

*Watershed Monitoring
Status Network Reconnaissance Manual*

**Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection
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This Reconnaissance Manual is dedicated to Margaret Murray, our colleague and friend who made learning about site reconnaissance and trading stories about recon really, really fun. Margaret passed away on December 1, 2012 and is greatly missed.

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I. Introduction

1.1 Watershed Monitoring Programs

The Florida Department of Environmental Protection (DEP) routinely monitors the quality of Florida's waters. The overall goal of the state's Watershed Monitoring Program is to provide DEP with scientifically defensible information on chemical, physical, and biological characteristics of state waters. This information provides the basis for advising the Environmental Protection Agency (EPA), relevant DEP programs, partner agencies, and the Governor and Legislature on the status of Florida water quality.

The Watershed Monitoring Section (WMS) oversees two monitoring networks that complement each other. In the Trend Monitoring Network, samples are taken from fixed surface and groundwater sites. In the Status Monitoring Network, a list of sampling locations is chosen randomly each year. Due to this variability of site locations, it is necessary to conduct reconnaissance (recon) of Status sites.

Recon is carried out to ensure that the Status Network is fiscally, logistically, and scientifically sound. Recon is a way to ensure that the sites are valid for sampling and are categorized as the correct resource type. For example, weather patterns before the sample collection date may have caused some streams to flood or go dry; this information may not be conveyed on the latest GIS coverage. Numerous materials including maps, aerial photos, records, web sites, and well logs, as well as local citizens can assist in determining whether a site can be sampled. This manual provides information on the different types of recon materials, including how and when to use them, and where to find them. The manual is updated as needed to include new recon materials as they continue to be identified.

This document contains a basic description of the Status Network monitoring design to provide context. The remainder of the manual is divided into two primary sections, Surface Water Recon and Ground Water Recon, each containing subsections on office and field procedures. At the end of each section is a step-by-step example for a specific site. Visuals and examples are included to illustrate real-world situations that staff have encountered. The manual also discusses the importance of documentation, which is used by samplers visiting the site at a future date and by data analysts interpreting the resource. Finally, the manual provides appendices as supportive references to the manual's text.

1.2 Status Network Monitoring Design

The objective of the Status Network is to estimate the conditions of all state freshwater resources on an annual basis. The Network is also designed to infer the proportion of waters that meet the applicable water quality criteria. Because it is impossible to annually sample every well and waterbody in Florida, the DEP uses a stratified random sampling approach to provide these inferences at both the state and regional level. The design is implemented as follows: 1) the state's waters are divided into different categories based on geography and resource type; 2) within each category, 15-20 samples are collected from randomly selected sites to provide a snapshot of statewide and regional conditions. The network is not designed to answer site-specific questions about coastal waters, individual wells, or individual surface waterbodies.

All stratified random sampling networks use "strata" that divide the population of interest into two or more groups. Stratification is a way to ensure that the sampled sites are representative of the full extent of the state's water resources. In the Status Network, the population of interest is all fresh surface water and groundwater in Florida, and the strata are as follows: the state's freshwater is categorized into seven resource types: rivers, streams, canals, small lakes, large lakes, confined aquifers, and unconfined aquifers. These resources are described in detail in Chapters [II](#) and [III](#). To accommodate geography, the water resources are also stratified into six reporting units or zones ([Figure 1](#)). Categorizing the waters of the State in this fashion allows for a representative assessment of statewide and regional water quality.

