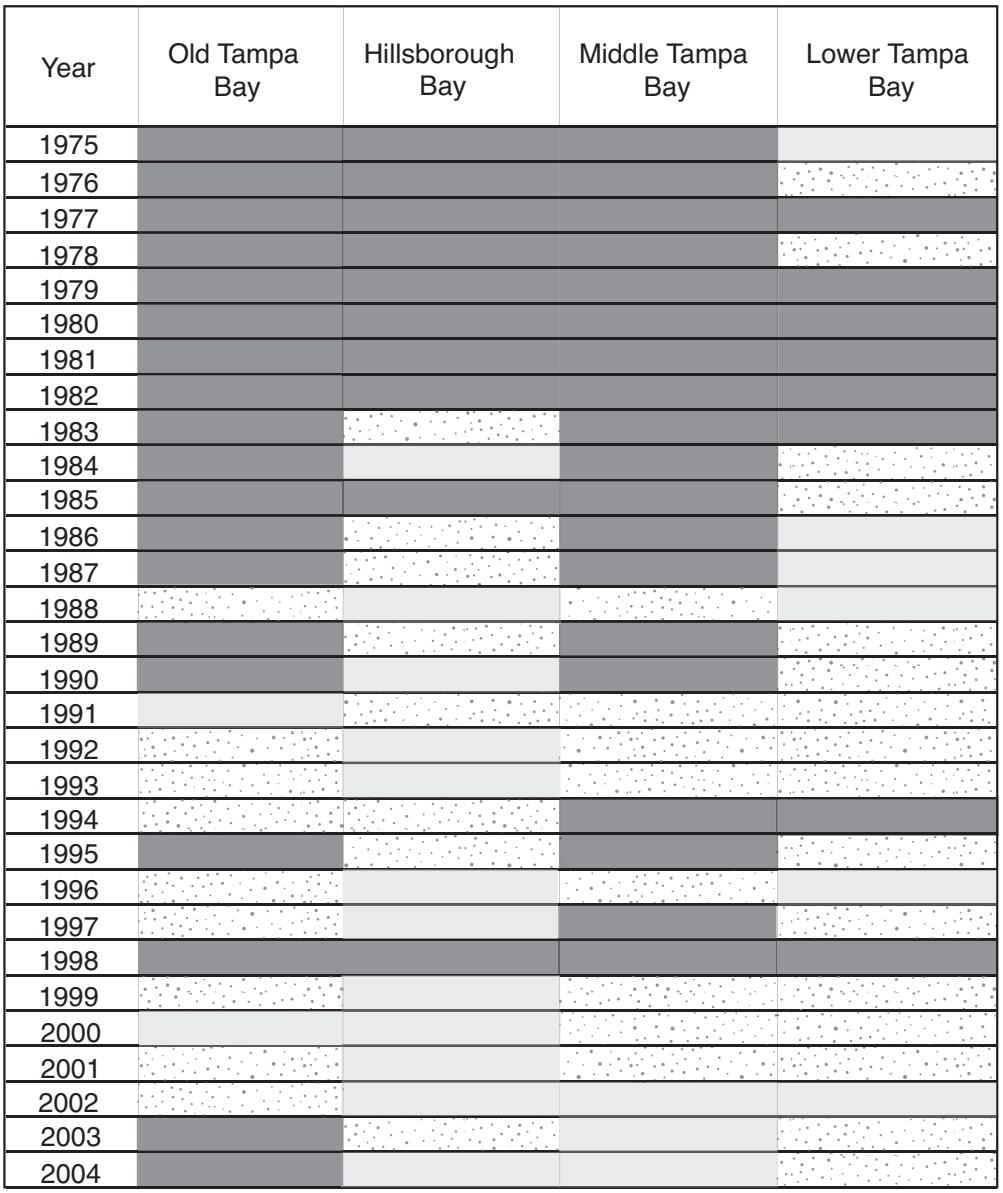
The current goal, based on modeling efforts, is to "hold the line" on nitrogen loadings at 1992-1994 levels to encourage seagrass recruitment. That necessitates a net nitrogen reduction of about 17 tons per year, or 84 tons over 5 years, to offset anticipated increases associated with population growth in the region. For the period 1995 to 1999, projects completed in the Tampa Bay watershed by TBEP partners actually exceeded those reduction goals. Additionally, all four major bay segments met chlorophyll *a* targets through 2002 with the exception of El Nino years (1997-98 and 2002), providing sufficient water clarity for seagrass recovery. In 2003 and 2004, targets were met in three of four major bay segments – Old Tampa Bay being the exception.

Local governments agreed to meet that portion of the nitrogen target addressing non-agricultural runoff and municipal point sources in their jurisdictions. The balance is addressed by partners in the Nitrogen Management Consortium, whose members have pledged additional action to meet the goal.

Seagrasses are responding to the management strategy, with an overall gain of 5,371

WQ-1

Tampa Bay Decision Matrix



SOURCE: TBEP

Legend:

= Not meeting one of the targets (either chlorophyll or light penetration)

= Not meeting chlorophyll *a* and light penetration targets

= Meeting both targets

The Decision Matrix provides a quick "report card" on water clarity in the four major bay segments. The matrix encompasses average annual chlorophyll *a* and light penetration measurements from 1975-2004. With the exception of high rainfall years in 1995 and 1998, water clarity has shown steady improvement in all bay segments except Old Tampa Bay, where recent declines bear watching.

acres since 1982, even after substantial losses in the late 1990s due to El Nino rains. However, seagrass acreage has been declining in Old Tampa Bay since 1994. Studies are now underway to help understand the factors involved with successful seagrass recovery in this bay segment. Basin-specific management plans which include refined strategies for nutrient and other contamination load management designed for the characteristics of each basin will be important next steps in maintaining seagrass recovery baywide.

The TBEP Technical Advisory Committee's Modeling Subcommittee is also examining the need for an appropriately-scaled loading model, which may take into account the need for estimating attenuation of nutrients in the watershed and other issues important for adequately estimating nutrient loading from different sources. The Modeling Subcommittee is due to complete its recommendations in 2006. TBEP is scheduled to update the baywide loading model after the Modeling Subcommittee finalizes recommendations.

This important action calls for tracking nutrient reduction projects through an electronic database; development of more detailed drainage basin plans; updating the Tampa Bay watershed loading model; and re-evaluating seagrass recovery and nutrient reduction goals.

STRATEGY:

STEP 1 Populate the electronic database developed by TBEP to effectively track and quantify nitrogen reduction projects outlined in partner action plans.

Responsible parties: TBEP (database maintenance) and TBEP partners (development and implementation of partner action plans and submittal of information for database)

Schedule: Ongoing

STEP 2 Encourage local government and industry participation in the development of drainage basin action plans.

Responsible parties: TBEP and Nitrogen Management Consortium partners

Schedule: Initiate in 2005

STEP 3 Develop numeric targets for chlorophyll *a* and light attenuation for Boca Ciega Bay, Terra Ceia and Manatee River.

Responsible parties: TBEP

Schedule: Initiate in 2005

STEP 4 Update the Tampa Bay nutrient loading model following recommendations of the Modeling Subcommittee. Consider how to include spills in loading estimates and reduction goals.

Responsible parties: TBEP

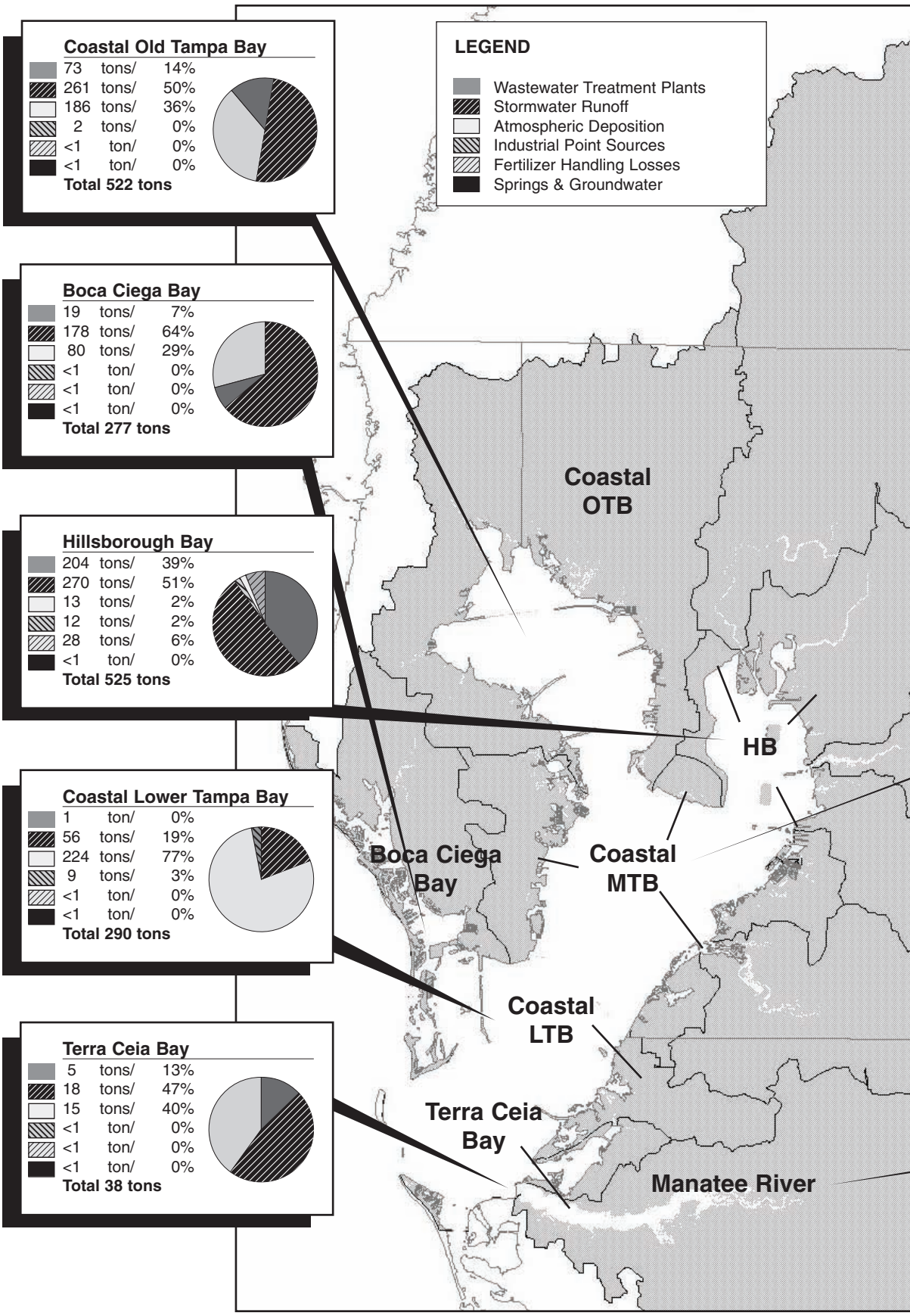
Schedule: 2006

STEP 5 Re-evaluate seagrass recovery and nitrogen reduction goals, following completion of site-specific evaluations in Old Tampa Bay and other areas.

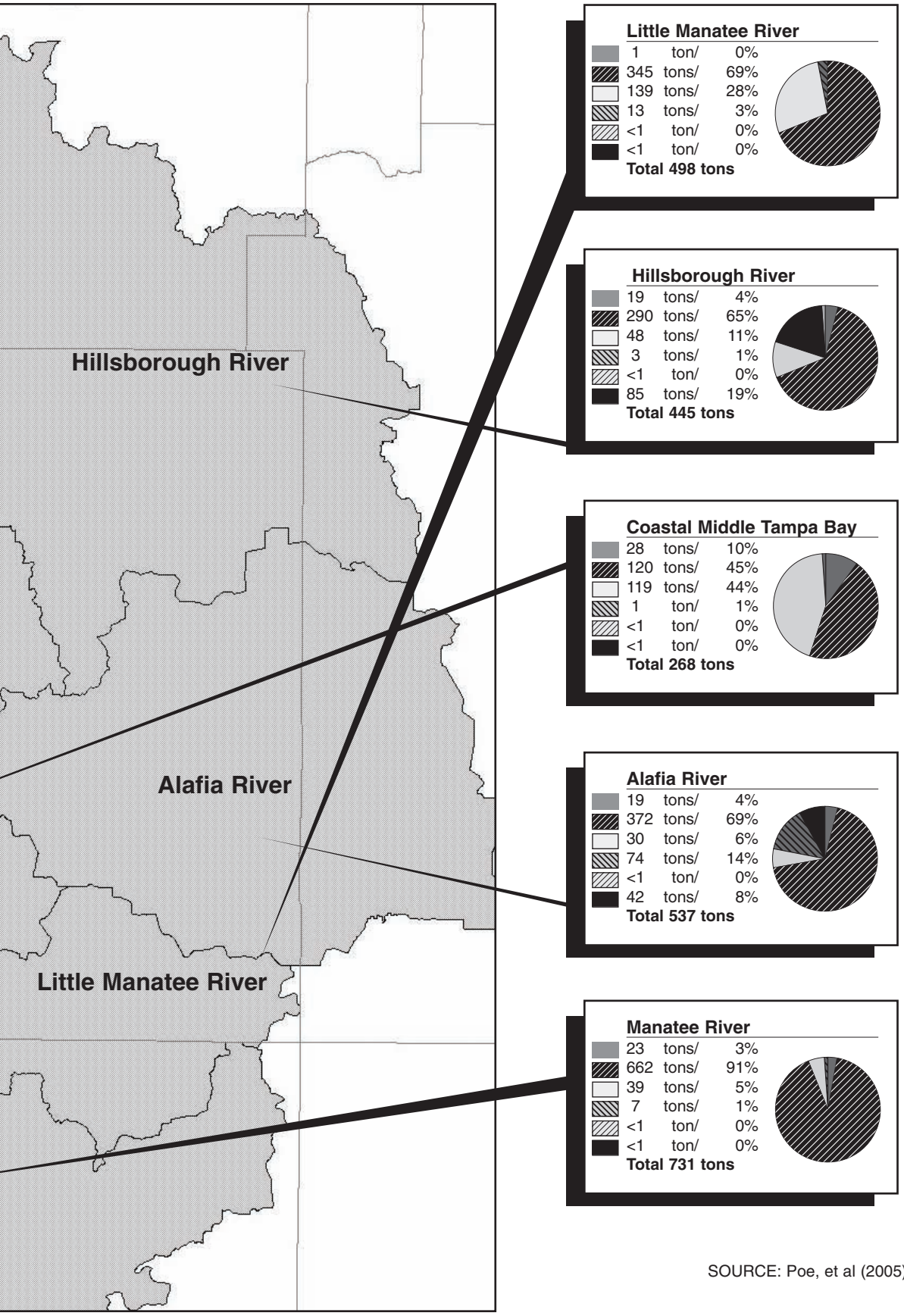
Responsible parties: TBEP and partners

Schedule: 2006

Major Drainage Basins Estimated TN Loadings (tons/year and percentage of total) by



