

# “Walk the Waterbody” Training Presentation

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## *Florida Department of Environmental Protection*

# *Walk the Waterbody Training*

City of Neptune Beach

February 10, 2011

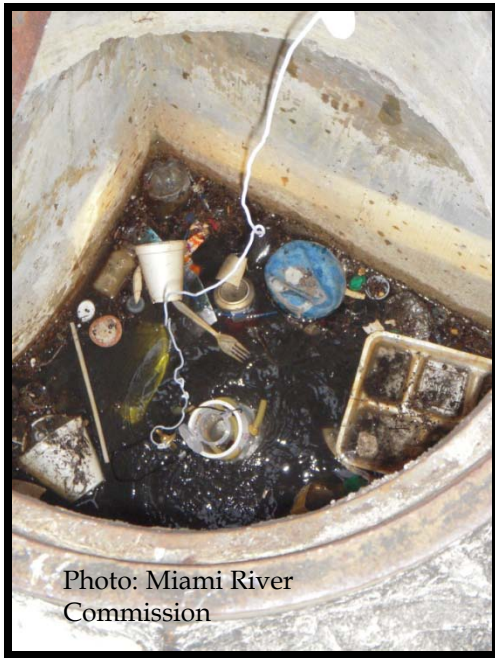


Photo: Miami River  
Commission



## *Today's Topics*

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- Why Walk
- Objectives
- Steps to Completing the Field Event
- Post Event Follow Up
- Additional Resources and Information





## *Why Walk the Waterbody?*

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- There is a fecal coliform impairment or TMDL.
- Good first step to determining sources and identifying easy to implement management actions.
- Utilize existing programs and ongoing activities to address “low hanging fruit.”
- Identify uncertainties and future options for more effective adaptive management.





## *Why Walk Continued*

- Contributes to improved communication between and within agencies.
- Increased public awareness.



Photo: Miami River Commission





# Walking your Waterbody *OBJECTIVES*





## *Objectives of Walk the Waterbody*

- Have all agencies with jurisdictional authority to collaborate simultaneously pre-event, in the field, and for post event follow up.
- Categorize conditions of watershed.
  - Hydrology;
  - Contributing ditches and branches; and
  - Flood prone areas.





## *Objectives Continued*

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- Implement management actions to eliminate sources and locate potential sources.
- Identify sampling needs:
  - Fill in knowledge gaps; and
  - Identify location of suspected sources.
- Establish follow-up protocol when a source is located.
- Determine potential next steps.







Just in Case

# *A QUICK REMINDER*





## *Fecal Coliform & Impaired Waters Rule*

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- IWR for determining fecal coliform bacteria impairment :
  - The most probable number (MPN) or membrane filter (MF) counts per 100 ml of fecal coliform bacteria shall not exceed a monthly average of 200, nor exceed 400 in 10 percent of the samples, nor exceed 800 on any one day.





Planning & Execution of the Field Event

# *STEP BY STEP*

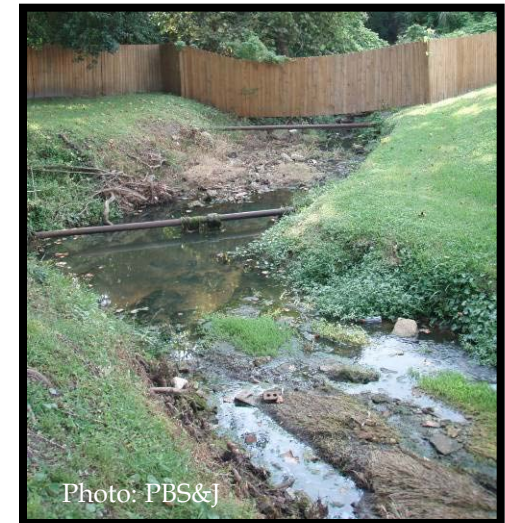


Photo: PBS&J





## *Walk the Waterbody Steps*

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- Lead Entity
- Stakeholder Identification
- Data Collection and Assimilation
- Maps on the Table (MOT)
- Synthesize Data from MOT
- Pre-Field Investigation
- Field Event





## *Identifying Stakeholders*

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- There must be a lead agency, typically:
  - MS4 permittee;
  - Municipality; or
  - Utility.
- How to identify partner agencies:
  - Characterize sources:
    - MS4 co-permittees that discharge to WBID;
    - Septic tanks: Department of Health;
    - Wastewater utility; and
    - Agriculture.
  - Check TMDL.







## *Data Collection and Assimilation*

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- Collect stormwater infrastructure data:
  - Inlets and outfalls
  - Ponds
  - Ditches
  - Underground conveyance
  - Best management practices (BMPs)
- Gather sewer infrastructure (private & public):
  - Pump stations
  - Force and gravity mains
  - SSO





## *Data Collection and Assimilation*

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- Identify septic tank locations:
  - Repair permits
  - Industrial permits
- Locate specialty farms, kennels, or other animal operations.
- Water quality sampling:
  - Sampling stations
  - Sampling frequency
  - Sampling results





# *Data Collection and Assimilation*

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- Hydrology:
  - Wetlands
  - Streams
  - Ponds
- Areas of special concern:
  - Landfill
  - Transfer station
  - Dog parks
  - Homeless populations





# *Data Collection and Assimilation*

- Make maps in large format and multiple copies:
  - Water quality sampling locations;
  - Stormwater;
  - Wastewater; and
  - Combined dataset.