Watershed Monitoring Reporting Units

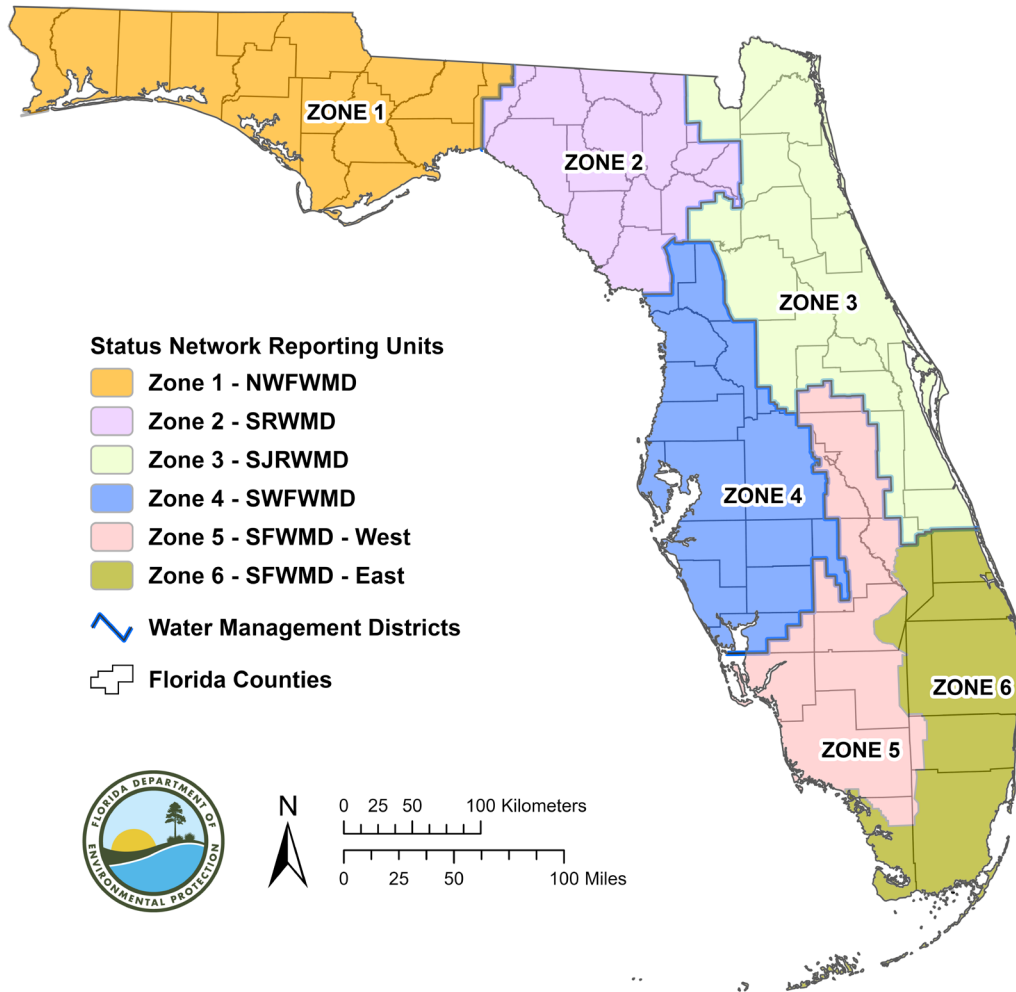


Figure 1 WMS Zones, or Reporting Units. The zones correspond to the five Water Management Districts (WMDs) in Florida, with South Florida WMD divided into eastern and western portions.

How Status Network Design Affects Recon Efforts

Status Network design affects recon efforts in two ways:

- 1) Since each resource is sampled during a specified sampling period, it is necessary to begin recon efforts several months ahead of time. [Figure 2](#) shows the statewide sampling periods and lists the total number of samples collected from each resource type.

STATUS NETWORK SAMPLING PERIODS

Effective October 1, 2017

120 ground water samples per resource (confined aquifers and unconfined aquifers) are split equally among 6 reporting units (20 samples each, in Zones 1 - 6).

90 surface water samples per resource (rivers, streams, large lakes, and small lakes) are split equally among 6 reporting units (15 samples each, in Zones 1 - 6).

60 surface water samples in canals are split among 4 reporting units (15 samples each, in Zones 3 - 6).

Totals do not include quality assurance samples.

Month	Confined Aquifers	Unconfined Aquifers	Canals	Rivers	Streams	Large Lakes	Small Lakes
Jan			60				
Feb	120						
Mar							
Apr				90			
May						90	
Jun							
Jul					90		
Aug							
Sep							90
Oct							
Nov		120					
Dec							



Primary Sampling Period



Overflow Sampling Period

Figure 2 Status Network sampling periods. Samples are split evenly among the state's six zones, except for canals, which are split evenly among Zones 3-6.

- Sampling order matters in the design of the Status Network. Random sample locations (150 for surface water and 200 for groundwater) for each resource are provided in a specific numbered order (1 -150 or 1-200). Sites must be evaluated in the provided numerical order. Sites must be evaluated and either sampled or excluded from sampling until the 15th sampleable surface water site, or 20th sampleable groundwater site is identified. If a sampleable site is not sampled, all data collected from sites with random sample locations higher than the skipped sampleable site will be excluded from the statistical analysis. The following passage expands on this idea:

For each resource type, a list of 15 surface water-20 groundwater Primary sites and 135 surface water -180 groundwater Alternate sites is randomly generated for each zone. There are 9 times as many Alternates as Primaries, so this is called a 9-time oversample. Due to requirements in the statistical analyses, all Primary sites require reconnaissance, regardless of order. If any of the Primary sites are found to be excluded, then the Alternate site list is used and the reconnaissance is

performed in list order. Therefore, if the first Alternate site is excluded, then the sampler should recon the second Alternate site, and so on until the required number of sites (i.e. 15 or 20) is sampled.

