Surface Water Quality Monitoring Programs in the Greater Charlotte Harbor Watershed

By Catherine Corbett

The map of water quality monitoring sites above was compiled by the Charlotte Harbor-Regional Ambient Monitoring Program, a subcommittee of the Charlotte Harbor NEP. Members of this subcommittee include Charlotte, Lee, Polk, Manatee and Sarasota counties; the Cities of Cape Coral, Sanibel and Punta Gorda; the Peace River/Manasota Region Water Supply Authority; the Department of Environmental Protection and both the South and Southwest Florida Water Management Districts. All of these entities have water quality monitoring programs that sample for the various core analytes in the NEP's CCMP on different frequencies. It is hoped that the database for this map will eventually include this information for each monitoring program.

CHEVWQMN—The Charlotte Harbor Estuaries Volunteer Water Quality Monitoring Network—This program is managed by the Department of Environmental Protection, Charlotte Harbor Aquatic Preserves in Punta Gorda. There are over 100 volunteers that take monthly water quality samples at approximately 35 fixed stations from Lemon Bay, Charlotte Harbor and southward to Estero Bay. This program started in 1996.

City of Cape Coral—This program is managed by the City's Environmental Resources Division. There are 33 sites sampled on a monthly basis. Samples are also collected twice annually for metals and yearly for pesticides.

City of Punta Gorda—This program is a requirement of the consumptive use permit with the Southwest Florida Water Management District for the City's Water Treatment Facility. The program monitors 6 fixed sites for chemistry and some physical parameters (see PRMRWSA information below for more detailed description) within Shell Creek, 1 site at the confluence of the Peace River and Shell Creek, and 1 site above and below each the mouth of Shell Creek within the Peace River on a monthly frequency since 1991. The City and the PRMRWSA coordinate their water quality monitoring programs for data comparability.

Lee County—This program, managed by the County's Environmental Lab, samples 14 sites on a monthly basis at fixed stations in Pine Island Sound and Matlacha Pass and monthly at 14 fixed sites in Estero Bay. The County also runs a new atmospheric deposition monitoring station on Lover's Key that collects both wet and dry nitrogen deposition rates.

Manatee County—The County's ambient monitoring program samples two fixed sites in the upper Myakka River on a monthly basis. With the advent of TMDL development for the Myakka River in 2001, the County has recently added an additional bi-weekly sampling at 9 stations in the Myakka watershed. These stations extend from the headwaters to the County line and include several major tributaries.

Polk County—This program monitors sections of the Peace River basin, including Saddle and Peace Creeks, Lake Hancock and the Winter Haven Chain of Lakes on a quarterly basis. The number of fixed stations in the upper peace watershed varies between 27 - 33 sites per year. The data is then reported annually in the County's Annual Lakes and Streams Report. Special projects also augment these data.

Sarasota County—This program was initiated in 1995. The program sites were randomly chosen and 40 sites are sampled every month. During each month, another 40 sites are sampled, so that by the end of the year, a total of 480 sites are sampled. This cycle then repeats itself the following year.

Eight segments of the bays located within Sarasota and the Myakka River were defined. Five stations are sampled each month from each segment. Meter readings are taken at bottom, middle and top depth, if possible, for every station each month. Two hydrolabs are deployed each month at randomly chosen stations.

SFWMD—South Florida Water Management District—This program in the Caloosahatchee River was established in April 1999. The program monitors 8 fixed sites on a monthly frequency. Water quality data are used to produce annual technical reports on the current status and trends of several nutrients and physical attributes of the system, provide supporting data for water supply modeling and contribute to a growing body of regional data made available to all interested parties.

PRMRWSA—Peace River/Manasota Region Water Supply Authority—This program, initiated in 1976, was developed by the Southwest Florida Water Management District and General Development Utilities, Inc. for the Water Supply Authority's consumptive use permit. The program was designed to evaluate the impacts and significance of natural salinity changes on the aquatic fauna and flora in upper Charlotte Harbor and to determine if freshwater withdrawals by the Authority could be shown to alter these patterns.