## *Maps on the Table*

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- All hands on deck, a representative from each agency needs to attend.
- Divide into teams, if appropriate. There should be one representative from each agency per team.
- Elect a note taker.
- Elect a presenter:
  - Potential sources
  - General information







## *Maps on the Table Continued*

- Review maps as team and identify:
  - Hydrology characteristics, and
  - Known areas of concern.
- Team members should be marking areas of concern on the maps themselves.





## *MOT Continued*

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- Note taker should be recording the map notations.
- After the team review, the presenter should review the teams findings to the group.



Photo: PBS&J



## *MOT Next Steps*

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- Elect field representatives.
  - Representative from each entity.
    - Consider if there is more than one side of the house (stormwater vs. public works).
  - Participants should have infrastructure knowledge and have access to facilities (gated stormwater ponds, pump stations, etc.).
  - Sampling staff:
    - Should have necessary sampling equipment, and
    - Should be familiar with sampling SOP.





## *Field Planning*

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- Spaces for field event are limited, as it is imperative all field participants ride in one vehicle.
  - *Yes, that means one vehicle.*
  - 12 passenger van is recommended.
- Remember you may need to coordinate with local law enforcement if you may be in areas that may have safety concerns.







## *Field Planning*

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- Participants should plan on bringing:
  - Lunch (there is no time to stop at restaurant);
  - Sunscreen and bug repellent;
  - Appropriate field clothing;
  - Water; and
  - Agency contact numbers.
- Equipment for field:
  - GPS;
  - Camera;
  - Sampling equipment, coolers, and ice;
  - Large format maps.







## *Pre Field Survey before Walking with Group*

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- Lead agency needs to complete a pre-field survey and identify:
  - Event day meeting location with appropriate parking.
  - Route from headwaters downstream.
  - Focus areas.
  - Lunch location.
  - Areas of concern (map and pre-investigation).
  - Access issues.





## *Walking the Waterbody*

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- Designate a documentation team or teams:
  - Primary note taker who coordinates GPS points, photos, and sampling locations.
  - GPS – take GPS points.
  - Camera – take pictures.
- **Imperative that the precise record (order) of GPS coordinates, photos, and notes is captured in the field.**
- Other participants should also be taking pictures.





## *When Walking What are we Looking For?*

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- Flood prone areas
- Evidence of pet waste
- Water fowl
- Chickens or other hobby animals
- Ruminant populations and raccoons, etc.
- Septic tanks
  - Ponding
  - Strong smell
  - Close to surface waters





## *Looking Continued*

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- Wastewater
  - Any infrastructure in close proximity to surface waters:
    - Pump Stations:
      - Alarms;
      - Contact Information;
    - Manholes; and
    - Air release valves (ARVs).
  - Branches and contributing ditches.





## *Still Looking*

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- Erosion or wash out
- Dense tree canopy
- Dense vegetation in stream
- Stagnant water
- Homeless
- Animals in water:
  - Horses
  - Cattle
  - Raccoons







## *It's a lot of Looking*

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- Stormwater
  - Potential Illicit Connections
  - Stormwater Drains:
    - Free of debris,
    - In repair, and
    - Smell of sewage (cross- connections).
  - Inlets:
    - Free of debris, and
    - Proximity to wastewater infrastructure.
  - Outfalls:
    - Ponds, and
    - Underground conveyances.





## *When You See a Discharge*

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- Take a sample:
  - At point, and
  - Downstream and/or upstream.
- If it is a serious infraction – Call it in!
  - Illegal discharge
  - Turbidity
  - SSO
- Take GPS point and pictures.





## *When You See Potential Sources*

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- Take pictures.
- Capture area with GPS point.
- Notes should indicate:
  - What it is or may be.
  - Who may be associated with corrective action, such as:
    - County not FDOT, or
    - Department of Business & Professional Regulation not local Utility.





## *Important!!!!*

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- Remember samples must be on ice while waiting for delivery.
- Samples must meet holding times (6 hours)!!
- Samples must be processed in NELAP certified laboratory.
- Arrangements to have samples picked up for delivery to lab.
- Chain of custody must still be maintained.





## Summary, Reporting & Follow-up

# *POST EVENT*



Photo: PBS&J







## *First Steps to Summarize Field Event*

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- Post process GPS coordinates.
- Create shapefile of coordinates.
- Edit shapefile to include description or information about point.
- Process pictures by adding labels so you can later recall what the picture was showing.
- Obtain sample results from lab.





# *Hold Follow Up Meeting with Participants*

- Review the findings from the field:
  - Pictures
  - Sample results
  - Follow up actions associated with jurisdictional authority:
    - Actions associated with permit obligations:
      - Observed SSO – Utility, or
      - Potential Illicit Connection – MS4.
    - Housekeeping of Existing Infrastructure:
      - Broken infrastructure or in need of maintenance:
        - Broken stormwater grate.
      - General maintenance:
        - Clogged stormwater drains.