Source and Major Basin 1999-2003



SOURCE: Poe, et al (2005)

WQ-2

Reduce Pollution from Recreational Boaters

ACTION:

Reduce pollution associated with recreational boating in the bay.

STATUS:

This action is a consolidation of actions TX-3 (Reduce toxic contaminants from ports and marinas; SP-3 (Improve fueling and bilge-pumping practices among pleasure boaters); and PH-3 (Install additional sewage pump-out facilities for recreational boaters and live-aboards).

BACKGROUND:

Significant progress has been made in implementing all three of the actions that are consolidated here. Among the accomplishments:

Twelve marinas in Pinellas, three in Manatee and one in Hillsborough have been designated Clean Marinas under the FDEP program.

FDEP estimates that about 17-18% of the marinas in Tampa Bay now have pump-out facilities, slightly higher than the 16.5% of marinas statewide. Pinellas ranks third in the state in the number of marinas receiving pump-out grants for the years 1994-1998, with 19 completed or under construction. Hillsborough and Manatee counties have not been as proactive in seeking grants, although one marina in Manatee and two in Hillsborough took advantage of the grant program. Additionally, all new marinas are now required to have pump-outs, as well as all designated Clean Marinas.

TBEP has assisted in promoting both the Clean Marina Program, and the Clean Vessel Act grant program, and in making local governments aware of these programs so they could help promote participation. TBEP also already provides a wealth of information on clean boating to area marinas and individual boaters upon request.

TBEP's Manatee Awareness Coalition (MAC) has expanded its mission to encompass a broader "bay-friendly boating" message, and created "new boater" packets in 2005 that include information on safe fueling, bilge pumping and a variety of other issues. Additionally, TBEP regularly contributes educational articles about bay-friendly boating to a new magazine, *Boaters i*, which is direct-mailed to some 15,000 boaters in the bay area – providing another forum for distributing information about clean boating practices.

STRATEGY:

STEP 1 Continue to promote FDEP's Clean Marina Program to area marinas, particularly in Hillsborough County, where participation in the program is lagging.

Responsible parties: FDEP, local governments, TBEP
Schedule: Ongoing

STEP 2 Encourage greater participation in the Clean Vessel Act grant program, which provides financial assistance to older marinas for installing sewage pump-outs.

Responsible parties: FDEP, local governments, TBEP
Schedule: Ongoing

STEP 3 Evaluate feasibility of distributing bilge socks to area boaters as a method of reducing fuel and oil spills from recreational vessels.

Responsible parties: FDEP, local governments, TBEP, Coast Guard Auxiliary
Schedule: If funds are available, distribution could begin in 2005-2006.

STEP 4 Encourage the U.S. Coast Guard Auxiliary and Power Squadron to include information about safe fueling, bilge pumping, and bay-friendly boating in their Safe Boating Courses.

Responsible parties: TBEP's Manatee Awareness Coalition
Schedule: The MAC could revise its "Minute for Manatees" curriculum in FY 2005, for inclusion in Safe Boating Courses thereafter.

STEP 5 Continue to distribute existing boater education materials, such as the Clean Boating Habits booklet and the Boaters' Guide series, and develop new materials as needed to target new concerns or to reinforce existing messages.

Responsible parties: TBEP, FDEP, FWC, local governments, Coast Guard Auxiliary
Schedule: Ongoing

SW-1

Continue Support for the Florida Yards & Neighborhoods Program and Similar Pollution Prevention Initiatives

ACTION:

Support the Florida Yards & Neighborhoods Program and similar pollution prevention initiatives.

STATUS:

Complete. Continue to monitor implementation.

BACKGROUND:

The Florida Yards and Neighborhoods Program encourages homeowners to utilize Florida-friendly gardening concepts that save water and reduce use of pesticides and fertilizers. FY&N encourages homeowners to water efficiently, mulch, recycle and select the least toxic pest control measures; put the right plant in the right spot; fertilize only when necessary; provide food, water and shelter for wildlife; protect surface water bodies (i.e., bays, rivers, streams, ponds); and minimize stormwater runoff.

The Indian River Lagoon, Tampa Bay and Sarasota Bay National Estuary Programs were among the original developers of this innovative program, in partnership with the University of Florida's Extension Service. As of 2005, 40 of Florida's 67 counties have implemented a FY&N program, and three more were expected to join the program by the end of 2005.

Locally, FY&N programs are active in Hillsborough, Pinellas, Manatee and Pasco counties, with full-time coordinators implementing a variety of initiatives. Manatee County's FY&N coordinator has worked successfully with developers in Sarasota and Manatee counties, while programs in Hillsborough and Pinellas counties have focused on individual homeowners, and even partnered with retailers such as Home Depot to distribute FY&N materials. The Hillsborough and Pinellas programs also are partnering with Tampa Bay Water and the Southwest Florida Water Management District to implement the Water-Wise Awards program, which recognizes water-efficient landscapes created by homebuilders as well as homeowners. Regionally, the Department of Environmental Protection recommends the use of FY&N concepts for Developments of Regional Impact.

Local FY&N programs also are at the forefront of efforts to educate residents about invasive plants and proper eradication and control techniques.

Advisory committees composed of water conservation and landscape professionals as well as educators set priorities for the local programs annually.

Additionally, a variety of other local government or agency initiatives promote water quality stewardship and pollution prevention to both children and adults, including:

- Hillsborough County's Officer Snook and Adopt-A-Pond programs
- The Museum of Science and Industry's Marine Gang
- The Florida Department of Environmental Protection's Clean Marina and Pollution Prevention (P2) programs, targeting specific businesses or industries.
- The Florida LakeWatch program, which trains lakefront residents to monitor water quality and reduce residential impacts to lakes.

TBEP should continue to support these existing programs as needed, assist in developing common reporting protocols for assessing the nitrogen reduction benefits of such programs, and encourage greater business and industry participation.

STRATEGY:

STEP 1 Continue to support FY&N programs in Hillsborough, Manatee and Pinellas counties, and assist in promoting and assessing the program by:

- Working with the Extension Service and local governments to develop common reporting protocols that better assess the impact of the program on reducing nutrient loads – such as mapping locations of participating households and total acres implementing FY&N, and estimating corresponding reductions in nitrogen loading.

- Encouraging more FY&N and pollution prevention education outreach to businesses, including builders, developers, and irrigation and landscaping specialists. (see Action SW-2)

- Emphasizing economic as well as environmental benefits of the Program. Coordinate with local and federal government Brownfields, Grayfields and Brightfields programs to optimize funding opportunities.

- Requesting information on how FY&N concepts are being implemented for publicly owned properties, such as government office complexes, parks, etc.

Responsible parties: Extension Services of Hillsborough, Pinellas and Manatee counties; TBEP

Schedule: Program ongoing. Initiate reporting protocols and other assessment tools in 2005.

SW-2

Assist Businesses in Implementing Best Management Practices to Reduce Stormwater Pollution, and Develop Model Landscaping Guidelines for Commercial Use

ACTION:

Assist businesses in implementing best management practices (BMPs) to reduce stormwater pollution, and develop model landscaping guidelines for commercial use.

STATUS:

Complete. Continue to monitor implementation.

BACKGROUND:

This action appears to be complete as written. The Florida Department of Environmental Protection (FDEP) and Bay Area counties all have active Pollution Prevention programs that provide voluntary, non-regulatory assistance with environmental compliance issues to local businesses.

Among the accomplishments:

- Several local P2 programs have expanded to include erosion and sedimentation from building sites as a priority issue for assistance in promoting best management practices (BMPs) to protect Tampa Bay and its tributaries from siltation and runoff associated with construction.

- The state Clean Marina Program requires marinas to implement BMPs for stormwater management as part of the "Clean Marina" designation process.

- FDEP is partnering with Enterprise Florida to provide services and assessments for manufacturing companies, and identify opportunities for businesses to implement self-audits and strategies for pollution prevention and waste minimization.

- The Environmental Protection Commission (EPC) of Hillsborough County operates an active Small Quantity Generator program. From January 2001-December 2004, the program performed on-site visits to approximately 3,166 businesses. In addition to verifying potential hazardous waste generators in Hillsborough County, these inspections provide an opportunity for EPC staff to discuss proper waste handling practices as well as require cleanup efforts for those facilities with environmental violations. EPC also mailed 56,000 notification fact sheets to affected businesses, and disseminated more than 10,000 pieces of related literature encouraging more efficient irrigation, use of Integrated Pest Management, and wise fertilizer use.

Additionally, EPC has signed Interlocal Agreements with Hillsborough County and the City of Tampa to assist in the reporting requirements of their stormwater-related National Pollutant Discharge Elimination System permits. Negotiations are currently underway with the City of Temple Terrace to establish a similar Interlocal Agreement.

- The Southwest Florida Water Management District, in cooperation with the other Water Management Districts, has completed a landscape ordinance model. Several local governments have adopted some elements of this model. Local governments in general have become stricter in landscaping requirements for new commercial buildings as a result of prolonged drought, and several now restrict the amount of turf grass that can be installed.

- Best management practices for the landscape industry have been revised statewide, and now encourage more efficient irrigation, use of Integrated Pest Management, and wise fertilizer application.

To more accurately quantify implementation of this action, there is a need to collect information from local governments on the number of businesses using BMPs for stormwater treatment and landscaping for inclusion in the CCMP action plan database. Targeting outreach assistance to individual business with repeated violations or problems might also be effective.

STRATEGY:

STEP 1 Request quantifiable information on the number of businesses using BMPs for stormwater treatment and landscaping for inclusion in the CCMP action plan database.
Responsible parties: TBEP
Schedule: Initiate in 2005

STEP 2 Ensure that BMPs being recommended are consistent among federal, state and local government agencies.
Responsible parties: federal, state and local agencies with P2 programs, through ABM or TBEP TAC
Schedule: 2006

STEP 3 Emphasize economic incentives of P2 programs for specific businesses and industries.
Responsible parties: agencies with P2 Programs, TBEP
Schedule: Ongoing

STEP 4 Request information from local governments on illicit stormwater discharge violations, to better target program to those sectors experiencing the greatest incidence of violations.
Responsible parties: TBEP
Schedule: 2006

STEP 5 Encourage the use of the "Florida Green Industries Best Management Practices for Protection of Water Resources in Florida" developed by the multi-agency effort of FDEP, FDACS, DCA, water management districts, UF and many private industry partners.
Responsible parties: TBEP
Schedule: Ongoing

STEP 6 Consider a "Bay Friendly Business" certification.
Responsible parties: Local governments, SWFWMD, FDEP, TBEP
Schedule: Initiate in 2006

SW-3

Encourage Local Governments to Adopt Integrated Pest Management Policies and Implement Environmentally Beneficial Landscaping Practices

ACTION:

Encourage local governments to adopt integrated pest management policies to reduce chemical use and implement environmentally beneficial landscaping practices.

STATUS:

Complete. Continue to monitor implementation

BACKGROUND:

This action is complete as written in the original CCMP. All local governments are actively utilizing IPM techniques in management of public lands, and all local governments have installed low-maintenance native or drought-tolerant landscapes in a variety of public areas.

For example:

- All local governments now employ IPM techniques on public lands to some extent. Hillsborough County and the City of Tampa adopted a formal resolution requiring the use of IPM on all county or city-owned lands. Clearwater also requires use of least-toxic pesticides and slow-release fertilizers by contractors that perform mainte nance on city-owned bodies of water.