As an example, let us focus on Small Lakes. Let sites 1-15 be Primary sites and let sites 16-150 be Alternates. Suppose that sites 1-10 are sampleable, sites 12-15 are dry, and site 11 has not been reconned. The sampler must determine the suitability of site 11 before proceeding to site 16. If the sampler does not recon site 11 and instead samples site 16, the sampler has effectively missed a lake that may have been sampleable. In this case, there is a gap in the data at site 11, and the data from sites 12-16 must be thrown out. The goal here is to proceed down the list until the first 15 suitable lakes are sampled. Fortunately, once all the Primary sites are reconned, the Primary lakes can be sampled in any order.

1.3 Professionalism, Courtesy, and Interacting with the Public

One of the first steps in recon is contacting property owners for permission to access their property. Always remember that you represent DEP and the state of Florida. In fact, you may be the only state employee with whom a citizen has ever interacted. On the other hand, the citizen may have had prior negative experiences with state personnel due to a regulatory action or other circumstance. Therefore, it is important that you remain courteous, friendly, and informative during this interaction, as your actions will likely be considered a mirror of the entire department, and state/other government as a whole.

When speaking with a property owner or occupant by phone, always identify yourself, and briefly explain your request to recon or collect a water sample on that parcel. Explain that this request is for research purposes to obtain an annual “snapshot” of Florida’s overall water quality. If denied, remain pleasant, thank the citizen for his/her time, and move on to the next selection ([Figure 3](#)). Never argue, attempt to cajole, or insinuate that the denial will cause the citizen trouble with the agency or state.

When contacting a property owner or occupant in person, first introduce yourself. Even though you may be wearing clothing with the DEP logo, carrying a DEP badge, and traveling in a vehicle bearing a large DEP logo, the occupant may see only an unfamiliar person. Always be pleasant, concise, and focused. Provide the occupant with your DEP business card, the Status Network brochure ([Appendix A.1. Status and Trend Networks Brochure](#)) and offer to send the link to the Status Network statewide reports

(<https://floridadep.gov/dear/water-quality-assessment/content/reports-documents-sops-and-links>) Explain that the sampling is research for obtaining an annual “snapshot” of the state’s overall water quality. Be prepared to answer any questions posed by the occupant. The same rules apply here to sampling denials: remain pleasant, thank the citizen for his/her time, and move on to the next parcel. If the citizen becomes angry or attempts to argue, politely disengage from the conversation, and leave.



Figure 3 Do not attempt to recon if the property owner denies permission. Photo courtesy of Jessie Taft and Sarah Seitz.

If the occupant approves the sampling and requests the data, obtain or verify his/her mailing address (which may differ from the sampling location) and/or email address, and explain the 6-9 month timeline for receiving the sampling results. If you need to return to resample the waterbody or well at some later date, it is important to notify the owner/occupant that you or another team plan to return. This could be to collect samples for a Lake Vegetation Index (LVI), resource resample, or confirmation sample for drinking water providing primary drinking water standards exceedances. If the occupant requests advance notification of the follow-up visit, record his/her contact information.

If she/he has concerns that should be elevated to management or another DEP section, let the occupant know that you will follow up on this issue, and then do so. Again, you may be the only DEP/state employee with whom a citizen has ever interacted, or the citizen may have had a prior negative experience with the state, so it is important to represent the agency in a courteous and professional manner.

1.4 Recon Tracking

It is helpful to use a spreadsheet to track the progress of recon. This spreadsheet should contain station information, well construction information for wells, and notes about locating the site. All contact information for the person who granted permission to sample should be contained in this spreadsheet. Typically, Microsoft Excel is used for the spreadsheets and each resource is contained in a file titled with the project name. [Figure 4](#) shows a representative recon tracking spreadsheet.