## *Follow Up Meeting with Participants, Cont.*

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- Coordinated community follow up actions.
  - Additional source investigations.
  - Sampling:
    - Increased sampling frequency (quarterly to monthly).
    - New stations:
      - Information gaps (only two trend stations in WBID).
      - Investigate potential source - Add sampling station to help identify source location , not intended to be a fixed sampling location .
    - Follow up sampling after high count.
    - Specialized sampling :
      - MST.
      - Boron or other indicators.
- Increased maintenance.
- Other source solutions.





## *Coordinated Community Follow Up*

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- Lead entity should host a follow up discussion to review the community follow up actions.
- This meeting should prioritize actions that eliminate sources.
- Agencies and partnerships of entities should volunteer for those actions that are closely related to their missions and authority.





## *Reporting*

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- Create table of follow up actions and indicate appropriate entities for management actions.
- Create mechanism to ensure all jurisdictional items are completed.
- Prioritize community follow up actions:
  - Identify which community follow up actions will occur near term, and
  - Actions for future implementation.







## *Reporting Continued*

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- This information should be recorded in a way that information can be provided to the Department to demonstrate:
  - Identified sources;
  - Completed management actions to remove sources;
  - Non-human sources;
  - Projects or activities to address identified source and source assessment and identification; and
  - Future steps.





## *Reporting continued*

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- The Department is working on a document template for inserting Walk the Waterbody results that will be available in March.





References, Case Studies

# *ADDITIONAL RESOURCES AND INFORMATION*





## *Additional Resources*

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- Tributary Pollution Assessment Manual (PBS&J).
- LSJ Technical Reports:
  - Miramar Creek
  - Big Fishweir Creek
  - Long Branch
  - Hogan Creek
  - Williamson Creek
  - Red Bay Branch





## *Additional Resources*

- The Department has developed a fecal coliform guidance document that is a great source of tools and information. It will be posted next month:  
<http://www.dep.state.fl.us/water/watersheds/bmap.htm>
- Contracting with consultant to obtain better information such as:
  - Develop sampling program,
  - MST work to identify human sources,
  - Water Quality Data Analysis.







# *Questions*

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# “Walk the Waterbody” Training Manual

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***DRAFT***

# **Walk the Waterbody Event: Training Manual**



***Florida Department of Environmental Protection***  
*Division of Environmental Assessment and Restoration*  
*Bureau of Watershed Restoration*  
*Tallahassee, FL 32399*

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## Purpose and Contents

Beginning in 2000, Florida has developed and implemented a cyclical process for assessing which surface waters in the state are impaired, determining the potential sources of individual pollutants, and removing those sources so that impaired waterbodies meet state water quality standards.

The Walk the Waterbody event is an important first step in determining the fecal coliform sources entering an impaired waterbody and identifying easy-to-implement management actions. It uses existing programs and ongoing activities to remove the most obvious sources and identifies uncertainties and future options for more effective adaptive management.

In the Walk the Waterbody exercise, a team walks along the banks of the impaired waterbody and its contributing waters to identify potential sources of fecal coliform contamination as well as other issues that may be affecting water quality. This field reconnaissance is carried out to gain a better understanding of conditions in the watershed—including the hydrology of the waterbody and its contributing ditches and branches, the locations of flood-prone areas, and the locations of sewer and stormwater infrastructure—in order to reduce the levels of fecal coliform entering the waterbody.

This manual contains guidance for stakeholders on how to conduct a Walk the Waterbody event. It first provides legislative and regulatory background information, discusses the use of fecal coliform as an indicator of water quality, and then describes the activities that should be carried out before, during, and after the Walk the Waterbody event.

## Legislative and Regulatory Background

Section 303(d) of the federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a Total Maximum Daily Load (TMDL) for each pollutant causing the impairment of listed waters on a schedule. The box on the next page describes Florida's water quality standard for fecal coliform bacteria.

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. They provide important water quality goals that will guide restoration activities.

The TMDL process consists of a series of steps conducted over a repeating five-year cycle, aimed at assessing waterbodies and identifying impaired waters, identifying potential pollutant sources, developing and implementing actions and strategies for eliminating or decreasing contamination from those sources, and tracking progress toward having the waterbody (or WBID) meet the specific target or criterion established by the TMDL. A WBID is a **waterbody identification** number assigned to a smaller drainage area within a large river basin.



There are several options for implementing TMDLS, including locally derived TMDL Implementation Plans and formally adopted Basin Management Action Plans (BMAPs). BMAPs are developed in close collaboration with permit holders, state and regional agencies, county and city governments, businesses, and other stakeholders associated with an impaired waterbody, and are adopted by the Florida Department of Environmental Protection (FDEP) through Secretarial Order. The BMAP details these sources, the actions and strategies that will be used, timelines for implementation, and how progress will be measured. Locally derived TMDL Implementation Plans are not adopted by FDEP but may follow a similar process to identify pollutant sources, management actions, and timelines for implementation. Also, National Pollutant Discharge Elimination System (NPDES) and Municipal Separate Storm Sewer System (MS4) permits associated with wastewater and stormwater discharges into an impaired waterbody require permittees to create a plan to address adopted TMDLS.