- Several local governments sponsored seminars in IPM utilization or sent employees to free IPM training provided by the Cooperative Extension Service through a grant from the Florida Department of Transportation's NPDES Stormwater Task Force.

- Florida Yards demonstration projects have been created at several public facilities, including a post office in Tampa, roadway medians in Pinellas and Hillsborough counties, the Pinellas Trail easement, TECO's Manatee Viewing Center, and the County Center complex in Tampa. Manatee Community College also incorporated FY&N landscape and maintenance concepts throughout its campus.

- All local governments utilize native and drought-tolerant plants wherever possible at their park properties, as well as on road easements and street medians.

However, there is a need for additional education, particularly of city, county and state road maintenance crews, to ensure that road easements and ditches are not mowed or sprayed indiscriminately.

One successful model appears to be the Invasive Species Task Force in Hillsborough County, which originally was established by the Hillsborough County Commission to

foster communication and cooperation among intergovernmental departments with regard to exotic species control. Members include Parks and Recreation, Resource Management, Solid Waste, Mosquito Control and Highway departments. These departments work together on invasive plant removal projects on county-owned properties.

The Task Force has expanded its membership to include interested citizens, non-profit and educational groups, and launched an aggressive public outreach campaign in which TBEP has played a major role. For example, TBEP has sponsored several "Give A Day For The Bay" invasive plant workdays with the Task Force utilizing citizen-volunteers working in partnership with city and county personnel to remove invasive plants from county parks and preserves. Additionally, TBEP provided funding in 2003 for a field guide to invasive plants in Tampa Bay, targeted at both homeowners and professionals. Upcoming Task Force projects include a video being produced by the Hillsborough Extension Service and TBEP showing homeowners how to remove invasive trees, vines and shrubs from their landscapes, and a series of homeowner seminars on invasive plant identification and eradication.

STRATEGY:

STEP 1 Ensure that all state, city and county personnel using herbicides are practicing IPM.
Responsible parties: SWFWMD, DEP, local governments
Schedule: Ongoing

STEP 2 Consider ways to incorporate economic incentives and ensure consistency in implementation of IPM programs.
Responsible parties: Local governments
Schedule: Initiate next steps in 2005

STEP 3 Survey local governments to determine the extent to which IPM practices are being implemented by road maintenance crews.
Responsible parties: TBEP
Schedule: 2006

STEP 4 Promote benefits of IPM to water quality in ponds, lakes and streams as well as landscapes, possibly through the LakeWatch, StreamWater Watch and Adopt-A-Pond programs.
Responsible parties: local volunteer water monitoring programs
Schedule: Ongoing

STEP 5 Emphasize the connection between pesticide and herbicide use and contamination of bay sediments.
Responsible parties: FY & N Programs, local citizen-based water monitoring programs, TBEP
Schedule: Ongoing

STEP 6 Explore how IPM education programs can be delivered to commercial pesticide applicators more effectively.
Responsible parties: County Extension Services
Schedule: Initiate in 2005

SW-7

Enforce and Require the Timely Completion of the Consent Orders for the Cleanup of Fertilizer Facilities in the East Bay Sector

ACTION:

Enforce and require the timely completion of the consent orders for the cleanup of fertilizer facilities in the East Bay section of Tampa Bay.

STATUS:

Nearly complete. Incorporate monitoring of nitrogen loading and water quality data for fertilizer facilities in East Bay and upper Hillsborough Bay into WQ-1, as part of the Tampa Bay Nitrogen Management Strategy.

BACKGROUND:

In 1990, the Florida Department of Environmental Protection (FDEP) and the Environmental Protection Commission (EPC) of Hillsborough County discovered that five fertilizer-shipping facilities in the East Bay area were discharging high levels of nutrients into the bay. Subsequent investigations determined that fertilizer product spillage from these facilities was affecting the Bay, and that associated stormwater runoff was not meeting current water quality standards.

Following lengthy negotiations, the five terminal facilities entered into joint consent orders with FDEP and EPCHC in late 1991. The consent orders included requirements for regular sampling of stormwater discharges, assessments of wastewater flows and concentrations at the facilities, and sediment sampling at the facilities and around adjacent loading docks. After completing an assessment phase, the facilities were to implement comprehensive best management practices (BMPs) to curtail product spillage and reduce nutrient-enriched discharges.

Four of the five companies resolved the associated consent orders and currently operate under FDEP industrial wastewater permits, which include ongoing monitoring requirements. Environmental agencies report significant nutrient reductions in the East Bay sector as a result of the BMPs that have been implemented, and the percent of nitrogen delivered to the Bay from the facilities has dropped from 7% of the total load in 1992-1994 to approximately 1% or less of the total load in 1999-2003.

One company remains under consent order, though FDEP is working with the facility to secure compliance and place it under a valid operating permit pending resolution of TMDL limits for nitrogen in eastern Tampa Bay.

STRATEGY:

STEP 1 Resolve final active consent order and complete implementation of stormwater management systems at all associated facilities.

Responsible parties: FDEP
Schedule: 2005

STEP 2 Continue the monitoring and reporting of nitrogen loadings from fertilizer facilities (along with other point source discharges) as an element of the Tampa Bay Nitrogen Management Strategy (WQ-1).

Responsible parties: Fertilizer terminal operators, EPCHC, FDEP, TBEP

Schedule: Ongoing

SW-8

Encourage Use of Best Management Practices (BMPs) on Farms

ACTION:

Encourage implementation of effective best management practices (BMPs) on farms.

STATUS:

Ongoing.

BACKGROUND:

Implementation of effective best management practices, or BMPs, can help farmers reduce impacts to soil and water resources while maintaining economically viable crop production levels. BMPs generally include a broad array of structural and non-structural approaches to conserving water and reducing fertilizer and pesticide use.

Based on nitrogen loading estimates for 1995 – 1998, a period of major El Nino storm events, intensive agriculture accounts for about 12% of the bay's total nitrogen loadings. Whereas nitrogen loading from agricultural sources has decreased in some areas of the watershed due to improved irrigation and fertilization practices, public acquisition of former cropland, and reduction in the number of dairies, loadings from localized areas of south Hillsborough and Manatee counties are still significant.

While recommended practices exist – and are promoted — for virtually every commodity, there are relatively few BMPs adopted by rule for this region. To date, BMP manuals have been published for the horticulture or green industry; cow/calf operations; silviculture; aquaculture; agrichemical handling; and for citrus in the Indian River Lagoon region. A BMP manual on row crops entitled "Water Quality/Quantity Best Management Practices for Florida Vegetable and Agronomic Crops Manual," 2003 edition, was finalized in 2004.

The 1999 Florida Watershed Restoration Act provides a means for the agricultural community to satisfy federally mandated water quality targets. Farmers and growers that voluntarily implement BMPs receive a "presumption of compliance" for helping meet Total Maximum Daily Loads (TMDLs) in impaired watersheds. The Legislation directs the Florida Department of Agriculture and Consumer Services (FDACS) to develop and publish BMP manuals in cooperation with commodity groups and the University of Florida Institute for Food & Agricultural Sciences (IFAS). Participating farmers choose from a menu of approved BMPs, and then sign a notice of intent to implement them. The Florida Department of Environmental Protection (FDEP) verifies the effectiveness of those BMPs and the grower is presumed compliant and eligible for cost-share monies. DEP and FDACS submitted a report to the Legislature in 2005 detailing progress and participation in the voluntary program. A sufficiency review of the progress report to be conducted by the Florida Legislature may provide a strong incentive for increased participation by agriculture in the Tampa Bay Nitrogen Management Consortium.

While the program is still evolving, particularly in Tampa Bay where established BMPs are lacking for certain commodity groups, overall participation is good in commodities and regions where BMPs exist. For participating growers, presumption of compliance relieves them of having to satisfy more stringent regulations and opens the door to cost-share funding that makes it feasible to implement new technologies. The Agricultural Lands and Practices Act adopted by the 2003 Florida Legislature provides that local governments may not adopt ordinances or policies regulating farm operations if the activity is already regulated through best management practices or by an existing state, regional, or federal regulatory program. The Act does not apply to existing regulations.

The Southwest Florida Water Management District, in cooperation with FDACS, has developed an innovative, cost-share program with the agricultural community known as Facilitating Agricultural Resource Management Systems, or FARMS. The program offers farmers grant money to encourage utilization of BMPs that can, if effectively applied, foster efficient irrigation and help reduce wasteful irrigation runoff. This prototype program is currently fully funded by the Manasota and Peace River Basin Board, but could be expanded to other basins including the Southern Water Use Caution Area to enhance participation and environmental protection.

Incentives to farmers other than financial ones have been proposed from time to time to encourage implementation of BMPs. For example, a program that streamlined and consolidated permitting and monitoring requirements in exchange for a commitment to implement effective BMPs and other environmentally sound practices could be an attractive supplement to financial support programs for agriculture. The Aquaculture Certification Program recently adopted by FDACS includes various incentives for aquafarmers to implement BMPs and might serve as a model farm certification program for other commodity groups in the Tampa Bay watershed.

STRATEGY:

STEP 1 Ensure base-level utilization of agricultural Best Management Practices (BMPs) in accordance with the process and principles outlined in the 2001 FDEP "Report to the Governor and the Legislature on the Allocation of Total Maximum Daily Loads in Florida." The BMP manual for row crops, a key commodity group in the Tampa Bay watershed, is now being finalized.

Responsible parties: FDACS and FDEP; TBEP TAC and NMC (for review)

Schedule: Report to Legislature submitted in 2005; sufficiency review pending

STEP 2 Encourage regional cost-sharing programs for implementing BMPs, including grower investment, low-interest loans and grants, and other incentives to make implementation of BMPs more affordable. Explore expansion of SWFWMD's FARMS cost-sharing program (currently funded by SWFWMD and FDACS) beyond the Manasota and Peace River Basin Board boundaries.

Responsible parties: SWFWMD

Schedule: Ongoing

STEP 3 Improve rules and procedures for monitoring compliance with Agricultural Ground and Surface Water Management Plans and other voluntary programs. Consider cross-training agency staff to help streamline and improve compliance monitoring of voluntary programs.

Responsible parties: FDACS, SWFWMD and FDEP
Schedule: Ongoing

STEP 4 Evaluate the merits of a farm certification program that streamlines and consolidates permitting and monitoring requirements in exchange for a commitment to implement effective BMPs and other environmentally sound practices.

Responsible parties: FDACS
Schedule: By 2006

STEP 5 Conduct workshop to inform the Tampa Bay Nitrogen Management Consortium of various water quality improvement programs available to agriculture, particularly those that could contribute to nitrogen load reduction.

Responsible parties: TBEP and Nitrogen Management Consortium
Schedule: Conducted in 2005

Design and Implement A Low Impact Development Strategy

SW-10

ACTION:

Design and implement a strategy to promote Low Impact Development.

STATUS:

New action consolidating actions SW-4, SW-5, SW-6 and actions to improve habitat and wildlife benefits of stormwater ponds as recommended by the Community Advisory Committee.

BACKGROUND:

Low Impact Development (LID) is an innovative stormwater management approach based on managing rainfall at the source using uniformly distributed, decentralized controls. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. LID addresses stormwater through small, cost-effective landscape features located at the lot level. LID is a versatile approach that can be applied equally well to new development, urban retrofits, and redevelopment/revitalization projects. Low Impact Development is a logical approach to integrating three currently separate actions in the Stormwater Action Plan of the CCMP: reducing impervious surfaces (SW-4); meeting current stormwater standards on redeveloped properties (SW-5); promoting compact urban development (SW-6); and a CAC proposal to enhance the habitat and wildlife benefits of stormwater ponds.

Reduce impervious paved surfaces (SW-4): Impervious paved surfaces dramatically increase the flow of pollutant-laden stormwater runoff to the bay. While incorporating pervious paving in parking lots may not be as cost-effective as standard pavement, other design features – such as small swales, berms and gardens, using grass or gravel for overflow parking, and generally avoiding direct connection of impervious surfaces to pipes – can produce a significant payback.

The Southwest Florida Water Management District (SWFWMD) has conducted an evaluation of stormwater research projects the District has constructed since 1989. Preliminary results of monitoring runoff from the 11.5-acre Florida Aquarium parking lot show substantial reductions in runoff, even after accounting for dryer than normal conditions. Almost all stormwater was retained on site, based on comparisons of the volume of water discharged from various elements in the treatment train (swales, strands and ponds). Researchers estimate that discharge would have occurred only four to five times during a normal year, and in greatly reduced amounts.

Results from the Florida Aquarium research project indicate that permeable paving reduces runoff from small rain events, although swales are more effective overall for reducing runoff, and asphalt pavement is a significant source of metals and PAHs.

The general consensus is that there are important opportunities to significantly reduce runoff from parking lots, with minimal or no impact on parking space, by incorporating cost-effective, alternative designs. That effort is aided by significant advances in BMP technologies and options in the past decade since the TBEP study was completed, along with a flourishing low impact design movement.

Meeting current stormwater standards on redeveloped properties (SW-5):
While this action appears complete as written in the CCMP, it will be important to monitor stormwater treatment requirements for redevelopment in local government comprehensive plans and regulations to assure their adequacy.

All six TBEP local government partners indicate that they require stormwater treatment, or equivalent compensation, during redevelopment where new construction exceeds 3,000 square feet. Additionally, existing environmental resource permitting (ERP) rules require redevelopment to comply with stormwater rules in effect at the time of redevelopment.

