

**Comprehensive Watershed Improvement Program (CWIP)**  
**Ad Hoc Technical Advisory Committee**  
**Immokalee/Lake Trafford Area**  
**Recommendations from Committee Members**  
Prepared by Collier County Stormwater Planning  
July 2, 2016

The questions below, along with the responses, were posed to CWIP Committee members to identify recommendations for watershed management in the Immokalee/Lake Trafford area of Collier County, Florida.

Committee Member	What are the priority issues, challenges, or problems?	What are the unique drivers, considerations, or other factors that should be understood?	What existing or upcoming efforts or solutions are being undertaken to address these identified problems, and what is your perspective on these proposed solutions?	Do you have a request, idea, or recommendation for addressing the identified problems that the Commissioners should consider? If so, what are they?	Is there anything else you would like to share?
Brent Bachelder, Biological Scientists III, Florida Fish & Wildlife Conservation Commission	<ul style="list-style-type: none"> <li>• Maintain rural/natural/undeveloped landscape, especially connections to adjacent watersheds (i.e. Okaloacoochee, Fakahatchee, Faka Union, Golden Gate Main, Estero Bay). Work towards ensuring urban, agricultural, and conservation lands are managed effectively to improve water quality and hydrologic conditions throughout the area.</li> <li>• Maintain/improve recreational public access to Lake Trafford and other conservation areas where practical</li> <li>• Protect investment of Lake Trafford restoration</li> <li>• Fill information gaps to establish an effective BMAP</li> </ul>	<ul style="list-style-type: none"> <li>• Hydrologic relationship between Corkscrew Swamp and Lake Trafford changes temporally. At times water discharges from Lake Trafford to Corkscrew, at other times water discharges from Corkscrew into Lake Trafford.</li> <li>• Northwestern portion of Lake Trafford watershed extends into Lee County; boundary approximately 4 miles NW of Lake Trafford. This increases challenge of additional management/planning towards Estero Bay watershed.</li> <li>• Information gap surrounding nutrient sources is problematic.</li> </ul>	<ul style="list-style-type: none"> <li>• The County's SSAs, CREW, and Audubon Society efforts have done much to protect the undeveloped nature of the watershed. I'm unaware of additional easement and/or acquisition efforts in the watershed. Additional land protection will be necessary to improve wildlife corridors between watersheds.</li> <li>• Maintaining success of Lake Trafford restoration will require establishment and implementation of a comprehensive and effective BMAP.</li> </ul>	Not at this time.	If possible, protection of undeveloped areas within the Cow Slough Basin and Immokalee Basin/Trafford Slough should be pursued. At a minimum, improvement of water quality should be addressed within these systems.
Jeff Carter, Stewardship Coordinator, Rookery Bay National Estuarine Research	<ul style="list-style-type: none"> <li>• Better and more comprehensive Water Quality Monitoring is needed as related to sources for people and ecosystems surrounding Immokalee and Lake Trafford.</li> <li>• The Immokalee water and sewer district might benefit from investigating how an ASR might benefit the community and the environment. It might be a useful management tool.</li> <li>• Need better short term and long term plans for Lake Trafford.</li> <li>• Investigate alternative plans so they're not relying solely on the Surficial Aquifer.</li> <li>• ....and how all these watershed related issues and potential</li> </ul>	<ul style="list-style-type: none"> <li>• Need to better understand their watershed and its Micro-watersheds. Where their water comes from and where it goes and how much water is needed by people and nature.</li> <li>• Need to better understand the areas surface water flows and sub-surface flows and how the natural resources and surface geology, as well as, the sub surface geology all interconnects and affects one another.</li> <li>• Also..... What are the sub-surface flows related to Lake Trafford?</li> <li>• Need to understand why the salinity and thus conductivity</li> </ul>	<ul style="list-style-type: none"> <li>• I did not hear of any efforts in our CWIP meeting that I thought were useless. Many good existing efforts are generating parts of an overall collective solution, however, more and better communication and integration needs to occur on a regular basis.</li> <li>• I know that Audubon is planning some watershed restoration efforts for some AG areas. How might this ultimately affect the area of Lake Trafford and/or Immokalee?</li> </ul>	<ul style="list-style-type: none"> <li>• Create a mini-watershed management and advisory team that can bring together all the different entities that deal with varying aspects of watershed issues in the greater Immokalee and Lake Trafford areas. This entity could also help create a mini-watershed plan for the area after bringing together all the stakeholders (County, City, Tribal, CREW, Pepper Ranch, Audubon, various agency folks, researchers, NGO's, Farming Interests, and local citizenry and businesses) so all these entities are communicating together at a common regular meeting (just about the Immokalee/Lake Trafford area) and thus collectively identifying problems, strategizing, and creating solutions together. It seems that presently many differing groups are thinking about and working on different aspects of this areas problems but they're not really talking regularly to one another or working closely</li> </ul>	Not at this time