### ***Florida's Water Quality Standard for Fecal Coliform***

*Fecal coliform is the portion of total coliform bacteria present in the gut and feces of warm-blooded animals, and thus is a more accurate indicator of the presence of animal or human waste in a waterbody than total coliform. TMDLS are now only applicable to fecal coliform, since total coliform is no longer a water quality standard regulated by the state.*

*For determining whether a waterbody is impaired for fecal coliform bacteria, Florida's Impaired Surface Waters Rule (IWR) (Rule 62-303, Florida Administrative Code) states that monthly averages shall be expressed as geometric means based on a minimum of 10 samples taken over a 30-day period. However, if there are insufficient data (fewer than 10 samples in a given month) available to evaluate the geometric mean criterion for fecal coliform bacteria, the criterion selected for the TMDL is not to exceed 400.*

*An additional explanation of this standard may be helpful, since it is complex and somewhat confusing. There are really three standards. The first is that a sample cannot exceed 800 colony-forming units (CFU) on any one day. If more than one sample for a waterbody in a day is over 800 CFU, then there is an impairment. The second standard, which should be used for providing guidance to eliminate impairment, is that the in-stream concentration of fecal coliform should not exceed 400 CFU. The third standard is 200 CFU and is based on the geometric mean, which requires more data than most entities can afford to collect.*

The Walk the Waterbody event can be an effective first step in the development of both BMAPs and other TMDL Implementation Plans because the event provides a useful starting point for gathering information and implementing management actions. The information gathered as part of this effort can be eventually incorporated into one of these plans.

## **Fecal Coliform as an Indicator of Water Quality**

Pathogens (disease-causing organisms such as bacteria, viruses, and protozoans) in surface water can cause many kinds of serious illnesses, including cholera, typhoid fever, hepatitis, dysentery, and

gastroenteritis. If pathogens are present, they can enter the body through the mouth, nose, or ears, or through cuts in the skin.

It is impossible to tell by the look, taste, or smell of the water if it contains pathogens. Testing for bacteria is the only reliable way to know if water is safe for human uses such as swimming or shellfish harvesting.

The concentrations of pathogens from fecal contamination are small, and the number of different pathogens is large. Thus it would be time consuming, expensive, and impractical to test for pathogens in every water sample collected. Coliform bacteria come from the same fecal sources as pathogenic organisms. They are relatively easy to identify and are usually present in larger numbers than more dangerous pathogens. Thus testing for coliform bacteria can be a useful indicator of whether pathogens are present. The sources of fecal coliform in surface waters include wastewater treatment plants, on-site septic systems (septic tanks), domestic and wild animal manure, and stormwater runoff.

If fecal coliform counts in a waterbody are high (over 200 colonies per 100 milliliters of water), there is a greater chance that pathogenic organisms are also present. In addition to the possible health risk, elevated levels of fecal coliform can cause cloudy water, unpleasant odors, and increased oxygen demand.

It is important to determine whether human sources of fecal coliform are present, because these have the highest potential for infection. However, it can be difficult to identify the source, because bacteria can regrow in sediments, even though the original source of the bacteria may no longer be present.

## **The Walk the Waterbody Exercise**

### ***Why Walk?***

The Walk the Waterbody exercise is a low-cost, common-sense, effective first step in addressing fecal coliform pollution in a waterbody so management actions can be implemented so that it meets state water quality standards. The exercise allows stakeholders to better understand conditions in the watershed and identify potential sources of fecal coliform contamination. It enables them to carry out easy-to-implement management actions, establish a plan to gather additional samples or sample more frequently, and follow up on those actions to assess the degree of success and the additional effort needed. The exercise also allows stakeholders to identify uncertainties and future options for more effective adaptive management.

Existing programs and ongoing activities can usually be tailored to address the impairment. For example, a street-sweeping program can be modified to focus on the portion of a municipality that drains to an impaired waterbody, or, if a stormwater inlet is full of leaves that prevent the inlet from working properly, the inlet can be maintained more often.

The event provides a good opportunity for individuals within an agency and from different agencies to establish relationships. This is a great benefit because having a contact person helps in following up on issues observed in the field. Another benefit is that when there is a large group in the field, people in the neighborhood want to know what is going on, providing a good opportunity to educate members of the public about potential sources and what to do when they see a problem.

In addition to participating in the Walk the Waterbody event, each municipality involved can do an intensive inspection of their jurisdiction; however, it is important to keep a record of these efforts to show FDEP what was done (e.g., repair, maintenance, or removal of a source). If stakeholders request support to ensure that they are on the right track, FDEP will provide help.

## **Objectives**

The objectives of the Walk the Waterbody event are as follows:

- *Having all agencies and entities with jurisdictional authority in the watershed collaborate simultaneously before, during, and after the event.*
- *Understanding and categorizing conditions in the watershed, including hydrology, contributing ditches and branches, sewer and stormwater infrastructure, and flood-prone areas.*
- *Implementing management actions to locate potential sources and eliminate sources;*
- *Identifying sampling needs to fill in knowledge gaps and identify the locations of suspected sources;*
- *Establishing a follow-up protocol when a source is located; and*
- *Determining near-term next steps and longer-term actions.*

## **Participants**

Participants include representatives from all agencies and entities with jurisdictional authority, who collaborate before, during, and after the event. These include county and city governments, state and regional agencies, local commissions, and law enforcement. For a municipality, more than one representative may be needed to provide information on the different functions that it carries out, such as wastewater and stormwater. If more than one representative cannot participate, the representative involved should have information on how to contact the staff responsible for the other functions.