Promote compact urban development (SW-6):
TBEP, the Tampa Bay Regional Planning Council and the Florida Department of Environmental Protection conducted a workshop in May 2004 to explore issues and opportunities associated with Low Impact Development. The workshop concluded that LID practices such as grassed swales, permeable paving, cisterns, rain gardens and other features may enhance stormwater treatment and storage, but that cost-benefit assessments of these techniques are lacking. A key recommendation was to conduct a side-by-side comparison of traditional versus LID techniques through a demonstration project. This workshop fulfilled the call for a Future of the Region conference in the original SW-6 Action.

A LID Design and Development Workshop also was conducted in April 2005 by Pascowildlife, Inc. and the Southwest Florida Water Management District. More than 80 workshop participants were trained by Larry Coffman, P.E., a recognized expert in LID technologies, in the principles and successful practices of Low Impact Development. At least 26 issues – real and perceived – impeding the implementation of LID in Florida and the nation were examined. The issues ranged from mosquito breeding in ponded areas and groundwater contamination to the need for more research to determine the effectiveness of LID practices.

Enhance the water quality and wildlife benefits of stormwater ponds:
The TBEP Community Advisory Committee recommended that the Management and Policy Boards consider several actions addressing the landscaping design and maintenance of stormwater detention ponds in the urban environment to improve water quality and expand habitat of native wildlife. The actions included: (1) requiring that new wet detention ponds be planted with native vegetation; and (2) requiring that new wet detention ponds include shallow littoral shelves wherever possible. A survey of local government and agency stormwater managers in the Tampa Bay area revealed that SWFWMD stormwater regulations already require creation of shallow littoral shelves on new wet detention ponds. However, SWFWMD rules and most local stormwater management ordinances do not require that native plants be planted along the pond shoreline.

STRATEGY:

STEP 1 Conduct a workshop on Low Impact Development (LID) co-sponsored by the Tampa Bay Regional Planning Council and prominent representatives of the development community. The purpose of the workshop will be to examine the principles and practices of LID and to determine if there is sufficient support at local government staff and policy-making levels and interest within the development community to pursue implementation of LID practices in the Tampa Bay region.

Responsible parties: TBRPC, TBEP
Schedule: Completed in May 2004

STEP 2 Conduct a side-by-side demonstration project of LID versus conventional stormwater management techniques to quantify costs and benefits, incorporating long-term operational and maintenance costs.

Responsible parties: TBEP, FDEP and other appropriate partners
Schedule: Identify project site and public/private partners by the end of 2006; construct demonstration project by 2008.

STEP 3 Incorporate elements of Low Impact Development specifically pertaining to stormwater management into the Strategic Regional Policy Plan; local government comprehensive plans; local development and redevelopment codes and stormwater management ordinances; and long-range transportation plans as needed. Include flexibility and incentives in those documents, where appropriate, to encourage developers to utilize LID features and alternatives for commercial and residential developments – particularly for parking areas — without lengthy permitting delays.

Responsible parties: Local governments through EAR process; FDEP for rule revision if appropriate.
Schedule: Initiate in 2005

STEP 4 Package and promote Low Impact Development practices through professional engineering and development associations.

Responsible parties: Professional engineering associations, such as the Florida Stormwater Programs Association; homebuilder associations
Schedule: Following completion and monitoring of side-by-side comparison pilot project (STEP 2).

STEP 5 Monitor implementation of LID strategies through updates by TBEP partners in their local action plans. Also, monitor implementation of local government ordinances requiring older properties being redeveloped to meet current stormwater treatment standards for that portion of the site being redeveloped, or provide equivalent compensation.

Responsible parties: TBEP local partners
Schedule: Following integration of LID practices in local comprehensive land use plans and land development codes.

SW-11

Expand the Adopt-A-Pond Program to Additional Communities

ACTION:

Expand the Adopt-A-Pond Program developed by Hillsborough County to additional communities to assist homeowners in maintaining and improving residential stormwater ponds.

STATUS:

New action.

BACKGROUND:

State and local regulations require that new stormwater ponds be designed and constructed to maximize their ability to retain and treat stormwater runoff before it is discharged to a larger waterway and, ultimately, to Tampa Bay. In fact, well-constructed and properly maintained stormwater ponds are essential to preserving water quality in Tampa Bay. They also serve an important secondary role for wildlife, by providing feeding and breeding areas for birds, amphibians and other creatures in urban areas where natural habitats are rapidly disappearing.

However, long-term maintenance of the ponds to ensure that they continue to provide these ecological benefits is a widespread problem. Typically, ponds in new developments are deeded to a homeowners association once the residential construction is complete. As the ponds age and begin to fill with sediments and excess nutrients from runoff, severe water quality problems may result. The homeowners association may be unwilling or unable to properly maintain the pond, or simply not know what types of management practices should be adopted.

Since 1992, the Adopt-A-Pond program has been helping neighborhoods in Hillsborough County improve the water quality, wildlife habitat value and aesthetics of stormwater ponds. This innovative partnership between the county and the Southwest Florida Water Management District empowers residents to take charge of their ponds through hands-on advice and assistance.

Among other benefits, participating neighborhoods receive a free one-time dredging of their pond; free native plants with which to landscape their pond; on-demand advice and occasional “pond walks” from a county biologist; and instruction in monitoring the water quality of the pond.

To be eligible for the program, the neighborhood’s stormwater pond must be owned by the county or, if privately owned, must have at least one drainage easement dedicated to Hillsborough County. Additionally, neighborhoods must sign an agreement pledging to monitor their pond’s water quality, plant native vegetation and submit regular maintenance reports to the county.

Although not all-encompassing, the Adopt-A-Program is a highly cost-effective way of addressing at least a portion of the residential stormwater ponds located within a community. The annual cost of the program for Hillsborough County is about $120,000, excluding the salary of one full-time staff member. The capital outlay for a Schaeff dredge machine (to conduct the one-time pond clean-out) is about $100,000. The Adopt-A-Pond Program can be operated without offering the one-time pond dredging; in fact, dredging is not possible for ponds without public easements. However, officials agree that, where practical, one-time dredging is a much-needed service that provides a strong incentive for neighborhoods to participate in the program. Chemical treatment (alum) also could be offered as an alternative to dredging.

Education is an important component of the Adopt-A-Pond program. A full-color brochure about the program was completed in 2002, and more than 5,000 citizens receive the quarterly newsletter. Adopt-A-Pond participants receive an Adopt-A-Pond notebook, aquatic plant identification references, educational meetings, pond walks, neighborhood signs, waders, native plants, a Pond Management Plan workbook, an annual pond seminar, annual awards and county staff support as needed.

The Storm Drain marking portion of the program provides materials to mark storm drains and participates annually in the Tampa BayWatch "Paint Tampa Bay Clean" event. The Storm Drain Marking program includes door-hangers, which are distributed door-to-door to educate residents about stormwater pollution.

While several bay area communities offer occasional pond improvement/restoration seminars or distribute educational materials about pond care, the direct assistance and long-term monitoring offered by the Hillsborough Adopt-A-Pond Program set it apart.

Currently, there are more than 150 ponds in the Hillsborough Adopt-A-Pond program.

STRATEGY:

STEP 1 Organize a seminar on the Adopt-A-Pond Program and invite stormwater managers from all over the region to attend to learn more about the program.

Responsible parties: TBEP, TBEP's Community Advisory Committee, Hillsborough County

Schedule: 2006

STEP 2 Encourage expansion of the Adopt-A Pond Program into at least one additional community every 3-5 years by identifying potential funding sources and assisting interested communities in applying for grants to jump-start an Adopt-A-Pond program, or to develop a similar initiative providing direct assistance to neighborhoods with publicly owned ponds.

Responsible parties: TBEP, Southwest Florida Water Management District

Schedule: Ongoing

AD-1

Continue Atmospheric Deposition Studies to Better Understand the Relationship between Air and Water Quality

ACTION:

Continue atmospheric deposition studies to increase understanding of the relationship between emissions and deposition to the bay, and the effect on Tampa Bay water quality.

STATUS:

Ongoing. Strategy revised in 2004.

BACKGROUND:

Intensive research on atmospheric deposition over the past seven years has addressed many important questions about air quality and air pollutants that end up in the bay, leading to better informed management efforts.

Of key concern are nitrogen oxides, or NOx, which contribute to the formation of ozone, an air pollutant of great public health concern in Florida. NOx emissions from power plants also increase the bay's nitrogen burden, spurring algal growth that can ultimately harm vital underwater grassbeds. Air pollution from stationary sources (oil and coal-fired power plants and waste incinerators) and mobile sources (including cars, trucks and boats) may also transport significant quantities of heavy metals to the bay.

Results of recent investigations indicate that:

- Tampa Bay's "airshed" includes all of Florida and south Georgia, and about 35% of the air pollutants that wind up here come from outside the region.
- About 20-30% of the bay's total nitrogen burden falls directly to the surface of the bay from the atmosphere. However, atmospheric deposition's true contribution is greater when air pollutants falling in the watershed are considered, since a portion of these will eventually enter the bay in stormwater runoff. Current estimates are that 15% of the atmospheric nitrogen falling on the watershed eventually reaches the bay through stormwater runoff.

Even though power plants are the largest local source of nitrogen emissions, preliminary investigations suggest that motor vehicles (including cars, trucks and boats) may account for half of the direct atmospheric deposition to the bay. That's because emissions from power plant stacks are more likely than those from low-to-the-ground vehicles to travel outside our watershed.

The relative contribution between wet deposition (pollutants transported in rainfall) and dry deposition (dust and particulates) is about 1:1 over water. Gaseous pollutants like ammonia and nitric acid deposit locally; aerosols are carried long distances before depositing either in dry fall or rainfall.

Several recent developments are working in the bay's favor. Tampa Electric Company's agreement, based on 1999 settlements with EPA and DEP, to clean up its Big Bend facility and convert its Gannon plant from coal to natural gas, will reduce NOx emissions from those plants more than 90% by 2010. The largest single source of NOx emissions in the region and among the largest in Florida, TECO's Big Bend and Gannon facilities together emitted 119,000 tons of NOx in 1996. NOx emissions will fall to 10,000 tons by 2010, translating into a reduction of 273 tons of nitrogen to the bay over the 14-year period. In addition, every boiler at Big Bend is now being scrubbed to control sulfur dioxide, the pollutant that causes acid rain. The utility is also cooperating with DEP to study the effects of air pollution on Tampa Bay with research funded through settlement fines.

The Environmental Protection Agency has recently finalized regulations for newly produced commercial and recreational marine diesel engines. These standards are for NOx, hydrocarbons, particulate matter, and carbon monoxide emissions. Many of the Tier 1 standards became mandatory in 2004 and stricter Tier 2 standards will begin as early as 2004 for smaller vessels. Larger Category 3 vessels, such as container ships and cruise ships, are subject only to NOx emissions standards.

Additionally, while more people will bring more cars to the region in the coming years, vehicle emissions are likely to remain steady or decline as new regulations clamp down on per-car emissions.

On the other hand, a reduction in NOx concentrations associated with Florida Power & Light Company's decision to convert two units at its Manatee County plant to "co-fire" natural gas and oil will be offset by an overall rise in NOx emissions as the plant expands generating capacity to meet increasing demand in fast-growing Manatee County.

Many important questions about air pollution and its effect on the bay remain. Researchers don't yet know, for example, how much of what is emitted from sources in the Tampa Bay watershed actually is deposited in the bay, or what the effects of emissions from commercial and recreational boats may have on air quality and the bay. Additional studies already planned for Tampa Bay will help answer some of these critical questions.

STRATEGY:

STEP 1 Continue studies to determine the sources and impact of atmospheric pollutants on the bay:

- Support continuation of BRACE (Bay Regional Atmospheric Chemistry Experiment) through the repowering of TECO's Gannon plant (from coal to natural gas) in 2004, to quantify and track effects of reduced emissions on atmospheric loadings of total nitrogen. Validate 15% indirect contribution and be more specific regarding sites, (e.g., basins or land use). Increase understanding of the impacts of denitrification.