	solutions do and can affect the Tribal, City, and County livelihoods and economies.	are trending upwards in the Lake.		together.	
<p>Joss Nageon De Lestang, Principal Engineer, Big Cypress Basin South Florida Water Management District</p>	<p>The issues discussed and identified in the Immokalee Watershed include:</p> <ul style="list-style-type: none"> <li>• Street flooding in urban Immokalee</li> <li>• An incomplete roadway stormwater collection and conveyance network.</li> <li>• Incomplete or lack of stormwater treatment facilities for runoff, which ultimately discharges west into Lake Trafford, or east into the SR29 Canal.</li> <li>• Incomplete or lack of a proper Management Plan for Lake Trafford. This requires a full understanding of potential sources of runoff, associated nutrient loading, and putting in place a defensible water budget.</li> <li>• Updated Stormwater Master Plan to incorporate latest findings.</li> </ul>		<p>Existing / Proposed Projects brought up for review include the following.</p> <ol style="list-style-type: none"> <li>1. Immokalee Drive: Water Quality Treatment pond at intersection of Carson &amp; Immokalee Road.</li> <li>2. Immokalee Stormwater Master Plan Update.</li> <li>3. Lake Trafford Road ditch culvert upgrade</li> <li>4. Madison Avenue ditch</li> <li>5. Immokalee Slough cross-drain</li> </ol>	<ul style="list-style-type: none"> <li>• In many ways, all of the projects should be under serious consideration, due to the existing structural deficiencies in the stormwater infrastructure, and the limited effectiveness of those facilities currently in place. The completion of an effective stormwater drainage network is essential if the Immokalee urban area is to be offered a minimum standard of flood protection. However, adequate collection and conveyance must also be matched by adequate treatment facilities, so that the water quality of the receiving water bodies is not compromised.</li> <li>• The correct sequencing of these projects poses perhaps the greater challenge, since they all cannot be implemented at the same time. It is also important to ensure that these efforts complement each other. The benefits to all the component projects should be additive, and be part of a logical framework which helps advance the larger goals. This highlights the need for an updated Stormwater Master plan. Much new data and information is now available, uncovered by the recent studies, and stakeholder efforts in this watershed, particularly associated with Lake Trafford. Clearly, these should be assessed and, as appropriate, incorporated into the Stormwater Master Plan.</li> <li>• Undeniably, the completion of projects #3 and #4 is essential if the storm sewer network is to be improved, at least for the Immokalee urban drainage. These projects represent continuing efforts towards attaining a better level of flood protection for the roadway and surrounding residents.</li> <li>• Project #4, the Madison Ave ditch, ultimately conveys to the east; into the SR29 canal, a conveyance of somewhat lesser sensitivity and arguably lower profile than Lake Trafford, which receives most of the west-flowing drainage from urban Immokalee. Project #3, addresses the lack of conveyance for this west-flowing drainage, an improvement clearly necessary if the roadway drainage network is to be improved, or even maintained.</li> <li>• The recent dredging and clean-up of Lake Trafford, done at significant public expense, further emphasizes the need for adequate treatment of any stormwater routed in that direction. Project #1, the Immokalee Drive Phase 2 detention pond, is well suited to help in this regard. If the possibility for this land acquisition exists, normally the perennial challenge in locating pond sites, this project should be considered as highest priority, to be undertaken without delay, or as soon allowed</li> </ul>	