## **Cost**

The only cost to the participants in the Walk the Waterbody exercise is staff time. Funding is needed to process the water quality samples associated with this effort; this can sometimes be done through an agency that has a lower-cost contract laboratory.

Future management actions associated with existing city and county programs will require scheduling, coordination, and follow-up on behalf of the participating agencies. Examples of follow-up activities that may result in additional costs include system maintenance, repair, and investigation; however, it is important to note that these activities generally correspond with jurisdictional missions and already-established programs.

## **Pre-Event Activities**

### ***Identifying a Lead Entity and Stakeholders***

A lead entity should be designated to organize and carry out the Walk the Waterbody event. Typically, this consists of an MS4 permittee, municipality, or utility in the watershed where the impaired waterbody is located.

Other stakeholders with jurisdictional authority in the watershed must also be identified. These include MS4 co-permittees that discharge to the waterbody, wastewater utilities, local health departments that regulate septic tanks, county and city governments, state and regional agencies, and potential sources such as agriculture. It may be helpful to check the TMDL document, if available, because it may contain maps and information on the impairment and potential sources, and also help to identify the stakeholders involved.

### ***Initial Steps***

Before going into the field, the lead entity should meet with stakeholders to exchange information in a Maps on the Table event (which is discussed in the next section). In preparation for this meeting, each entity should provide their information so stakeholders can better acquaint themselves with the conditions in the watershed. The information should be provided in advance to the lead entity, which compiles it and creates multiple copies of large-format maps. Another set of maps, each showing just one type of infrastructure, is also helpful for reference in the field.

The information that should be collected and assimilated includes the following:

- *Geographic information system (GIS) data,*
- *Stormwater infrastructure maps showing the locations of inlets and outfalls, ponds, ditches, and underground conveyances;*
- *Stormwater best management practices (BMPs) being implemented;*
- *Maps of private and public sewer infrastructure showing the locations of pump stations and force and gravity mains, as well as the location and number of sanitary sewer overflows (SSOs) (overflows of 1,000 gallons or more, or that affect surface waters; both must be reported) and their causes;*
- *Sanitary sewer events (SSEs) (nonreportable overflows that consist of less than 1,000 gallons, or that do not affect surface waters) and their causes;*

- *Septic tank locations and the locations of repair permits and industrial permits issued;*
- *The locations of specialty farms, kennels, and other animal operations;*
- *Water quality sampling information such as the locations of sampling stations and sampling frequency and results;*
- *Hydrology, including the locations of wetlands, streams, and ponds; and*
- *The locations of areas or issues of special concern, including homeless populations, dog parks, landfills, and transfer stations.*

### ***Maps on the Table Session***

Once all the data are collected and compiled into maps, the lead entity should hold a Maps on the Table session to identify areas of concern to visit during the Walk the Waterbody exercise, based on field knowledge from staff and a synthesis of the available information. This meeting allows all stakeholders to become familiar with the information before the field visit. A representative from each agency or entity should attend. If even one stakeholder cannot be there, then the effort will not be a success. It is essential to have participation and buy-in from all those involved for the event to be successful and to ensure that the problems identified can be fixed. The lead entity is responsible for ensuring that each agency or entity is represented.

If there are a lot of people attending the meeting, then the group can divide into teams, with a representative from each agency on each team. Each team should designate a note taker to track all discussions, and a presenter to share the team's information with the rest of the group. The teams should then review the maps, with each representative describing their knowledge of the area and what they have seen when they are working in the field. The teams should also mark key hydrologic characteristics and areas of concern on their maps. Providing information on the map helps to create a crosswalk between the spatial locations with notes. **(NOTE: It is very important for team members to mark the areas of concern on the maps themselves, with the note taker recording the map notations.)** After the teams have reviewed their maps, the presenters should discuss the findings with the entire group.

To prepare for the walk, field representatives should be elected. A representative from each agency or entity should be included. More than one person from each organization can attend, but there is a limit on the number of people who can be in the field. If an agency or entity carries out more than one function (e.g., stormwater and wastewater), then it is important to have representation from each.

Participants going into the field should have infrastructure knowledge and access to facilities (such as gated stormwater ponds and pump stations). All infrastructure does not need to be inspected, but if there is an odor or something does not look right, access may be needed to check for potential sources. It is also important to have participation from staff who can collect samples and who are trained in the appropriate sampling standard operating procedures (SOPs).



## ***Prefield Survey***

The lead entity should carry out a preliminary field reconnaissance, which will help to make the actual walking day more efficient and focus efforts when everyone is in the field. As part of the prefield survey, it is important to decide on a meeting place to leave from in the morning that has adequate, safe parking. The Walk the Waterbody route from the headwaters to downstream (or vice versa) should be outlined to keep everyone on track during the event. The areas of concern from the Maps on the Table meeting should be noted and included in the route.

Access issues should also be noted. Participants cannot enter private land, and so there may be portions of the waterbody that cannot be walked. If an area has significant access issues, it may be necessary to schedule a follow-up event to tour those areas by boat.

Safety concerns that may require coordination with local law enforcement should also be identified, and the lead entity should contact local law enforcement to ensure their support during the exercise.

The lead entity should also pick a lunch location, such as a park, to avoid having to drive around the day of the event to find a good place to eat.

