

Project Proposal

RETROSPECTIVE REVIEW OF THE HYDROLOGIC INFORMATION AVAILABLE FOR STORMWATER AND RECHARGE IN THE SARASOTA BAY WATERSHED, FLORIDA

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Introduction

In 1995, the Governor of Florida and the Administrator of the US Environmental Protection Agency signed and approved the Comprehensive Conservation and Management Plan (CCMP) for Sarasota Bay. The CCMP contains six action plans designed to reduce nitrogen pollution from storm water and wastewater, increase available habitat for fish and wildlife, and increase access to the Bay and its resources.

The Sarasota Bay area is among the most beautiful in the United States -with the Bay, barrier islands and white sand beaches. Tourism is the #1 industry in Sarasota County and #2 in Manatee County behind agriculture. The Sarasota Bay area is among the most rapidly growing in the nation - mostly in residential and commercial development along

the I-75 corridor. The area has been promoted through national publications as one of the top five areas to live in the United States.

Sarasota Bay was named in Water Quality Act of 1987 as an estuary of national significance; and since the signing of the CCMP more than \$200 million has been committed to Sarasota Bay restoration (Sarasota Bay National Estuary Program, 2000).

Studies completed by the Sarasota Bay National Estuary Program in the early 1990's indicated that the Bay was more degraded than originally hypothesized. Nitrogen loading to Sarasota Bay in 1989, for example, had increased to 480 percent above pristine levels. Through concerted action by the local, state and federal agencies, nitrogen pollution to Sarasota Bay decreased 47 percent between 1989 and 2000 (or to levels approximating 254 percent above pristine) (Sarasota Bay National Estuary Program, 2000). The load reduction has been achieved as a result of: 1) improved wastewater treatment, 2) reduced volume in wastewater discharge due to construction of reclaimed water systems, and 3) construction of storm water treatment systems (Sarasota Bay National Estuary Program, 2000).

It is currently estimated that 56 percent of the remaining nitrogen load to the Bay is from storm water (Sarasota Bay National Estuary Program, 2000).

The Sarasota Bay community is addressing additional nitrogen reductions in the storm water media through integrated water resource management approaches: the development of regional storm water treatment systems (i.e. Phillippi Creek); investigations into storm water reuse; and broad based educational programs (Florida Yards and Neighborhoods – FY&N) promoting cultural change and water conservation.

Progress is being made. For example, Sarasota County recently released information indicating that 90 percent of the 271 condominium owners contacted in 2002 as a part of FY&N Program significantly changed landscaping and/or irrigation practices (Mark Shelby, University of Florida extension, personal communication). Moreover, a water

conservation ordinance was also passed in Sarasota County in 2002 requiring drought tolerant landscaping on 50 percent of new yards as well as efficient irrigation systems. A water conservation rebate program is pending in Manatee County as well.

Nationally, the State of Florida is recognized as a leader in storm water management; and the storm water treatment systems required under the regulatory process are providing excellent treatment. However, the saltwater intrusion issue in southwest Florida (via the Southern Water Use Caution Area) has propelled water conservation to a new level of visibility in the community. As such, new developments need as many water conservation features as possible to maximize future supply and preserve the aquifer. This heightened level of awareness provides an opportunity to further reduce pollutant loading to Sarasota Bay as storm water can be managed for alternative uses.

Community discussion has evolved to address current construction practices in relation to the volume of storm water (and resulting pollutant loading). Refinement to these practices could result in reduced volume, improvements in the quality of storm water runoff, and reduced demand from potable ground-water sources.

The high water table, low porosity of the area soils, and unique geology present both a challenge and an opportunity to develop innovative approaches to both conserve water and enhance our natural systems during construction activities. The SBNEP envisioned that innovative ideas will emerge as more is learned about the local conditions and hydrology.

Before these innovative approaches are developed, a review of existing hydrologic studies and an inventory of existing hydrologic data in the Sarasota Bay watershed are needed.

Objective

The objectives of this project are to review existing or ongoing investigations and summarize the existing hydrologic data, and to identify data gaps for successfully determining recharge, water quality, and constituent loads within the Sarasota Bay watershed.

Management Questions

1. How do natural versus urbanized hydrologic regimes compare? What are the predevelopment and present hydrologic regimes?
2. Are changes in imperviousness impacting runoff volumes to the Bay?

Hypothesis

As urbanization continues in Florida, does surface runoff increase and recharge to the aquifer decrease because of increases in impervious surfaces caused by the compaction and modification of the natural soils.

Scope

The project will focus on surficial aquifer and stormwater studies, and data collection programs within the Sarasota Bay watershed over the last 10 years. Selected studies outside the Sarasota Bay watershed (for example, Tampa Bay, Charlotte Harbor) could be included, if applicable to the Sarasota Bay watershed.

Applicable data will be inventoried but developing a repository for the data is outside the scope of this project. Data to be inventoried may include the hydrogeologic characteristics of the surficial aquifer system, rates of recharge to the surficial aquifer system, quantity and quality of stormwater runoff, and rainfall/runoff data within the Sarasota Bay watershed. If studies addressing changes to shallow, subsurface hydrology resulting from construction practices exist for the areas of interest, then these data will be included.