				<p>by funding. Properly designed, this detention pond would attenuate flows and allow needed residence time to runoff before eventual discharge into the Lake.</p> <ul style="list-style-type: none"> <li>• A Management Plan for Lake Trafford is another critical component to the long term health and sustainability of this watershed. Now that the Lake Trafford sub-basin delineation study is nearing completion, sufficient information already exists to begin identifying the main sources and pathways of contributory runoff. As a next step, a targeted monitoring program will do much to identify and document lake nutrient loading, this background information is essential to the development of a successful Management Plan.</li> <li>• Project #5, the Immokalee Slough cross-drain, may well be needed to improve the watershed connectivity in the interconnected wetlands. It's even likely that the existing culverts were sized and located with an imperfect understanding of the drainage flow paths they were intended to serve. Ultimately however, this is perhaps a structural roadway improvement with arguably lesser direct impact to the residents and to the lake.</li> <li>• As was discussed initially, projects which comprehensively address identified problems offer a clearer choice, and should have added validity in this selection effort.</li> </ul>	
<p>Gregg Strakaluse, Director- Streets &amp; Stormwater Department, City of Naples</p>		<p>From my perspective I would like to offer the following thoughts for stormwater management within the Immokalee watershed area.</p> <ul style="list-style-type: none"> <li>• Collier County staff is in a unique position to develop stormwater management programs and projects in coordination with several key partners within the watershed. It is important to maintain partnerships and collaboration with a variety of organizations in the watershed.</li> <li>• Furthermore, economic support from Collier County government may be justified as it may relate to data acquisition and the development of programs and projects that improve stormwater storage, recharge and quality.</li> <li>• Organizations to collaborate with include the Immokalee Water &amp; Sewer District, Pepper Ranch, CREW, Corkscrew Swamp Sanctuary, the Lake Trafford Management Team</li> </ul>	<p>Collier County's development of an update to the Immokalee Area Stormwater Master Plan is, in my opinion, one of the most important tools for progress. By setting clear goals, an updated stormwater master plan can guide Collier County and the community towards significant improvements in drainage and water quality. Some goals may include:</p> <ul style="list-style-type: none"> <li>• A summary of the stormwater management issues for the Immokalee area in terms of stormwater quality, quantity and the environment.</li> <li>• A review of land development regulations with a focus on integrating higher levels of stormwater management features such as onsite retention or detention volumes, pervious pavements, reduced impervious areas, etc.</li> <li>• Consideration for the development of a stormwater management utility that would assist in creating funding</li> </ul>	<ul style="list-style-type: none"> <li>• Based on what I learned, Collier County engineers have a good idea for some projects that would help improve drainage within the Immokalee area. With those drainage improvements, there will need to be water quality components and I encourage engineering designers to find innovative ways to exceed water quality volume requirements, not just meet them.</li> <li>• There are still some questions that remain about stormwater affects to Lake Trafford versus potential overland flow inputs. This area should continue to be studied. Over the course of the next 5-years, it appears that significantly more detailed information will become available that would enable planners and engineers to develop more specific improvement projects and programs.</li> <li>• A significant invest been made to dredge Lake Trafford and projects and programs should be developed to preserve that investment by averting sediment deposits back into the lake. Measures should be taken to prevent the remaining stockpile of dredge material that exists nearby from eroding back into Lake Trafford.</li> <li>• Additionally, other sediment sources entering the lake should be tracked and programs in place to minimize further sediment loading into the lake.</li> </ul>	<p>The presentations delivered at the May 6, 2016 Collier County Comprehensive Watershed Improvement Plan was thought provoking and informative. The presentation also given by Mr. Robert Wiley on April 22<sup>nd</sup> regarding the Immokalee Area Stormwater Master Plan development was also very informative. At both meetings, the presenters provided a substantial amount of information to committee members and those in attendance. I believe the meeting created an opportunity to review many of the technical aspects and stormwater</p>