## **Field Event**

### ***Field Planning***

Spaces for the field event are limited because all participants need to be in one vehicle. When they stop to walk areas or do investigations, most of these places do not have adequate parking for multiple vehicles, and it is difficult for several cars to stay together while driving around all day. A 12-passenger van is recommended. It is essential that the participants travel in one van because it ensures that all areas identified can be visited in the time allotted. If everyone is in the field together and can see the problem firsthand, the necessary actions to correct the problem are more likely to occur.

Participants should plan on bringing the following:

- *Lunch (there will not be time to stop at a restaurant);*
- *Sunscreen and bug repellent;*
- *Appropriate field clothing (including sunglasses and hat if needed);*
- *Water; and*
- *Agency contact numbers.*

The team should take water quality sampling equipment to collect information about potential sources and locations identified in the field. Field equipment should include the following:

- *Global positioning system (GPS);*

- *Camera (participants should also feel free to bring their own cameras to document observations);*
- *Sampling equipment, including a cooler and ice;*
- *The large-format maps.*

### **Documentation Team**

Before going into the field, team members should designate a documentation team (or teams) responsible for the following:

- *Because capturing a precise record in the field is essential, it is essential to have detailed notes, so that all the information can be sorted out after the walk. A primary note taker should be designated to coordinate the GPS points, photos, and sampling locations. Having the information in chronological order is helpful in thinking about the issues after the event.*
- *Someone to take the GPS points.*
- *Someone to take pictures of potential sources and other issues observed during the event. It is also important to take pictures of the team members in the field, because this is of interest to boards, commissions, and supervisors. **(NOTE: Other participants besides the documentation team should also take pictures.)***

### **Field Activities**

Team members should explore the entire waterbody while in the field, referring to the maps to follow the waterbody above and below ground. They should look at the waterbody's banks and in its vicinity for potential sources. Branches, contributing ditches, and canals that intersect the waterbody should also be walked, because all inputs to a waterbody are typically not known without a site visit. Sometimes connecting branches do not show up on maps or GIS layers, and the fecal coliform in a waterbody could be transported from one of the contributing branches. It is also important to ensure that the waterbody and its associated branches are all included within the watershed boundary.

Care should be taken to ensure that only appropriate agency representatives access private property, unless the property owner has granted access to the entire team.

Participants should look for potential sources of fecal coliform during the walk, including the following:

### **Sanitary Sewer**

- *Public and private sanitary sewer infrastructure (such as manholes, force and gravity mains, and pump stations). Often private infrastructure is a problem because it is typically out of sight and often not inspected regularly.*
- *Package plants.*
- *Signs of recent SSOs, or areas with multiple SSOs.*

- *Septic tanks or wastewater infrastructure located close to surface waters and/or stormwater inlets, including pump stations, manholes, and air release valves (ARVs). Sewage overflows could enter the stormwater system through an inlet and be transported to the waterbody. Pump stations should be properly maintained with appropriate contact information posted. Manholes should be checked for unreported SSOs, which can occur in remote areas. ARVs allow gases to be released to prevent corrosion of the sewer lines; however, if the ARVs are not functioning properly, sewage can leak out.*
- *Flood-prone areas, since flooding affects the ability of a septic tank drainfield to operate properly and can also cause infiltration in wastewater pipes, which can lead to SSOs.*
- *Failing septic tanks (as indicated by ponding and a strong smell of sewage). Unless there is an obvious problem with a tank, the local health department cannot enter private property to inspect the tank unless it receives a complaint call. Some septic tanks are older and are unmounded, or were permitted closer to surface waters. Tanks located close to the waterbody should be noted during the walk, in case sampling in that area indicates a high fecal coliform count.*
- *Evidence of homeless populations. These tend to be transient, and while the people are not usually seen, signs of a population are typically evident.*

## **Stormwater**

- *Potential illicit connections (PICs) or stormwater discharges. PICs should be identified for follow up. Not all PICs are a fecal coliform source, but they should be evaluated.*
- *MS4 conveyances requiring cleaning, accumulated trash and debris on streets and parking lots, and accumulated trash and debris near to or inside stormwater drains and catch basins. The stormwater system is not a fecal coliform source in itself, but it can convey bacteria or promote its growth. Therefore, the system should be clear of debris, in repair, and with no smell of sewage, which could indicate a cross-connection with the sewer system.*
- *Clogged or broken stormwater grates.*
- *Stormwater drains undergoing repairs.*
- *Stormwater inlets close to wastewater infrastructure or septic tanks, because overflows could enter the stormwater system through an inlet and be transported to the waterbody.*
- *Debris in stormwater inlets.*
- *Stormwater outfalls discharging from underground conveyances or into ponds. Bacteria regrowth can occur underground, and when the conveyance discharges to the creek, it could cause a high fecal coliform count unless the underground conveyance is cleaned out.*

- *Excessive sediments and signs of erosion or wash out. Sediments cause turbidity in a waterbody and can help fecal coliform bacteria regrow by limiting ultraviolet (UV) light penetration, which kills bacteria.*
- *Stagnant water that can allow fecal coliform bacteria to regrow.*

### **Other Potential Sources**

- *Exposed pipes of unknown origin.*
- *Evidence of illegal dumping or discharge of liquids.*
- *Unusual odors.*
- *Evidence of pet waste or high-traffic pet areas.*
- *Presence of horses, cattle, and other ruminants in the water or close to the water.*
- *Evidence of wildlife such as raccoons and waterfowl.*
- *Evidence of chickens, rabbits, or other hobby animals.*
- *Dense vegetation in the waterbody, or vegetated ditches. These may be collecting trash that allows fecal coliform to grow, and the vegetation may need to be maintained.*
- *Areas with heavy tree cover that prevents UV light penetration.*

When a discharge is observed, a sample should be taken to determine if it is a fecal coliform source. It is also helpful to sample upstream and downstream of the discharge to determine if the source is being transported. If the discharge is a serious infraction such as an illegal discharge, turbidity, or SSO, it should be called in to the appropriate agency from the field. To provide documentation, GPS points and pictures, as well as notes, should also be taken.