  Responsible parties: FDEP and USF College of Public Health
  Schedule: Ongoing

AD-1

- Support continuation of AIRMon monitoring to estimate long-term wet deposition tracking.
  Responsible parties: FDEP
  Schedule: Ongoing, but may be limited duration

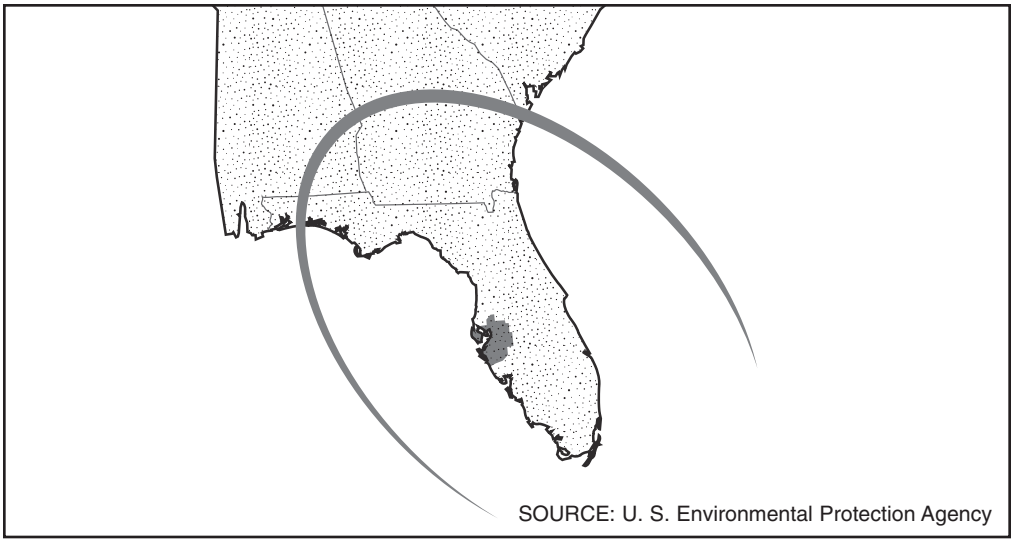
- Quantify the relative contribution of motorboat and ship exhaust to atmospheric deposition.
  Responsible parties: USF College of Public Health (student thesis)
  Schedule: 2004-2005

- Pursue estimating effects of Clean Air Act reductions so they can be incorporated into nutrient reduction action plans. The TBEP nitrogen management plan currently does not reflect "credits" from anticipated reductions that have not yet been quantified.
  Responsible parties: EPA and TBEP
  Schedule: 2005

- Continue collaboration at the regional, state and national levels to curtail air pollution (long-range transport) impacting the bay from outside the region. Gain a better understanding of the impacts of long-range pollution to local and regional areas.
  Responsible parties: Local, state and federal governments involved with the Tampa Bay Atmospheric Deposition Study (TBADS)
  Schedule: Ongoing

- Track atmospheric mercury concentrations from the Chassahowitzka NWR monitoring station, and track mercury concentrations in fish tissue from Tampa Bay.
  Responsible parties: TBEP and FWRI (for fish tissue concentrations)
  Schedule: Initiate tracking in 2005

Principle Oxidized Nitrogen Airshed for Tampa Bay



SOURCE: U. S. Environmental Protection Agency

Promote Public and Business Energy Conservation

ACTION:

Promote public and business energy conservation.

STATUS:

Ongoing. Strategy refocused in 2004 to concentrate on energy conservation related to motor vehicles.

BACKGROUND:

This action appears mostly complete as originally written in the CCMP, with multiple programs in place in both the public and private sector to encourage and reward energy conservation.

EPA's Green Lights program was incorporated into the Energy Stars program in 1998. EPA and TBEP sponsored an Energy Stars workshop targeting hospitals in the Tampa Bay area, and EPA continues to market the program in the region. Among the participants are Hillsborough County, Tampa General Hospital, Eckerd Corporation, Oxford Properties, Verizon, the Hillsborough County School District and the University of South Florida.

Nationwide, there are more than 13,000 Energy Star qualifying models in over 35 product categories nationwide, including VCRs, computers and major household appliances. To earn the Energy Star, these products meet strict energy efficiency guidelines set by the EPA and U.S. Department of Energy.

Examples of other energy conservation initiatives include:

- A wealth of rebate programs, free energy audits and other incentive programs sponsored by local utilities such as TECO, FP&L and Progress Energy to increase efficiency of appliances, heat pumps, ducts, insulation, etc. Progress Energy also maintains six experimental solar-powered homes in Palm Harbor that are being monitored as part of an effort to reduce the cost of photovoltaic cells and assess the energy savings of solar-powered systems.

- TECO has recently initiated its Smart Source Renewable Energy Program, in which customers pay a small monthly fee to purchase a portion of their monthly power needs from renewable energy sources such as organic waste. Currently, about 200 residential customers and 10 businesses participate, but that number is expected to increase as awareness and marketing of the program expands.

- The City of Tampa has developed its own energy-saving program, which includes a demonstration site at the Tampa Municipal Office Building.

AD-2

The program is now being expanded to community and recreation centers, fire stations and other city buildings. The Tampa Convention Center has also implemented improvements in energy-saving lighting, and the city estimates that a 45% savings in energy use has been achieved there.

- The Tampa Bay Regional Planning Council has initiated the "TELEWORK Tampa Bay" program to promote and assess the benefits of tele-commuting to local businesses. TBEP is among the companies and organizations participating in the program.

- FDEP's Small Business Assistance Program provides confidential, free technical and regulatory assistance to businesses statewide in the form of light/heating/air conditioning energy audits.

- The City of St. Petersburg is continuing to implement city-wide energy conservation measures, including replacing inefficient/high maintenance chillers and air handling units with state-of-the-art systems and controls at the Mahaffey Theater and St. Petersburg Police Department. The city has also replaced incandescent lighting systems with fluorescent systems in 26 city buildings. In addition, the city has completed retrofitting of street lighting systems from metal halide and mercury vapor to high pressure sodium

- The Extension Service has developed a series of workshops to promote "green" home building and buying. "Build Green and Profit" shows home builders how to incorporate eco-friendly components, while "Buy Green and Save" teaches homebuyers the benefits of "green" construction, and "Sell Green and Profit" educates realtors and mortgage brokers about discount or tax incentive programs available for "green" homes. Energy conservation is a major element of all these workshops.

Despite these substantial successes, more could be done especially in the private sector and among individual homeowners to conserve energy. And TBEP and its partners could do a better job of explaining the link between energy usage and water quality in the bay, particularly the connection between automobiles and pollution from nitrogen, air toxins and carbon dioxide.

STRATEGY:

TBEP will focus its efforts on energy conservation as it relates to motor vehicles, since research is showing that emissions from vehicles are a primary source of nitrogen loadings to the bay.

STEP 1 Work with commuter and public health organizations, such as Bay Area Commuter Services, local MPOs and the American Lung Association, to better publicize the link between air and water quality, and public health.

Responsible parties: TBEP Partners
Schedule: Initiate in 2005 and continue thereafter

STEP 2 Encourage carpooling, vanpooling, telecommuting, and other alternative

forms of transportation. Emphasize the link between obesity and the built environment, which currently discourages walking.

Responsible parties: Local commuter agencies, TBEP partners, TBRPC

Schedule: Ongoing

STEP 3 Assist in promoting the use of fuel-efficient hybrid vehicles in government and industry fleets.

Responsible parties: TBEP

Schedule: Initiate in 2005-2006 and continue thereafter

STEP 4 Assist in evaluating the potential impacts to the bay of various transportation strategies and alternative fuel sources.

Responsible parties: ABM, TBEP

Schedule: Ongoing, as needed

Expand the Use of Reclaimed Water Where Reuse Benefits the Bay

WW-1

ACTION:

Expand the use of reclaimed water where reuse benefits the bay.

STATUS:

Ongoing.

BACKGROUND:

Efforts to develop and expand reclaimed water systems in the Tampa Bay watershed for irrigation and natural system restoration continue at a breathtaking pace, reducing the region's dependence on groundwater while saving the bay from an overly rich diet of nutrients discharged in treated wastewater. However, reductions to the bay's nitrogen loadings must be balanced against the need to preserve and restore water flows in areas where restricted flows could harm juvenile fisheries.

Local government wastewater reuse has more than doubled since the region's bay management blueprint, *Charting the Course*, was finalized in 1996 – and is expected to double again by 2010. Pinellas, Pasco, Hillsborough and Manatee counties used more than 89 million gallons per day (mgd) of reclaimed water in 2000, up from 40 mgd in 1996. That represents almost 40% of the 227 mgd of wastewater produced in the four-county region, offsetting the need to tap existing or new potable water supplies by an estimated 55 mgd.

Early efforts by St. Petersburg paved the way in the use of reclaimed water. Pinellas County (and the cities therein) remain at the forefront, with approximately 46 mgd of reclaimed water, followed by Hillsborough County's 20 mgd, 15.5 mgd in Manatee County and 7.5 mgd in Pasco County. Combined expansions in the region are expected to increase the reclaimed water supply by as much as 105 mgd for a total reclaimed water use of 194 mgd by 2010, or approximately 73% of the 265 mgd of the treated wastewater these counties are projected to produce.

These efforts bring the region closer to meeting the reuse goals of the Southwest Florida Water Management District to utilize at least 75% of the available reclaimed water supply, and to promote efficient use of the water once it reaches customers to further relieve demand for freshwater and groundwater sources. The District is meeting these goals by:

- Maximizing local reuse to meet water demands

- Using technology to increase the efficiency of reclaimed water by managing demand (through education and meters) and pursuing wet-weather aquifer storag and recovery (ASR), and

• Interconnecting systems to move excess flows to areas where it's needed and when it's needed.

ASR technology was developed to help communities address demand and supply challenges, which can force them, for example, to dump excess water in wet-weather months while leaving them without enough water to meet demand during dry periods. Efforts to interconnect local and regional systems may also help to alleviate demand and supply problems. Tracking ASR projects and potential benefits and impacts will be an element of the first step of this action.

An issue identified by the TAC during review of this action is the need for education of managers of large areas receiving reclaimed water on the proper application of reclaimed water. Maintenance of irrigation systems for ball fields, golf courses, and larger landscaped areas around public or private buildings will ensure that reclaimed water is not being directed to stormwater drains (and eventually to the bay) from impervious surfaces. Education should focus initially on areas around the bay and tributaries.

REUSE BY COUNTY, 2000-2010 (as of November 2003)

Pinellas County

Ongoing reuse expansion projects between 2000 and 2005 are expected to supply an additional 18 mgd of reclaimed water and offset 8 mgd of potable quality water. Project sponsors include Pinellas County; the cities of Clearwater, Largo, Oldsmar, Pinellas Park, Dunedin, Tarpon Springs and St. Petersburg; and On Top of the World Utility. Most of these utilities are also pursuing Aquifer Storage and Recovery (ASR) of reclaimed water, coupled with system interconnects, to maximize utilization of reclaimed water and increase system reliability.

Between 2000 and 2010, new construction projects may result in an additional 27 mgd of reuse, offsetting at least 12 mgd of potable quality water.

Pasco County

Ongoing expansion of reclaimed water systems in Dade City, New Port Richey, and Zephyrhills, along with Aloha Utility and Pasco County Utilities, are expected to supply an additional 1.3 mgd of reclaimed water to the county between 2000 and 2005, while offsetting 1 mgd of potable quality water.

By 2010, new reuse projects may produce another 4 mgd of reclaimed water, offsetting 2.4 mgd of potable quality water. Pasco County also may be receiving reclaimed water through the Hillsborough River Watershed Regional Reclaimed Water Project, and the Largo/Clearwater/Pasco ASR-Interconnect Project following city approvals, to restore lakes and wetlands damaged by excessive groundwater pumping. Altogether, about 13 mgd of reclaimed water from the cities of Tampa, Largo and Clearwater will be used to recharge and restore these natural systems.

Hillsborough County

Substantial reuse expansion projects are planned and underway in Hillsborough County. Between 2000 and 2005, Tampa, Temple Terrace, Plant City and Hillsborough County are expected to expand reuse by an additional 20 mgd, offsetting 12 mgd of potable water. Additionally, Hillsborough County Utilities permitted and constructed Florida's first ASR and is currently exploring other ASR expansions to store wet-season reclaimed water supplies. Future innovations include investigations to determine the potential of ASRs to prevent aquifer saltwater intrusion.

The City of Tampa, Pasco County, Hillsborough County, and the City of Temple Terrace are jointly planning the Hillsborough River Watershed Regional Reclaimed Water Project. If completed, the project will interconnect their reclaimed water systems to maximize utilization and increase system reliability, while boosting restoration of vital natural systems. About 6 mgd of reclaimed water could be distributed below the Hillsborough River dam to meet minimum flows during the dry season, and an estimated 10 mgd could be used to recharge and restore wetlands in Pasco and Hillsborough counties damaged by excessive groundwater pumping.

Between 2000 and 2010, local governments within the county plan to construct reclaimed water projects resulting in an additional 55 mgd of reclaimed water, which will eliminate the need for more than 36 mgd of potable quality water.

Manatee County

Expansion of reclaimed water systems in Manatee County is similar in scope to those for Pinellas County. Between 2000 and 2005, the cities of Bradenton and Palmetto, together with Manatee County's "Manatee Agricultural Reuse Supply" (MARS) project, are expected to supply an additional 7.4 mgd of reclaimed water, offsetting another 5.5 mgd of potable quality water. The MARS project also is pursuing ASR and system interconnects.

Between 2000 and 2010, new reuse projects could produce another 18.6 mgd of reclaimed water, offsetting at least 12.7 mgd of potable quality water.

STRATEGY:

STEP 1 Complete calculations of actual nitrogen reductions associated with reclaimed water through 2003 (TBEP). Using the SWFWMD Regional Reuse Plan as a base, update information on major reuse projects, ASR and interconnects, including project name, reuse volume, total nitrogen reduction, where reduction will occur, and project status.

Responsible parties: TBEP
Schedule: 2005-2006

STEP 2 Identify and evaluate issues associated with downstream augmentation on rivers.

Responsible parties: ABM/TBEP TAC and Tampa Bay Water for identification of issues; Tampa Bay Water for evaluation of issues

Schedule: Identification of issues for the Hillsborough River and Tampa Bypass Canal completed in Spring 2005; evaluation completed Fall 2005.