The program includes U.S.G.S 15-minute interval water level recorders at Boca Grande, Harbour Heights and just downstream of the Peace River Facility. These latter two gages also provide surface and bottom conductivity information at 15-minute intervals. Monthly chemical and physical water quality measurements are conducted at 4 "moving" salinity-based isohaline locations (0,6,12 and 20 ppt) along a river kilometer center-line, running from the mouth of the Peace River upstream to above its junction with Horse Creek, and downstream to Boca Grande Pass. Monthly water column physical profiles are conducted at 16 locations along a transect running from just below the river's mouth upstream to a point just above the Peace River Facility. Chemical water quality samples are collected at 5 of these locations also. Finally, both the "moving" and fixed stations include physical *in situ* water column profile measurements (temperature, dissolved oxygen, pH, conductivity and salinity) at 0.5-meter intervals from the surface to the bottom and light attenuation (PAR—photosynthetically active readiation) information.

SWFWMD--Southwest Florida Water Management District—This program was initiated in 1997 and currently monitors 11 fixed stations in the Peace River basin and 5 fixed stations in the Myakka River basin on a monthly basis. The District also collects field data for 16 fixed sites on a monthly basis in Flatford Swamp in the upper Myakka watershed.

A new collaborative program now exists for Charlotte Harbor, the tidal Peace and Myakka rivers and Lemon Bay. SWFWMD, Charlotte and Sarasota Counties, Florida Fish and Wildlife Conservation Commission-FMRI and DEP monitor this region in a stratified, random program that samples for the core analytes listed in the NEP's CCMP on a monthly frequency. Five monitoring stations for each of the 7 "strata" listed below are randomly chosen every month:

1. Upper Lemon Bay (Sarasota County portion),
2. Lower Lemon Bay (Charlotte County portion),
3. Tidal Peace River,
4. Tidal Myakka River,
5. Western side of Charlotte Harbor,
6. Eastern side of Charlotte Harbor, and
7. Lower Charlotte Harbor within Charlotte County.

For more information on any of these programs, please contact the entity listed above or Catherine Corbett of the Charlotte Harbor NEP at (941) 995-1777.

Explanation of the Florida Department of Environmental Protection Programs

By Catherine Corbett

Florida has more than 50,000 miles of rivers and streams, 7,800 lakes, and 4,000 square miles of estuaries, including four of the nation's 28 estuaries of national significance, three estuarine research reserves, and numerous marine protected areas.[1] Embodied in the vast amounts of the State's surface waters are highly diverse ecosystems with often disparate resource users, such as oysters, tarpon, wood storks, seagrasses and, of course, humans.

In order to manage this vast array of systems, Florida follows the provisions of the **Clean Water Act** that require each state to classify its surface waters according to their designated uses. For example, located within the Charlotte Harbor NEP study area are waters listed as Class I-Potable Water Supplies, such as Shell and Horse creeks; Class II-Shellfish Propagation or Harvesting, in areas where shellfish beds are likely to occur such as the tidal portion of the Peace River; and Class III-Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, including most of the Peace River. An additional complement to these classifications is the designation of Outstanding Florida Waters, such as those located within the Charlotte Harbor Aquatic and State Buffer Preserve and the Myakka River State Park.

The Florida Department of Environmental Protection (FDEP) has established water quality criteria for each classification that sets standards for the acceptable amounts of contaminants, such as nutrients, pesticides, heavy metals, and coliform bacteria. If a water body is found to have exceeded the maximum allowable limit for any one of the many parameters listed for each classification in an allocated number of monitoring samples, it is considered "impaired" and should eventually find its way to the **impaired waters list, also known as the 303(d) list**. (This 1998 list is available on the Internet at http://www8.myflorida.com/environment/learn/waterprograms/tmdl/index.html.)

To safeguard their natural resources and address public health issues in their respective regions, many local governments, organizations and the water management districts have developed their own ambient water quality monitoring programs. While most of these programs collect invaluable information, they can be geographically and temporally uncoordinated, and their monitoring results may not be reported or utilized by the State. In 1996 FDEP formed the **Integrated Water Resource Monitoring (IWRM) Committee** to develop strategies and techniques for implementing an integrated monitoring plan that would combine surface water, groundwater, and biological monitoring. The U.S. Environmental Protection Agency (EPA), FDEP, water management districts, and local governments were all asked to participate. The program subsequently established a three-tiered assessment approach.