A detailed record should be kept of major findings in the field, including observations about the waterbody, potential sources, followed-up items and the responsible agency, and any areas that should be added to the sampling plan or that require additional investigation. Potential sources should be catalogued in the field and reported to the proper jurisdiction. Pictures and GPS points should be taken, and the notes should indicate what the source is or may be, and which agency might be associated with the corrective action.

It is not always easy to identify the responsible agency in the field, and so this may need to occur after the walk. The Florida Department of Business and Professional Regulation (available at <http://www.myfloridalicense.com/dbpr/>) is a good contact for ensuring that potential issues with restaurants and businesses are rectified.

### **Water Quality Sampling**

If team members find flowing pipes in the field that are PICs, they should take samples at the point of discharge, downstream, and upstream. Other potential sources should also be sampled. Sampling does have a cost, and the stakeholders should be sensitive to that fact before asking for a sample in the field.

Areas where there appear to be problems should be identified, so that sampling can be added to that area to help determine the source.

Water quality sampling requires knowledge of FDEP SOPs, types of equipment, and holding times. It is essential to have someone on the team who brings the necessary equipment, knows how to use it, and is familiar with the SOPs.

The following important reminders apply to sampling:

- *Samples must be kept on ice while waiting for pickup and delivery.*
- *Samples must meet the fecal coliform holding time of 6 hours.*
- *A meeting place should be established if necessary, so that someone can pick up the samples and bring them to the lab for analysis.*
- *Samples must be processed in a National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory.*
- *For proper documentation, the chain of custody must be maintained.*

## **Follow-Up Activities**

### ***Processing the Information***

The GPS coordinates should be post-processed in either GIS or on a map. If GIS is available, a shapefile of coordinates should be created, and the shapefile attribute table should be updated to include a description or information about the point collected in the field. All pictures should be labeled shortly after the field event in a way that any nontechnical or technical person can understand. The sample results should also be obtained from the lab.

### ***Follow-Up Meeting***

Once all the data are gathered and processed, the lead entity should hold a follow-up meeting with participants to review the findings from the field, discuss and prioritize the actions to be taken, and identify the responsible agency or organization.

### **Jurisdictional Follow-Up Actions**

Certain actions are part of the jurisdictional authority of an entity—for example, the MS4 is required to address PICs, and the local wastewater utility addresses SSOs.

Activities such as system maintenance and improvement are addressed by the entity that uses them. These include infrastructure repairs (e.g., broken stormwater grates), general maintenance (e.g., cleaning clogged stormwater drains, inlets, or catch basins more often), infrastructure improvements and retrofits (e.g., doing a closed-circuit television inspection of sewer lines, inspecting vitrified clay pipe, removing tuberculated pipe, and slip lining). Capital improvements may take longer to initiate, and additional funding may have to be secured.

A mechanism should be created to ensure that all jurisdictional items are completed. Agencies and partnerships of entities should volunteer for those actions that are closely related to their individual missions and authority.

### **Coordinated Community Follow-Up Actions**

Actions to address sources such as homeless populations and pets are not directly linked to a permit responsibility. Thus it is especially important for participants to decide who will carry out these nonpermit-related, coordinated community follow-up actions. The lead entity should host a meeting to review these actions, categorize them, and determine which issues can be addressed immediately, which will be implemented in the future, and which should be placed on hold. For example, some projects, such as flood control, are expensive, will require a source of funding, and will take longer to implement. Participants can then develop a table of follow-up actions listing the appropriate entity to implement each action.

Coordinated community follow-up actions can include additional source investigations, the sampling of contributing branches, increased sampling frequency, new stations to fill information gaps or temporary stations to help identify the location of a source, sampling upstream and downstream of a high count to identify the source, and specialized sampling to help identify sources, including microbial source tracking (MST), boron, or indicators of wastewater (chemicals).

### ***Reporting***

There will be differences in the level of detail reported, depending on each lead entity's sophistication and resources. Regardless, it is important to keep track of both the jurisdictional and community follow-up corrective actions and to organize the information in an appropriate format for reporting. FDEP will work with lead entities on the reporting.

The information should be reported in a way that summarizes what sources were identified, their locations, the priority for removing them, the projects or activities undertaken to address them, who is responsible for the action, which actions are completed, any nonhuman sources identified, source assessment sampling needs, and future steps to address sources. At a minimum, the lead entity should provide this information to FDEP in an Excel table. Providing supporting information in the form of pictures, GPS coordinates, and sampling results is also essential.