STEP 3 Develop and implement education for institutions (e.g., schools; government buildings, parks and open spaces; hospitals) and public and private golf courses on the proper application and maintenance of reclaimed water systems for landscaped areas. Establish cut-off valves for use where applicable.

Responsible parties: Local governments, SWFWMD and Tampa Bay Water

Schedule: 2006

STEP 4 Reevaluate next steps based on results of updated loading estimates by the Tampa Bay Estuary Program Nitrogen Management Consortium in 2005.

Responsible parties: TBEP, Tampa Bay Nitrogen Management Consortium

Schedule: 2005-2006

WW-2

Extend Central Sewer Service to Priority Areas Now Served by Septic Systems

ACTION:

Extend central sewer service to priority areas now served by septic systems.

STATUS:

Ongoing.

BACKGROUND:

While most bay-related septic system investigations have focused on the impact of nitrogen loadings from septic tanks (thought to be relatively minor overall), recent studies have shifted the spotlight to bacterial pollution from older, malfunctioning septic tanks. A 1999 survey of 22 rural, urban and beach water sites around Tampa Bay identified Allen's Creek and the Courtney Campbell Causeway in Pinellas County, and Hillsborough County's Sweetwater Creek and Bullfrog Creek, as problem spots. The sites were surveyed using a variety of traditional and alternative indicators, and included bacterial source tracking, coliphage testing (for the presence of viruses and indication of recent fecal pollution) and direct pathogen monitoring for viruses and parasites.

Bullfrog Creek and Sweetwater Creek were among the most heavily polluted. These sites not only revealed increased coliphage levels, but also high levels of human fecal contamination based on virus testing and bacterial source tracking. Bullfrog Creek near Riverview in southern Hillsborough County is bordered by fairly intense residential and commercial land uses and there is no central sewer service. Sweetwater Creek on Old Tampa Bay's northwestern shore, by comparison, drains a largely residential area with a mixture of central sewer service and septic tanks, which may or may not be the cause of the contamination.

The most heavily impacted site in Pinellas County was Allen's Creek. Older septic systems dominate in the largely residential communities bordering its shores, and efforts to convert portions of these neighborhoods to central sewer service are underway. While the nitrogen loading from septic systems is a concern, so are other chemicals including phosphates and "emerging contaminants" such as pharmaceuticals and metabolites.

Conversion from septic to sewer service can be costly, with residential hookup fees ranging anywhere from $2,000 to $5,000 or more. That underscores the need for financing options such as interest-free loans and cost-sharing grants to assist residents in areas slated for conversion. Additionally, the availability of central sewer service may actually encourage higher density development in environmentally sensitive areas, an issue local governments must consider in their long-term planning.

Jurisdictional boundaries can further complicate matters. Most of the remaining septic

tanks in the Allen's Creek watershed, for example, are located in unincorporated Pinellas County in numerous enclaves inside Clearwater city boundaries and far from Pinellas County sewer lines. Accessing sewer hookup from Clearwater may require residents to annex into the City, or for the City to agree to provide sewer service to residents in County enclaves as Largo has done.

Another problem recently identified is that numerous neighborhoods with septic tanks have been upgraded with central service on their streets, but for a variety of reasons, many homes and possibly even businesses have not connected to sewer service. In some cases, septic systems have been operating for many years despite readily available sewer service.

In some instances the link to septic tanks as the cause of contamination is strong; in other areas, less so. This revised action calls for a review of current knowledge regarding the environmental impacts of septic tanks to identify appropriate next steps. These next steps may include additional source tracking and/or epidemiology studies to quantify the human health risks associated with the levels of pollutants.

Bacterial contamination at some level is common in all surface waters. Sources of these contaminants range from wildlife and domestic animal waste to septic tanks and sewer overflows, and not all bacteria are harmful to humans. The Healthy Beaches Study used a variety of indicators to focus in on potential trouble spots, then used source tracking to further identify areas most heavily impacted by human contaminants. One of the most striking findings was the extent to which animals (wild and domestic) dominate as a source of fecal coliforms. In 73.6% of all water quality samples, the majority of isolates were from non-human sources. The Healthy Beaches report, coupled with source typing in the City of Clearwater's Stevenson Creek study, also show that septic systems on low-lying land near creeks can leak into water bodies.

Local government partners are taking steps to remediate problem areas where feasible.

In Pinellas County

A watershed management plan completed in 1996 identified approximately 1700 septic systems in the Allen's Creek watershed. By 2000, the City of Largo had converted the 130 within its boundaries to central sewer service. Nearly all of the septic tanks that remain are north of Belleair Road, in numerous small (unincorporated) Pinellas County enclaves inside Clearwater city boundaries but far from Pinellas County sewer lines.

The City of Clearwater conducted a sewer expansion feasibility study and conceptual sewer layout in April 2002. The study identified 1,674 residential homes with septic tank systems (9% of the properties) in the Allen's Creek watershed. However, funding is not currently available to implement sewer expansion. Accessing sewer service will also require annexation into the City.

Pinellas County also has completed all identified sewer line extensions and collection system construction in its service area around Lake Tarpon,

though many septic tanks remain within the City of Tarpon Springs' service area adjacent to the lake.

The City of St. Petersburg continues to inventory the septic tanks in its service area. At this time 95 tanks have been located, with the vast majority located in the Snug Harbor area of unincorporated Pinellas County. Some properties here are connected to the city sewer system. While there are no plans at present to expand sewer service in this area, rapid property turnover may prompt future expansion.

In Hillsborough County

Hillsborough County DOH will assess findings from the Healthy Beaches report and other sources to identify areas where septic tank conversion may be desirable and feasible.

In Manatee County

In Manatee County, all areas where septic systems are suspected of causing water quality impacts are either already on the County's central sewer system, or have been included for assessment in Manatee County Comprehensive Plan Capital Improvement Element for connection to central sewer. The only coastal area that still has septic systems is a portion of Terra Ceia Bay. In 2004 the county implemented new, countywide requirements that mandate a 400-foot setback from waterways for new septic systems, encompassing freshwater, marine and tidal waters. If this setback is not feasible, then performance-based standards providing Advanced Wastewater Treatment must be achieved by the septic system.

STRATEGY:

STEP 1 Include this action in both the Wastewater (nutrients) and the Public Health (pathogens) sections of the Water and Sediment Quality Action Plan.

Responsible Parties: TBEP
Schedule: 2005

STEP 2 Assess progress towards removal of package plants.

Responsible parties: TBEP, working with FDEP and local governments
Schedule: 2005-2006

STEP 3 Convene small working group of local health department designees, along with experts from FDEP, SWFWMD and USF, to:

- Review relevant findings from the 2001 Healthy Beaches report and EPA's 1997 Response to Congress on the Use of Decentralized Wastewater Treatment Systems.
- Evaluate progress on sewering older areas dominated by septic tanks.
- Create a map of central sewer service areas for the watershed, by compiling county and city maps.

- Determine factors contributing to failure of septic systems and create a map overlay of these factors.

- Evaluate how best to encourage homes and businesses with access to central sewer to connect, including potential funding opportunities.

- Determine whether additional research is needed in areas where high levels of human fecal contamination have been documented to trace sources or associated human health risks.

- Evaluate current septage design standards and monitoring.

- Discuss whether environmental performance or design standards for septic tanks to address nitrogen impacts are warranted or worth pursuing.

- Evaluate new performance-based systems for possible use in the Tampa Bay area.

- Address septage spreading as a nutrient and public health concern, and as a source water protection issue.

- Identify next steps and strategic opportunities for collaboration.

- Assess maintenance/inspection requirements for existing systems in identified "hot spots" of bacterial contamination.

- Determine the density and impacts of septic systems during development review process.

- Develop recommendations for setback requirements, considering local conditions.

  Responsible parties: TBEP to convene working group; participants as noted

  Schedule: 2005-2006

STEP 4 Increase educational outreach in problem areas to encourage proper operation and maintenance of septic systems, and encourage hook-up to central service where it is available. See Pinellas County literature developed for Allen's Creek, which could be adapted by other local governments.

Responsible parties: Local governments

Schedule: 2005-2006

Require Standardized Monitoring of Wastewater Discharges

WW-3

ACTION:

Require standardized monitoring of wastewater discharges to improve the accuracy and timeliness of pollutant loading estimates.

STATUS:

Ongoing.

BACKGROUND:

Important strides have been made in implementing this action. For example, FDEP now requires domestic wastewater facilities in the Tampa Bay watershed to monitor and report TN, TP, and TSS and other parameters including ammonia if they are reasonably expected to cause or contribute to water quality degradation or standard violations in the receiving water body.

FDEP data entry also has been centralized for discharge monitoring report (DMR) data for dischargers to state surface waters. FDEP strives to enter the data within 30 days of submittal. The Department is also testing a new Electronic Discharge Monitoring Report system that allows permit holders to submit monitoring data electronically and thereby expedite entry in the database. TBEP has offered to help FDEP assess the accuracy of output from the database. FDEP also has established a Statewide Monitoring Program Core Group that has been meeting to review and inventory existing monitoring programs, formats, types of information, and posting/linkage opportunities.

On the local level, EPCHC currently maintains its own files of discharge monitoring reports (DMRs) and data.

While all point source discharges may be required to report the concentrations of monitored parameters in consistent units (e.g., mg/l), a number of industrial facilities are not currently required to report their TN, TP, and TSS discharges. Many of these facilities report discharge concentrations of only a subset of nutrient forms (e.g., unionized ammonia, ortho-phosphate), and often do so in a way (e.g., without concomitant flow data) that is not conducive to the calculation of accurate loading estimates. In recent years, this lack of standardization has caused problems for watershed management programs seeking to estimate cumulative loadings of TN, TP, and TSS to receiving water bodies such as Tampa Bay and Charlotte Harbor.

STRATEGY:

STEP 1 Require the measurement and timely reporting (including standardized reporting units) of a core group of parameters — including TN, TP, TSS, and average daily or monthly flow — from point-source facilities in the Tampa Bay watershed with National Pollutant Discharge Elimination

System (NPDES) permits discharging an average daily flow of more than 100,000 gallons of wastewater, when discharge of a constituent is reasonably expected to contribute to water quality degradation.

Responsible parties: FDEP
Schedule: Initiate in 2005

STEP 2 Improve access to the FDEP computerized databases for permit compliance and for wastewater spills at the regional level through District offices.

Responsible parties: FDEP
Schedule: 2005

STEP 3 Assess accessibility and usefulness of FDEP's discharge monitoring database(s) and send a letter to FDEP outlining recommendations. If necessary, consider options for a reliable and accessible Tampa Bay regional database of discharge monitoring reports.

Responsible parties: TBEP
Schedule: 2005-2006

TX-1

Address Hot Spots of Toxic Contamination in the Bay

ACTION:

Identify and remediate priority "hot spots" of toxic contamination in the bay.

STATUS:

Ongoing.

BACKGROUND:

A Tampa Bay Benthic Index (TBBI) has been adopted which provides a measure of the health of bottom-dwelling animal communities in the bay. This Index assesses the severity of contamination at various sites based on lack of diversity or abundance of benthic organisms, low dissolved oxygen concentrations, or exceedances of contamination thresholds for heavy metals, PAHs and other toxics.

Areas of the bay are being ranked from degraded to healthy based on an analysis of benthic communities using the new Benthic Index. Goals for improvement will likely focus on maintaining healthy areas while steadily upgrading the quality of degraded bay sectors.