		and the Immokalee CRA.	<p>opportunities for new and improved stormwater management infrastructure, data collection, public education, and environmental restoration efforts.</p> <ul style="list-style-type: none"> <li>• Review stormwater drainage level of service and determine drainage infrastructure needs and cost estimates over a 10-year period.</li> <li>• Based on existing water quality data, determine water quality project and program needs and cost estimates over a 10-year period.</li> <li>• Review the existing allocation of resources dedicated to infrastructure maintenance and determine the need for additional resource allocation.</li> <li>• Coordinate with Collier County Utilities in regards to the new Integrated Water Management Plan for the next 50 year horizon.</li> </ul>		management challenges for the area.
Dennis P. Vasey, Supervisor, Seat 3, Collier Soil and Water Conservation District	<ul style="list-style-type: none"> <li>• Lake Trafford is a broad, very shallow basin with an area of about 70 square miles in which the low spot is the lake. The Town of Immokalee lies to the east of the lake while to the north and south, the very permeable sandy soils have historically supported citrus or row crop agriculture. To the west of the lake lies the headwater area of the Corkscrew Swamp.</li> <li>• Potential drainage of agricultural chemicals or other anthropogenic chemicals into the lake;</li> <li>• (2) possible runoff from the Town of Immokalee;</li> <li>• (3) possible runoff or shallow groundwater flow from the Town's wastewater treatment plant (WWTP) operation located south-southeast of the lake;</li> <li>• (4) runoff or shallow groundwater flow from either the capped, but unlined landfill, or the active lined landfill, and</li> <li>• (5) There are no wells to monitor shallow groundwater flow and</li> </ul>	<ul style="list-style-type: none"> <li>• Geologically and hydrogeologically, Lake Trafford is situated on the Immokalee rise, a broad domal Tertiary uplift, across which Tertiary subaerial and submarine erosion stripped off a layer of clay and silt prior to the deposition of a mixed siliclastic and carbonate sequence across the region. The clay/silt unit elsewhere in Collier and adjacent Lee counties now forms a semi-confining unit separating the unconfined water table aquifer from the underlying, confined Lower Tamiami Aquifer. In the Lake Trafford area, the Lower Tamiami Aquifer is unconfined.</li> <li>• Topography</li> <li>• Geology</li> </ul>	I was shocked to realize that stormwater and utility infrastructure programs were such a large part of the Immokalee Community Redevelopment Agency tasks. My impression is that there is no Emergency Services Bureau presence and floodplain and stormwater planning have been largely left the Immokalee WWTP operators.	<ul style="list-style-type: none"> <li>• Lake Trafford is a nearly circular water body with a surface area of approximately 1500 acres and a cross-sectional shape approximating that of a shallow saucer. The lake has a marshy shore zone dotted with Sabal palm. Lake levels average about 19' above Mean Sea Level (MSL) throughout most years with fluctuations from wet to dry season. The lake has no natural inflowing or out-flowing streams, receiving water via overland flow, through manmade drainage ditches or small canals, groundwater, and precipitation. Yet, the lake remains an integral part of the headwaters of the Corkscrew Swamp, visibly contributing water to the Swamp through overland flow when lake levels exceed approximately 21' elevation above MSL, and via shallow subsurface seepage the remainder of the year.</li> <li>• To be effective and to provide credible advice and counsel to agency partners and interested public in a timely manner regarding land management activities, agency staff need an understanding of fundamental hydrologic processes and basic/core hydro-meteorological facts for the land being analyzed. The published fundamental hydrologic concepts and basic hydro meteorological facts and their sources need to be identified, assessed, and managed on a watershed basis. From this information, specific factors that influence F,Q, and T are arrayed. Core hydro-meteorological data</li> </ul>	Lake Trafford is as important to the well-being of the Corkscrew Swamp and part of the Big Cypress Basin as Lake Okeechobee is to the Everglades. It is important that we concentrate on the northern portion of the county to assure water quality and quantity. Our energies need to be focused here and not on Everglades or Everglades Area projects.

	<p>quality between the lake and the spray fields.</p> <ul style="list-style-type: none"> <li>• Challenges:</li> <li>• WWTP spray field runoff into Lake Trafford during periods of intense rainfall</li> <li>• TMDL Improvement</li> <li>• Stormwater infrastructure</li> <li>• Water retention</li> <li>• Drainage</li> </ul> <p>Wetlands</p>			<p>is assembled in order to</p> <ul style="list-style-type: none"> <li>○ gain a basic understanding of the hydrologic cycle of a watershed, and</li> <li>○ serve as a data source for assessing hydrologic changes due to land use management actions.*</li> </ul> <ul style="list-style-type: none"> <li>• A permanent watershed case file should be developed and maintained for each watershed within Big Cypress Basin. These case files build a picture of the basic characteristics of the watershed. By documents that directly address activities in the watershed, historic conditions, response to severe storms, and other relevant information the current and future manager/analyst can quickly understand the watershed. Used properly, this case file improves efficiency by making key information readily available.*</li> </ul>	
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\*Supplemental information was provided by Dennis Vasey.

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**Immokalee/Lake Trafford Area**  
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July 2, 2016

**Supplemental information provided by CWIP Committee Member Dennis P. Vasey.**

Ecosystem and resource management planning and analyses include determinations of current and predicted economic, social, biological, and physical conditions, at variable scales. Four scales of ecosystem analysis are:

- basin-wide
- watershed (square miles or hydrologic units )
- and site.

The protocol for hydrologic condition analysis could be used to assess hydrologic condition during land and resource management planning efforts. The process could provide the broad context and to point to specific data and information which are needed for subsequent project investigations, design, prescriptions, and implementation.

Hydrologic condition analysis results in an understanding of the interrelationships between meteorological, surface and ground water, physical and biological factors that influence water flow, quality, or timing (F, Q, and/or T).