In areas without a BMAP, it is better for the Walk the Waterbody report to be a more detailed, formal document, making it easier to report to interested parties later, or for FDEP to eventually include the information in a BMAP for adoption. FDEP has developed a document template for reporting the Walk the Waterbody results that is available at [insert url](#).



## List of Acronyms and Glossary of Terms

Acronym/Term	Explanation
<b>ARV</b>	Air release valve—ARVs allow gases to be released to prevent corrosion of the sewer lines; however, if they are not functioning properly, sewage can leak out.
<b>BMAP</b>	Basin Management Action Plan—A formally adopted plan that describes how a specific TMDL will be implemented for an impaired waterbody, developed in collaboration with permit holders, state and regional agencies, county and city governments, businesses, and other stakeholders in a river basin.
<b>BMPs</b>	Best management practices— Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.
<b>CIPP</b>	Cured in place pipe—The process of relining old pipe with fiberglass.
<b>Colony-forming unit</b>	The number of viable cells in a water sample that have the potential to multiply into a colony.
<b>Designated use</b>	Uses specified in water quality standards for each waterbody or WBID (such as drinking water, swimmable, fishable).
<b>DNA</b>	Deoxyribonucleic acid
<b>Exfiltration</b>	A condition where waste from gravity and force mains leaks out from a pipe; this is generally not an issue in Florida because of the higher water table.
<b>FDEP</b>	Florida Department of Environmental Protection
<b>GIS</b>	Geographic information system—A database that captures, stores, analyzes, manipulates, manages, and presents data linked to a specific geographic location.
<b>GPS</b>	Global positioning system—A satellite-based system maintained by the United States government that provides accurate information on location and time to anyone with a GPS receiver.
<b>Impairment</b>	A condition when a waterbody does not meet Florida water quality standards.
<b>Infiltration</b>	A condition where water enters a wastewater pipe; this is a common occurrence in Florida because of the high water table in many areas.
<b>Manhole detection</b>	An alarm that is placed in manholes with a tendency to overflow. It consists of a sensor that monitors the level in the manhole and sends an alarm to the utility when it gets too high, helping to prevent overflows.
<b>MS4</b>	Municipal Separate Storm Sewer System—A publicly owned conveyance or system of conveyances (including ditches, curbs, catch basins, and underground pipes) that is designed or used to collect or convey stormwater and that discharges to surface waters of the state. MS4s can be operated by municipalities, counties, drainage districts, colleges, military bases, prisons, and other entities.
<b>MST</b>	Microbial source tracking—A scientific technique used to analyze the genetic material in fecal coliform to determine the source of the bacteria (humans, ruminants, or birds).
<b>Nonpoint source</b>	Diffuse runoff without a single point of origin that flows over the surface of the ground by stormwater and is then introduced to surface or ground water. It includes atmospheric deposition and runoff or leaching from agricultural lands,

Acronym/Term	Explanation
	urban areas, unvegetated lands, on-site sewage treatment and disposal systems (septic tanks), and construction sites.
<b>NPDES</b>	National Pollutant Discharge Elimination System—The permitting process by which technology based– and water quality–based controls are implemented for point sources of pollution that discharge to surface waters, , such as industrial and municipal facilities.
<b>Open cut</b>	The process of gaining access to repair the damaged portion of a sewer line by digging an open trench.
<b>Package plant</b>	A small, private wastewater treatment plant permitted by FDEP; these are being phased out, but they may have an allowable discharge.
<b>Pathogens</b>	Disease-causing organisms such as bacteria, viruses, and protozoans.
<b>PIC</b>	Potential illicit connection—An illegal discharge of wastewater to a stormwater system or waterbody. PICs include untreated sewage from failing septic tanks or water from swimming pools or washing machines.
<b>Pipe bursting</b>	The process of clearing old pipe by bursting it while laying new pipe.
<b>Point source</b>	An identifiable and confined discharge point, such as a pipe, channel, vessel, or ditch, for one or more pollutants.
<b>Pump run times</b>	If the pumps are running too long at pump stations, it indicates that the station may be overloaded, which can result in failure and overflows.
<b>Septic tank</b>	A watertight receptacle constructed to separate the solid and liquid components of wastewater, allow the digestion of organic matter, store solids, and allow clarified liquid to discharge for further treatment and disposal in a soil absorption system.
<b>Sliplining</b>	The process of slipping a liner into a pipe that needs replacement but not upgrading.
<b>SSE</b>	Sanitary sewer event—A spill below 1,000 gallons or a spill that does not impact surface waters and does not have to be reported to FDEP
<b>SSO</b>	Sanitary sewer overflow—A spill in excess of 1,000 gallons or a spill that impacts surface waters and must be reported to FDEP.
<b>SOPs</b>	Standard operating procedures—The minimum FDEP requirements for sample collection, sample handling, field testing, and laboratory procedures used to generate data.
<b>Stormwater runoff</b>	The portion of rainfall that hits the ground and is not evaporated, percolated, or transpired into vegetation, but that flows over the ground surface seeking a receiving waterbody.
<b>Tuberculated piping</b>	Iron piping with rust in the interior that can catch debris and cause a blockage.
<b>Vitrified clay piping</b>	Generally, a condition that indicates very old infrastructure. As it ages, the clay becomes brittle and porous, increasing the opportunity for leakage.
<b>WBID</b>	Waterbody identification number—The number assigned to a smaller drainage area within a large river basin.