Approach

Refining our existing understanding of complex urban stormwater issues will be accomplished by conducting a technical synthesis of existing information. Areas of data gaps will be identified and a plan describing topics for future study by interested parties will be developed.

Study design

The following approach will be used. A wide variety of research and technical studies have been conducted by various agencies in west-central Florida on stormwater runoff, recharge, and nutrient loading. A retrospective review of existing data and the applicability of data transfer from other watersheds to Sarasota Bay will be conducted. An inventory of historical and current streamflow, ground-water levels, water-quality, and rainfall/runoff data will be performed. The inventory may be used to develop historical trends for selected data sets within the Sarasota Bay watershed.

Project Tasks

Task 1 – Agency/TAC Involvement: Meet with relevant agencies and organizations to determine data sources.

These agencies could include, but not be limited to, the USGS, SWFWMD, NRCS, TBNEP, IRLNEP, CHNEP, Sarasota County, Manatee County, City of Sarasota UF-Extension, UF-Ft. Lauderdale Research Institute, USF, FSU, and private consultants.

Deliverable: Kick off meeting.

Timeline: No more than one (1) month following Authorization to Proceed.

Task 2 – Technical Synthesis: Conduct a detailed review of the relevant hydrologic studies in the Sarasota Bay watershed. The review could include studies that address water quality, evapo-transpiration, storm water, rainfall/runoff, infiltration, soil characteristics, geologic framework, wastewater re-use, alterations in stream characteristics, and modifications to water levels in the surficial aquifer. Selected studies outside Sarasota Bay watershed (for example, Tampa Bay or Charlotte Harbor) could be included, if applicable, to the Sarasota Bay watershed.

Deliverable: PowerPoint presentation with handouts on the inventory of the hydrologic data and the relevance of the reviewed studies in developing approaches to address stormwater and recharge in the Sarasota Bay watershed.

Timeline: 6 months from authorization to proceed.

Task 3 – Determination and Reconciliation of Hydrologic Properties: Hydrologic properties will be inventoried for the study areas from Sarasota County’s detailed hydrologic GIS database. These properties will include (1) the contributing drainage area located upstream of each gauge site based upon the best available topographic information, (2) the area of total impervious coverage, (3) the area of directly connected impervious coverage, and (4) the percentage of the contributing drainage area with stormwater management best management practices. Current hydrologic properties will be compared to USGS data sets between 1991 and 1993 using 1” = 200’ scale aerials available in the Survey and Mapping Section of Sarasota County. This task will be performed by Sarasota County. Hydrologic properties will be compared to those previously published by the USGS. Differences will be noted by the USGS.

Deliverables: Digital maps of contributing drainage area at each gage site and tabular summary of hydrologic properties for each study watershed for 1992 and 2002.

Timeline: 90 days from authorization to proceed.

Task 4 – Reduction of Hydrologic Data: Utilizing the reconciled contributing areas from Task 3, the USGS will review runoff volumes for selected study basins in Sarasota county, including the nine basins previously studied by the USGS. A table will be prepared for each study watershed summarizing the total rainfall and runoff volumes for each month during the study period. The ratio of monthly runoff to rainfall volume will also be provided for each month.

Deliverables: A table will be prepared for each study watershed summarizing the total rainfall and runoff volumes for each month during the study period. The ratio of monthly runoff to rainfall volume will also be provided for each month.

Timeline: 210 days from authorization to proceed.

Task 5 – Summary Report: The USGS will prepare a report summarizing the activities completed in tasks 1 through 4. The report will summarize the availability of data for rainfall-runoff, recharge, and water-quality conditions, issues of concern, and management efforts in the Sarasota Bay watershed. It will identify areas of study where sufficient data to effectively manage stormwater is lacking. This report will provide the conceptual framework for future studies to be conducted by interested parties.

Deliverable: A report summarizing the availability of data used to manage stormwater in the Sarasota Bay watershed will be prepared at the end of the first year. This report will provide the conceptual framework for future studies. The primary product of this investigation will be a U.S. Geological Survey Open-File Report.

Timeline: One (1) year from authorization to proceed.

Personnel

The personnel required for the project will be drawn from the USGS office in Tampa. The project will require a hydrologist experienced in surface water and water quality (part time).

Funding

The cost of the project will be \$109,200 (50/50 cost share between USGS and SBNEP).

Schedule

The project will be completed within 12 months from authorization by the Sarasota Bay National Estuary Program and approval of the proposal by the USGS Regional office.

References

Sarasota Bay National Estuary Program. 1992, Sarasota Bay: Framework for Action: Sarasota Bay National Estuary Program, 13.15 pp.

Sarasota Bay National Estuary Program. 1993. Sarasota Bay: Reclaiming paradise: Sarasota Bay National Estuary Program, 12 p.

Sarasota Bay National Estuary Program. 2000. Sarasota Bay 2000: A decade of progress, 62 p.