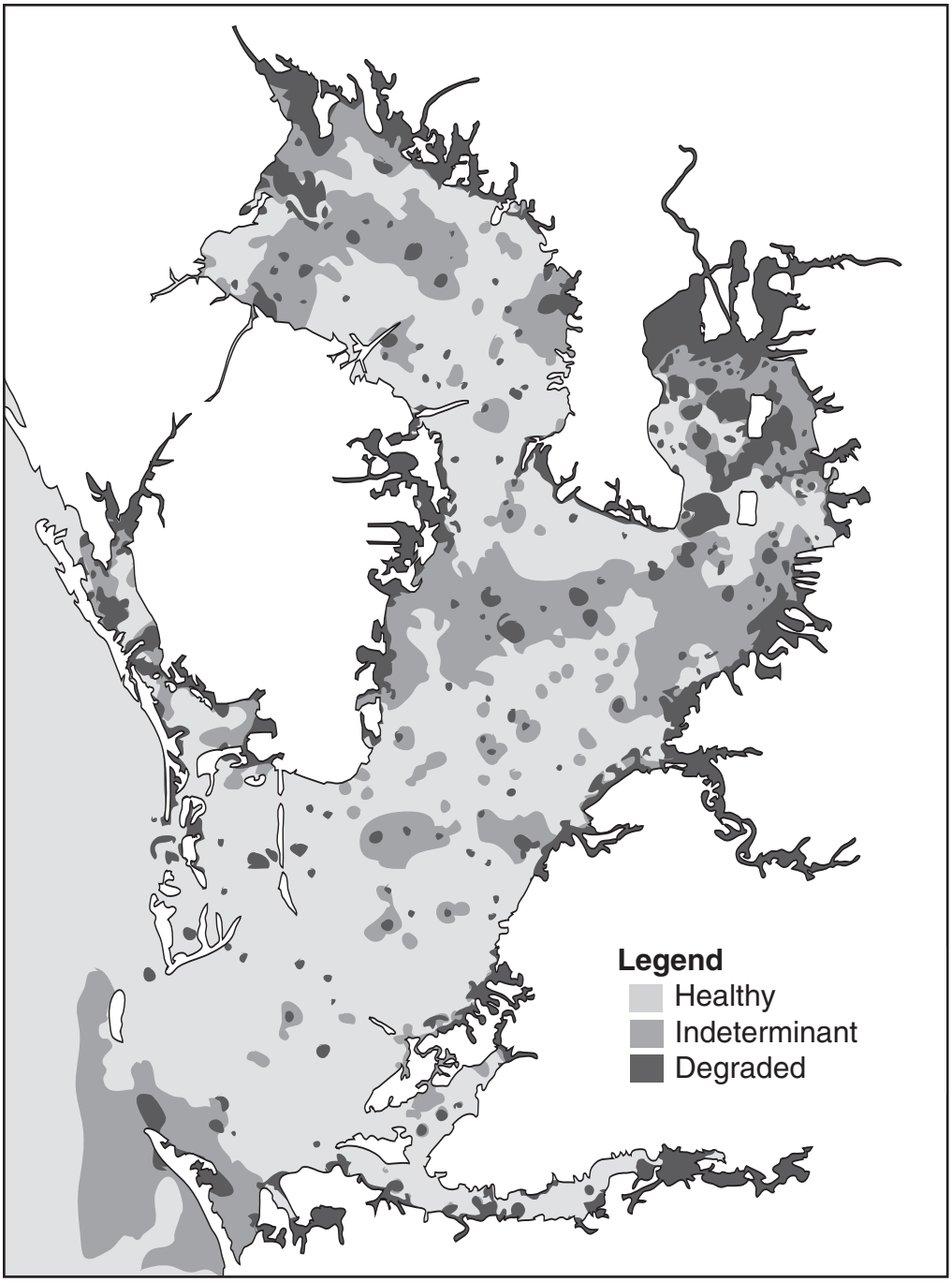
Benthic index scores indicate that most of Tampa Bay remains healthy, with the exception of "hot spots" of contamination around the Port of Tampa, the mouth of the Hillsborough River, the St. Petersburg/Clearwater Airport, Bayboro Harbor and the Apollo Beach/Big Bend area. This includes areas where pollutant sources are no longer active (i.e.; banned pesticides such as DDT that linger in the environment).

Hot spots are areas where contaminated sediments may pose a direct threat to fish and wildlife, or impact human health through the consumption of fish. Contaminants include heavy metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and organic pesticides. Most of these pollutants enter the bay in stormwater runoff and air pollution.

While priority projects have not yet been identified for each hot spot, efforts are progressing in some of the bay's most heavily impacted sectors. SWFWMD's Surface Water Improvement and Management (SWIM) program and local governments have spearheaded five stormwater treatment projects along Tampa's McKay Bay, an industrialized embayment in the upper arm of Hillsborough Bay, to stem the flow of contaminated sediments. The projects, at the 30th Street outfall, Pond 56, Melbourne Pond, East Lake (near the old East Lake Mall), and East Shore Commerce Park near the intersection of Hwy 301 and State Road 60, employ a variety of treatment techniques, from concrete baffle-boxes to alum injection, to "cleanse" contaminants and sediments from stormwater before they reach the bay.

Bay sediment samples taken from 1995 to 2002 show no significant changes in conta-

Tampa Bay Benthic Index



SOURCE: EPC, Manatee County, Pinellas County DEM, from samples collected in 1993-2000

The Benthic Index is a tool for assessing the severity of contamination at various bay sites based on lack of diversity or abundance of benthic (bottom-dwelling) organisms, low dissolved oxygen concentrations, or exceedances of contamination thresholds for heavy metals, PAHs and other toxics.

mination since 1993 when intensive sediment sampling began, although additional hot spots were identified. Most of these hot spots are in the lower Hillsborough and Palm rivers, where targeted sampling didn't commence until 1997. Benthic monitoring is coordinated by the Environmental Protection Commission of Hillsborough County with participation from Manatee and Pinellas Counties. About 120 samples are analyzed each year (since modifications to the study design in 2000) for the presence of contaminants and to determine the abundance and health of organisms living in the sediments.

STRATEGY:

STEP 1 Complete development of benthic health assessments for impacted areas of the Bay, using the new Tampa Bay Benthic Index to identity priority sites in need of cleanup.

Responsible parties: TBEP Sediment Quality Assessment Group
Schedule: Priority sites identified in 2005

STEP 2 Develop and implement site-specific Action Plans for contaminated areas on the priority list. Action Plans may incorporate stormwater improvements, pollution abatement projects, source-control strategies and sediment remediation, such as capping of degraded sediments with clean fill.

Responsible parties: TBEP Sediment Quality Assessment Group for development of Action Plans for first two priority areas; implementation may involve various partners, including local governments, the Tampa Port Authority, U.S. Army Corps of Engineers, and private industries
Schedule: First two Action Plans developed in 2006; implementation initiated in 2007 with appropriate responsible parties

STEP 3 Incorporate benthic community targets with tidal streams target development.

Responsible parties: TBEP Sediment Quality Assessment Group
Schedule: 2006

65

Toxics of Concern for Tampa Bay

	Contaminant/Impacts	Sources
Heavy Metals	**Cadmium -** Potentially toxic and may concentrate in food webs as it is retained for long periods in biological systems. Does not appear to accumulate in fish or undergo biomagnification, but does accumulate in sediments. High levels of cadmium present in sediments from the Hillsborough Bay/Lower Palm River, Allen's Creek, Cross Bayou and Boca Ciega Bay.	Common trace element widely employed in electroplating applications. Also present in paints, plastics, batteries and domestic sewage sludge.
Heavy Metals	**Chromium -** Exhibits varied levels of toxicity in different fish species. Also listed as a mammalian carcinogen. Highest levels in bay sediments found in Hillsborough Bay near the mouth of the Alafia River, in Boca Ciega Bay near Cross Bayou, and near Bayboro Harbor.	Atmospheric sources include alloy and metal production, coal combustion, waste incineration, cement production. Direct sources include electroplating/metal finishing, wastewater treatment plants, iron/steel foundries and other industrial applications, residential runoff and phosphate fertilizers.
Heavy Metals	**Copper -** Widely distributed in the natural environment, but also demonstrates acute toxicological effects at small concentrations above essential levels. Exceedingly toxic to aquatic biota. Highest levels in bay sediments found in Boca Ciega Bay near Cross Bayou, in Hillsborough Bay near the Alafia River and Davis Islands, and in Middle Tampa Bay near Bayboro Harbor and Papys Bayou.	Large number of human-induced sources to marine environment, including oil and fuel combustion, antifouling paints, metal cleaning operations, plating baths and rinses, commercial pigments and dyes, wood preservatives, leachate from copper pipes, domestic sewage sludge, and copper sulfate used to control algae in reservoirs.
Heavy Metals	**Lead -** Causes a number of acute and chronic human health impacts, and accumulates in sediments. High levels found in bay sediments from Hillsborough Bay near the Alafia River, the lower Hillsborough River, and Boca Ciega Bay near Cross Bayou.	Largest source of lead to the environment originates from its past use as a gasoline additive and from atmospheric deposition from auto emissions. Paint, batteries and domestic sewage sludge also are potential sources.
Heavy Metals	**Zinc -** Toxic at high concentrations and widespread in the environment. Highest levels in bay sediments found in Boca Ciega Bay near Cross Bayou and in Hillsborough Bay near the Alafia River.	Major application is coating of other metals to protect against corrosion. Used widely as a component in batteries and tires. Sources include municipal wastewater and sludge, direct industrial discharges, surface runoff, and atmospheric deposition.
Pesticides	**DDT -** Animal and potential human carcinogen; biomagnifies in organisms and persists in the environment. Caused wide-spread contamination of fish and wildlife, especially during 1960-80. Banned in 1972. DDT remains in sediments at several bay sites. Highest concentrations are reported at northern Boca Ciega Bay, northern Hillsborough Bay and near the Alafia River and Papys Bayou.	Formerly used to control a broad spectrum of agricultural, silvicultural and household insect pests.
Pesticides	**Chlordane -** Environmentally persistent insecticide used extensively in termite control and also to control certain agricultural insects. Banned in 1988. Concentrations of chlordane at northern Boca Ciega Bay, Papys Bayou, Mullet Key and northern Hillsborough Bay were the highest of any sites measured in the bay.	Farmers used granular chlordane mixed with fertilizers for broad-spectrum insect control on field crops. Also applied occasionally as a liquid spray for some beetles, and used as an insecticide on golf courses. Agricultural and urban runoff are among the major documented sources.

	Contaminant/Impacts	Sources
Pesticides	**Mirex -** Neuro-toxic pesticide; also known as Dechlorane. Sublethal effects in the marine environment include decreased algal growth, reduced fish growth, disrupted blue crab behavior, reduction in body weight and body lipid in salmon. Sublethal effects in birds include reduced reproductive capacity. Causes tumors in rats and mice. Mammalian symptoms include weight loss, enlarged livers, altered liver enzyme response, reproductive failure, fetal abnormalities including cataracts, heart defects, scoliosis and cleft palate. Concentrations of mirex in oysters from Tampa Bay are relatively low compared to many other sites around the nation. Production of mirex discontinued in 1977. Highest concentrations in bay sediments at Boca Ciega Bay, Mullet Key and Cockroach Bay.	Widely applied by aircraft to control fire ants on pastures between 1965 and 1978. Also used as fire retardant in electrical components, fabrics and plastics. Sewage sludge also a potential source.
	Endosulfan - Hazardous neuro-toxic pesticide with acute toxicity to marine organisms, high bioconcentration factor and fairly long half-life. Although not widely sampled for in Tampa Bay, endosulfin has been recorded in sediments from Cockroach Bay and in stormwater from an industrial park in West Tampa.	Introduced about 30 years ago and widely used to control winged insects associated with many row and field crops. Applied as a liquid spray to crops.
	Dieldrin - Pesticide for soil-dwelling insects including termites. Sublethal effects include starvation, liver damage, immunological suppression, decreased fertility, postnatal mortality. A carcinogen for some animals and a mutagen in cell cultures. Highest levels in bay sediments reported at the mouths of the Hillsborough River and Boca Ciega Bay.	Widely used from 1950-1974 to control soil insects on cotton, corn and citrus. All uses banned in 1985 except subsurface termite control and some mothproofing. Dieldrin is a breakdown product of the pesticide aldrin, both of which are long-lasting in soils and not highly water-soluble.
PCBs/PAHs	**PCBs -** Among the most persistent and toxic of organic compounds. Most risk of cancer from consumption of contaminated seafood attributed to PCBs. Biomagnifies. Manufacture ended in 1976. PCBs at sites in Hillsborough Bay exceed Florida's Probable Effects Level (PEL) for biological effects from toxic contaminants. PCBs also found in sediments at Boca Ciega Bay near Cross Bayou.	Formerly employed in a wide variety of industrial applications including insulation in electrical capacitors and transformers; paints, additives, adhesives, and caulking compounds; hydraulic fluids. Sources to environment are varied including direct discharge from production facilities into municipal sewage systems, leaching from disposal sites, refuse incineration and reuse of transformer oil.
	PAHs - Many PAHs are potent carcinogens or mutagens. Highest levels in bay sediments found in Hillsborough Bay near Davis Islands and the Alafia River, Boca Ciega Bay, and Middle Tampa Bay near Papys Bayou.	A group of related compounds present in crude oil and its products, released to the atmosphere during combustion. Also released from burning of non-petroleum substances, such as wood (brush fires). Sources include treated sewage, stormwater runoff and oil spills. Suspected sources include aerial fallout, petroleum refinery wastes, and discharges of drilling fluids.

Improve Opportunities for Proper Hazardous Waste Disposal

TX-2

ACTION:

Improve opportunities for proper hazardous waste disposal by area residents and businesses.

STATUS:

Complete. Continue to monitor implementation.

BACKGROUND:

This action appears to be complete.

All Tampa Bay counties now have permanent household hazardous waste collection centers. The times and dates these centers are open vary, but most are open at least one or two weekend days a month. Geographically large counties such as Hillsborough have opened multiple permanent centers to ensure access for residents throughout the county. Other communities, such as Pinellas, combine permanent drop-off facilities with occasional mobile collection days tied to specific events. City residents are permitted and encouraged to use the county drop-off facilities, and several cities – including Clearwater and St. Petersburg – sponsor special "amnesty days" when residents are encouraged to bring wastes to mobile collection stations.

TBEP and the Southwest Florida Water Management District partnered to produce a general-interest, foldout poster listing all household chemical collection centers or services in the bay watershed, along with non-toxic alternatives to common household cleaners.

Hillsborough and Pinellas counties, as well as the City of Tampa, recently began accepting consumer electronics at their collection centers.

Used oil recycling stations are located in all three Bay Area counties.

Pinellas County offers a special disposal program for small businesses that generate hazardous waste. Manatee County provides residents and businesses with "milk-run" collection of household wastes with business wastes collected at a discounted cost for small-quantity generators.