Tier 1 **Status Network** monitoring program uses a stratified, random sampling design to characterize the overall health of Florida's water resources and observe possible trends. The State has been divided into 20 geographic reporting units, or strata, with four reporting units roughly within each water management district boundary. Every year each reporting unit is monitored but then five are intensely monitored, one within each district. After four years all 20 units will have been completed, and the cycle will begin again.

During each cycle, the five intensely monitored reporting units sample six resource categories. The categories are:

confined aquifers,
unconfined aquifers,
high-order streams (Horton order greater than 4),
low-order streams,
small lakes (1-10 hectares),
and large lakes.

Thirty randomly selected sampling sites within each of these resource categories will be sampled each year, making a total of 180 sites for each reporting unit. Thus, 30 sampling sites will be located in small order streams, another 30 in large order streams and another 30 in large lakes, etc. until all six resource categories are sampled in that reporting unit. It is possible to have all 30 sites for a resource category located, for example, in one large lake if that is the only relevant resource for that category in the reporting unit or if all sample sites fall within that location during the randomization process. Currently, the status network samples chemical and physical water quality parameters, such as pH, dissolved oxygen, water clarity, organic carbon, and ortho-phosphate. FDEP expects to add biological parameters, such as habitat assessments, at a later date.

The recently revised **Trend Network** can also be considered part of Tier 1 monitoring. With the recent inception of the IWRM program and resource reallocations, the network has decreased from approximately 430 to 80 fixed surface water quality sampling stations, monitored on a monthly basis and 50 groundwater sites. The revamped network is designed:

- to correlate Tiers 1, 2, and 3 monitoring results with seasonal climatic changes,
- to estimate general basin-wide loadings for the sampled parameters, and
- to make best estimates of the temporal variance of the sampled parameters in the basin.

The results generated from these Tier 1 sampling programs are used to generate the **305(b) Water Quality Assessment Report**, a requirement of the Clean Water Act. In this report, water quality is evaluated using the results from the programs listed above as well as biological data, other chemistry data from the federal water quality database (STORET), mercury fish consumption advisories, and information solicited through public workshops. The 305(b) report is the primary method of informing the public and Congress about the water quality conditions in the State of Florida. Information from this list and the Impaired Waters Rule is then used to help generate the 303(d) or impaired waters list. (This 305(b) report, submitted in 1996, is available on the Internet at www.dep.state.fl.us/water/division/monitoring/pubs.htm.)

Florida is presently using the 303(d) list that was approved by EPA in November 1998 from data generated for the 1996 305(b) list. FDEP is currently working on assembling available biological and water quality data for a 2000 305(b) list. The new data are not expected to change the 303(d) list until 2002. Ultimately FDEP, under provisions of the Clean Water Act, will need to establish **Total Maximum Daily Loads (TMDLs)** for those waters on the 303(d) list for each parameter that does not meet the standards of the State classification system. TMDLs are quantitative analyses of water bodies where one or more water quality standards are not being met and are aimed at identifying management strategies necessary to attain those water quality standards.

The **Tier 2 monitoring programs** consist of strategically placed fixed sampling stations with the goal of further characterizing water body segments on the 303(d) list. This tier of ongoing water quality monitoring provides:

- in-depth information of water quality conditions for individual water body segments,

- identifies specific water resource problems and the extent and severity of these problems, and
- evaluates the effectiveness of management activities.

This tier of monitoring will be used in conjunction with a land use model from EPA to extrapolate pollutant loading rates for the various land uses on an impaired water body segment and the assimilative capacity for that segment in the process of TMDL development and allocation. To help fulfill these goals, FDEP hopes to play a role in coordinating the regional water quality monitoring efforts of local governments, water management districts and organizations.

Finally, **Tier 3 monitoring programs** function mainly as ongoing compliance monitoring programs and will determine if permitted facilities are in compliance with their permits. This monitoring tier provides in-depth information on individual water body segments and yields the basis for evaluating the effectiveness of the management choices relating to facilities.

References

[1] Florida Department of Environmental Protection: www.dep.state.fl.us/water/watershed/surface/surface.htm as of November 28, 2000.

[2] *Florida's Integrated Water Resource Monitoring Network*, St. Johns River Water Management District, March 2000.