The magnitude, direction, and rate of change in flow, quality, or timing are the expression of hydrological condition. Therefore, the determination of hydrologic condition focuses on the analysis of the factors that most directly influence changes in flow, quality, or timing of water in a specific watershed of interest.

Watershed characteristics that are not subject to change by management activities (e.g., geology, landform, within which management actions can be expected to influence water F, Q, or T. Analysis and documentation of these watershed characteristics are fundamental to supporting interpretations of hydrologic condition and to define the limits of management influence over the physical system.

Because watersheds vary tremendously across the county, flexibility is needed to select the watershed characteristics which are most relevant for the watershed being considered. Therefore, the focus is on a process of analysis rather than a prescribed or fixed set of factors that drive the analysis. It permits the use of existing tools (e.g., terraces, nomographs) and adaptation of the process based on available information Big Cypress Basin conditions and needs.

My expectations are that standard procedures to analyze factors indicative of hydrologic condition (e.g., techniques of Water Resources Investigations of the United States-Geological Survey, An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources (A Procedural Document)-EPA) would point us in the right direction. Use of existing information brings with it a wide range of reliability and confidence in the values. It is very important to document the level of confidence and the reliability of estimates and conclusions. It is important to document data voids which have decreased the reliability of conclusions.

Analysis steps should follow a logical sequence that provide the basis for supporting professional estimates and judgments resulting in credible conclusions. The products of one step provide information for subsequent steps. The steps of the process are:

Step 1. Characterize Watershed- Organize, display, and document existing data and information about the watershed.

Step 2. Rate Factors- Rate relative importance of the factors used in Step 1 for potential to influence F, Q, and T.

Step 3. Identify Important Factors- Identify specific factors needed to determine hydrologic condition.

Step 4. Establish Current Levels- Quantify current ranges and status for the factors selected.

Step 5. Establish Reference Levels- Establish benchmark values for comparison by documenting the range of expected variation of the factors selected prior to any significant alteration of the watershed.

Step 6. Identify Changes and Interpret Results- Compare current and reference levels and provide interpretive conclusions.

The analytic process provides a starting point for discussion of hydrologic issues, related resource issues, and questions to be addressed through ecosystem and resource management planning. The analysis is intended to be watershed specific dealing only with factors associated with the specific watershed being analyzed. It is likely that the analytic factors will differ between watersheds, especially watersheds in substantially different geographic settings. However, within a common landscape unit, the important processes will likely be similar. This means that the knowledge gained in one analysis may be used to shape the next analysis.

## WATERSHED CASE FILES

To be effective and to provide credible advice and counsel to agency partners and interested public in a timely manner regarding land management activities, agency staff need an understanding of fundamental hydrologic processes and basic/core hydro-meteorological facts for the land being analyzed. The published fundamental hydrologic concepts and basic hydro meteorological facts and their sources need to be identified, assessed, and managed on a watershed basis. From this information, specific factors that influence F, Q, and T are arrayed. Core hydro-meteorological data is assembled in order to

- gain a basic understanding of the hydrologic cycle of a watershed, and
- serve as a data source for assessing hydrologic changes due to land use management actions.

A permanent watershed case file should be developed and maintained for each watershed within Big Cypress Basin. These case files build a picture of the basic characteristics of the watershed. By documents that directly address activities in the watershed, historic conditions, response to severe storms, and other relevant information the current and future manager/analyst can quickly understand the watershed.

Used properly, this case file improves efficiency by making key information readily available.

Watershed case files are numbered by the Hydrologic Unit Code and a watershed name. The case file will evolve from an empty numbered folder to a case file as each watershed analysis is performed. Developing full descriptive case files may take years or decades depending on the level of activity in a watershed and the priorities and resources that can be devoted to analysis.

A two phase approach. for analyzing hydrologic condition of watersheds and their treatment.

- Phase 1 is the analysis of hydrologic condition. The results from the hydrologic condition analysis are used to provide part of the rationale for listing or delisting waters that have impaired water quality per Section 303(d) of the Clean Water Act and to prioritize watersheds for treatment.
- Phase 2 is the preparation and implementation of a water quality recovery plan for those watersheds having impaired water quality.

A project level plan like this would involve all the Big Cypress Basin residents by watershed and could be used to:

- (1) identify specific source(s) and extent of pollution,
- (2) prescribe and schedule the implementation of treatments and their maintenance,
- (3) identify who is responsible for funding treatments and maintenance, and
- (4) include a monitoring and evaluation plan.

Consideration should be given to the potential for treatments and their maintenance based on economic, social, bio-physical resources, technological, and political limitations.