The state Department of Environmental Protection sponsors an annual program called Operation Clean Sweep, which collects unused or recently banned pesticides from farmers, pest control operators and other targeted industries.

DEP's Pollution Prevention (P2) Program, a non-regulatory initiative that encourages businesses to maximize efficiency while minimizing waste, now has a full-time coordinator in each of DEP's six districts. The coordinators provide on-site assessments,

telephone consultations and workshops to any business owner upon request. Hillsborough's Environmental Protection Commission and Pinellas County's Department of Environmental Management offer similar programs to businesses that generate small quantities of hazardous wastes. In addition to on-site visits, EPC's Small Quantity Generator program mailed more than 12,000 notification fact sheets to affected businesses and disseminated more than 5,000 pieces of related literature. EPC plans to continue this program at least through the year 2005.

A variety of retailers, including Radio Shack and Target, accept cadmium, lead-acid and lithium ion batteries – such as those used in cell phones and digital cameras – for recycling.

Although recycling centers are not universally convenient to all county residents, and opportunities for small businesses to dispose of hazardous waste and electronics could be further enhanced, substantial progress has been made in implementing this action. Additionally, further progress seems likely because of new or expanded regulations governing hazardous waste storage and disposal, and expanding uses of and markets for recycled materials. Therefore, no further TBEP action other than continued monitoring of implementation seems warranted at this time.

STRATEGY:

STEP 1 Continue to monitor implementation.

Responsible parties: Counties, cities, FDEP, SWFWMD, TBEP

Schedule: Ongoing

STEP 2 Develop endpoints and indicators to track progress, e.g. amount of waste collected, number of customers served, etc.

Responsible parties: TBEP, working with partners

Schedule: 2005-2006

PH-1

Reduce the Occurrence of Municipal Sewer Overflows to the Bay

ACTION:

Reduce the occurrence of accidental municipal sewer overflows to the bay.

STATUS:

Ongoing.

BACKGROUND:

Significant strides have been made to address the problem of sewer overflows in Tampa Bay. Although spills will occur periodically as a result of equipment failures, especially during very heavy rains and storm events, extensive infrastructure and maintenance investments have abated the local problem and are enabling officials to better track trends and trouble spots. Some of the most significant upgrades have occurred in cities such as St. Petersburg and Clearwater, where millions of dollars have been invested to replace and improve aging infrastructure.

EPA conducted a workshop in 1999 to encourage municipal wastewater plants to perform self-audits on wastewater collection systems in lieu of state or federal agency audits. St. Petersburg and Clearwater were specifically targeted to participate and have since completed audits.

St. Petersburg completed the design on a long-term sanitary sewer overflow abatement program in 1998, including recommendations for immediate and long-term actions. A key conclusion was that the City should focus more resources on cleaning large-diameter lines. To address that, the City has procured three additional sewer-cleaning machines (vactors) and contracted with two sewer-cleaning companies for routine maintenance of critical segments in the collection system. Additionally, St. Petersburg has started to replace and reline sanitary sewer lines in critical areas throughout the city. A $30 million bond issue in 1999 secured the money for design and construction of long-term improvements. In June 2003, a bond issue secured an additional $30 million to complete implementation of the sewer overflow abatement program. The City continues to implement the recommendations of the Sanitary Sewer Evaluation Study completed in March 1998, budgeting over $6 million a year in FY 2000, FY 2001, FY 2002 and FY 2003 to support maintenance. In addition, $8 million a year has been designated in the 5-year Capital Improvement budget for sewer system rehabilitation and improvement.

The City of Clearwater is implementing a capital improvement plan to improve its wastewater collection system by reducing stormwater infiltration into the City's wastewater collection systems to prevent sewer overflows. Line infiltration, which causes flows that exceed system capacity, is the primary cause of wastewater discharges from treatment facilities. Phase 1 of the Sanitary Sewer System Evaluation Study and Self Audit was completed at a cost of $2.3 million dollars with recommendations for manhole renovation, upgrading pump stations and sewer lining.

In 2005, the City of Tampa also embarked on a Sanitary Sewer Evaluation Study to

identify areas in need of pipe replacement to prevent infiltration and inflow, which can cause overflows. The study will take 18 months, and implementation of the recommendations will likely take five additional years. The City also is purchasing additional portable generators to reduce power outages, a key cause of sewer overflows during the 2004 hurricane season. Finally, Tampa is preparing an ordinance to restrict the dumping of grease into the sewer system – the single largest cause of overflows for the city.

Pinellas County Utilities is implementing a 5-year plan to correct problem areas within the Pinellas County south collection area. Additionally, an aggressive program to install inflow protectors on manholes began in 1999. The goal is to fit every manhole in both service areas with these devices. In severe inflow problem areas, manhole rings and covers are being replaced with watertight, lock-down ring and cover assemblies. Pinellas County Utilities has also voluntarily entered the self-audit phase of the USEPA Capacity, Management, Operations, and Maintenance Program effort.

Hillsborough County efforts include the include the procurement of a remote monitoring and control system (SCADA, or Supervisory Control and Data Acquisition). The SCADA system will identify and advise of pump station failures, and use upstream pump stations to hold flows in the event a downstream pump malfunctions. The system is being constructed in phases at a cost of nearly $5 million. The County also has implemented improved maintenance and inspection procedures.

To better assess the impact of wastewater spills on nitrogen levels in Tampa Bay, Pinellas County conducted a one-year study of overflows throughout the bay watershed, covering September 2002-October 2003. Monthly nitrogen spill estimates were compared to modeled "best estimate" mean monthly nitrogen loads calculated for TBEP (from 1999-2003) by bay segment. The analysis showed that the monthly spill loads were minor relative to total external bay segment loads in Hillsborough ((0-2%) and Middle Tampa Bay (0-4%), but were potentially significant for at least one month in Old Tampa Bay (0-26%) and Boca Ciega Bay (0-20%). Because of the potential for localized water quality impacts resulting from sewer overflows, this action warrants ongoing monitoring to ensure continued progress.

STRATEGY:

STEP 1 Support local government efforts to gain grant funding to replace substandard or aging facilities.

Responsible parties: TBEP (through contracted grant writing services)
Schedule: Initiate in 2005

STEP 2 Consider implementing the recommendations of TBEP's Technical Advisory Committee, as follows:

- Use standardized forms to report spills to FDEP, EPC and the public.
- Repeat the spill data collection and analysis for an additional year, since the period assessed by Pinellas County included abnormally high rainfall amounts.
- Check for bay water quality impacts from reported spills.
- Use same-day WWTP influent nitrogen concentration data to estimate loads from storm-related spills.

Responsible Parties: TBEP, local governments, FDEP
Schedule: Initiate in 2006

PH-2

Continue Source and Risk Assessments of Human and Ecosystem Health Indicators Suitable for Subtropical Marine Beaches and Waters

ACTION:

Continue source and risk assessments of human and ecosystem health indicators appropriate to detect bacteria and pathogens for subtropical marine beaches and waters.

STATUS:

Ongoing

BACKGROUND:

Clean beaches and the recreational activities associated with them form the backbone of Tampa Bay's tourism industry. Water quality at beaches ranges from excellent (Gulf beaches where warnings and health advisories are rare) to moderate (bay and inland waterway beaches where advisories are more frequent) to poor (lakes and other freshwater environments that are not suitable or approved for swimming). Of particular interest are the moderate quality beaches that have received heightened media exposure associated with advisories and closures. These beaches include Fred Howard Park in Tarpon Springs, R.E. Olds Park in Oldsmar, beaches along the Courtney Campbell and Gandy causeways, and St. Petersburg's North Shore beach. Swimming is not advised in canals and intercoastal waters, as well as Chestnut Park at Lake Tarpon, the Boy Scout Camp at Lake Chautauqua and Wall Springs in Palm Harbor, the latter representing a growing problem with springs in Florida driven by deteriorating groundwater quality.

Of key concern is the risk to swimmers and the necessity for establishing effective water quality indicators to detect harmful bacteria that can cause rashes, ear, nose and throat infections and gastrointestinal diseases. However, the finding that the most widely used indicator of human and animal fecal contamination — fecal coliforms and more specifically *E. coli* – grows naturally on vegetation in warm climates has raised questions about its efficacy as an indicator in Florida. Additionally, in recent years total and fecal coliform bacterial indicators have failed to consistently detect the persistence of pathogens, especially viruses in surface waters. That has led to a search for better indicators of human health risks.

Healthy Beaches Tampa Bay

Pinellas County established the first Healthy Beaches program in 1998 after a growing body of evidence suggested that reliance on traditional water quality standards, such as total and fecal coliform, may not be appropriate for sub-tropical waters. This raised the concern that beaches may be closed unnecessarily, while overlooking other potential health concerns. The St. Petersburg/Clearwater Convention & Visitors

Bureau recognized the implications, and together with the Pinellas County Health Department, brought the issue to the attention of the Tampa Bay Estuary Program. TBEP, along with Pinellas County and the Southwest Florida Water Management District, helped finance the first phase of the study through the University of South Florida College of Marine Science. Phase 1 was to recommend the best indicator for use in evaluating water quality at recreational beaches in Florida.

Phase 1, completed in 2001, found enterococci (*Enteroccocus* species) to be the preferred test for marine waters because they tend to live longer than fecal coliforms and are more closely correlated with cases of gastrointestinitis in recreational waters. However, enterrococci share the same major disadvantage of the fecal coliform group in that they are shed in feces of all warm-blooded animals, providing no clues as to their source. Phase 1 ultimately recommended the use of enterococci, along with fecal coliform bacteria, while proposing source tracking of the fecal coliform to fingerprint the types of bacteria found (Rose et all 2001).

Those recommendations mirror state standards utilized since 2000, when Florida's 34 coastal counties began bi-weekly beach water sampling (weekly since 2002) as part of the Florida Healthy Beaches Program. Coastal counties analyze for bacteria indicating enterococci (as required by EPA) and fecal coliform (as required by DEP). County health departments issue health advisories or warnings based on these standards, although the link between exposure to these organisms and public health risk remains unclear. EPA funding now requires counties to use a five-sample geometric mean of the enterococcus indicator, resulting in more frequent exceedances and associated health advisories.

A proposed Phase 2 for the Healthy Beaches Tampa Bay project recommends a risk assessment of pathogens to establish the source and fate of these organisms, and to help develop a system and policies to better forecast and inform the public about health risks. The tidal modeling needed for Phase 2 is available through USF's PORTS system (Dr. Mark Luther), but the pathogen link remains unfunded to date.

Health advisories warning swimmers of potential risks due to high bacteria counts have risen significantly in recent years at the nation's beaches, according to the EPA. In Florida, beach warnings increased 30% to 686 in 2001, up from 527 the previous year. This can be attributed in part to an increase in the number of samples taken, the concurrent use of two indicators (fecal coliforms and enterococcus), and changes in the way results are calculated. Although beach water quality in Tampa Bay is generally good, some trouble spots remain.

STRATEGY:

STEP 1 Reconvene Healthy Beaches Tampa Bay partners through the USF College of Marine Sciences' Healthy Beaches/Healthy Coasts Center to evaluate health advisory standards and policies for public beaches and discuss development of sensors for rapid detection of viruses and bacteria. Provide results to federal, state and local health units.

Responsible parties: USF College of Marine Sciences' Healthy Beaches/Healthy Coasts Center
Schedule: 2004-2005

STEP 2 Pursue Phase 2 Healthy Beaches Tampa Bay funding for an assessment of pathogens to aid in formulating more effective health advisories (including effective notification of the public), and to speed development of sensor technologies that could determine the specific pathogens present on our coastlines. Computer modeling and additional work is needed to:

- Better establish the link between exposure to certain organisms and risk of disease – with special emphasis on at-risk populations (elderly, immuno-compromised).
- Identify sources (animal type, septic tank, boating, natural vegetation, insects).
- Determine fate — how long an organism persists before the risk becomes negligible.
- Predict weather and water conditions that will intensify or diminish the contamination.
- Develop a "microbiological toolbox" for establishing standards and identifying potential mitigation strategies.

Responsible parties: USF College of Marine Sciences' Healthy Beaches/Healthy Coasts Center
Schedule: 2004-2005

STEP 3 Increase public education and awareness of health and beach advisories by posting beach and health advisories on the Tampa Bay Estuary Atlas and www.HealthyBeaches.edu.
Responsible parties: TBEP; USF Healthy Beaches/Healthy Coasts Program
Schedule: 2005

STEP 4 Identify measures to reduce contamination and provide results of research (1st and 2nd Steps) to EPA and the State of Florida.
Responsible parties: TBEP partners, other local governments
Schedule: Initiate following source identification in Step 2, or as sources become identified

STEP 5 Provide side-by-side data on total coliforms, fecal coliforms, and enterococci information to the State of Florida for TMDL development.
Responsible Parties: local governments
Schedule: 2005-2006

STEP 6 Track assessments conducted by EPCHC and the Hillsborough County Health Department for swimming in canals and evaluate for future bay-wide application.
Responsible parties: EPCHC, Hillsborough County Health Unit
Schedule: 2005-2006

STEP 7 Update the "Is It Safe To Swim In The Bay?" fact sheet to include precautions against swimming in stormwater ponds and residential canals.
Responsible parties: TBEP
Schedule: 2006