Color Key	Sampled	Ready to Sample	In Progress of getting permission	Excluded												
SITE	COUNTY	STATION_NAME	ALIAS	FLUWID	COMMENTS	LATITUDE	LONGITUDE	LAT DEG	LAT MIN	LAT SEC	LONG DEG	LONG MIN	LONG SEC	LOC METH		
Z3-CA-7001	OSCEOLA	OS0229			AIRMENS RANCH/YEEHAW JUNCTION; UB B; UN new jn 10/98	264827.243	810109.045	26	48	27.243	81	1	9.045	DGPS		
Z3-CA-7002	DUVAL	D-1342	City of Win at watertower	AAE1234	TMAN WATER WORKS; LB A; AC Status sampled 2/6/11 and 1/12 301802081585001	311802.000	815849.030	31	18	2.000	81	58	49.030	DGPS		
Z3-CA-7003	LAKE	L-0591		AAE0001	SOMEWHERE IN THE HILLS PS #9; MB B; AC	321802.000	814640.691	31	43	31.372	81	46	40.691	DGPS		
Z3-CA-7004	BREVARD	BR1932	Frank Burbanks	AA56789	STILL WAITING ON PERMISSION	292202.736	805130.257	29	22	2.736	80	51	30.257	DMAP		
Z3-CA-7005	NASSAU	N-0304			Fort Clinch State Park	314211.000	812714.000	31	42	11.000	81	27	14.000	DMAP		
Z3-CA-7006	ALACHUA	R22T09SEC2601			Formerly Mike Boger well; Well has been sampled for Radon; Formerly Boger well; GPS 3/96 DEP UNIT	304055.370	820432.802	30	40	55.370	82	4	32.802	MMAP		
Z3-CA-7007	VOLUSIA	V-0531			PIERSON AIRPORT; VB C; IN REDUNDANT 12/95 ANOTHER FA WELL 200 YDS	301449.000	812748.000	31	14	49.000	81	27	48.000	DMAP		

Figure 4 Example recon tracking spreadsheet.

Always be sure to document the reason a site is excluded. This includes documenting and selecting the exclusion category and exclusion criteria in the Generalized Water Information System (GWIS) Database Utilities Recon Tracking section (see [Section B. Generalized Water Information System \(GWIS\) Database Utilities / Map Direct](#)), and providing comments such as whether the exclusion was based on

office or field recon, the date, and name of the person performing the recon. Photos of excluded sites should be taken if a site is excluded in the field.

Sometimes several staff may be working on a resource, and job responsibilities need to be made clear. This is important, so that different employees are not working on the same tasks at the same time. Communication between staff is critical. Lack of good communication results in inefficiencies and can cause morale problems. [Figure 5](#) shows an example of how tasks can be tracked and divided among staff.

2017 Reconnaissance Tracking							
This spreadsheet should be updated daily as site status changes							
Resource	Staff Responsible	Shapefile creation	% of Site Notebooks ready	Recon spreadsheet updated	# of sites ready	# of sites sampled	Issues
Surface Water							
Z2LL1704	Andrea	2/18/2017	100%	1/18/2017	11	2	Z2-LL-11024 may be too shallow for sampling
Z2LR1705	Fiain	3/14/2017	40%	3/6/2017	4	0	
Z2SS1707	Sally						
Z2SL1709	Morgan						
Ground water							
Z2CA1701	Luke	12/2/2016	100%	2/28/2017	25	20	
Z2UA1710	Alex						

Figure 5 Example of how to distribute recon responsibilities.

Sampling teams should complete office and field recon for a resource no later than one month before the resource Index Period ([Figure 2](#)) begins. During this period, sampling teams should also enter recon updates into the GWIS Database Utilities¹ recon tracking site (<https://prodapps.dep.state.fl.us/gwis/secure/ReconTracking/index>). No later than two weeks before the start of the Index Period, sampling staff should send the list of sites to be sampled and the Recon spreadsheet to their Project Manager. The Project Manager will review the list of selected sites and exclusions using GWIS Database Utilities and the Recon spreadsheet, and, if necessary, make recommendations to the Sampling team for additional recon, changes to Exclusion Categories or Criteria, or other revisions.

¹ The GWIS Database Utilities manual is located at http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Standard%20Operating%20Procedures/GWIS%20Manual/WMS-GWISManual.pdf.

II. Surface Water Resources

This chapter provides descriptions of surface water resources that are sampled, including rivers, streams, lakes, and canals. It provides definitions for Waters of the State because the WMS only collects samples in these waters, with one exception, which is discussed in the [Waters of the State](#) section. The chapter continues with recon procedures, useful media resources, a list of exclusions, and a walk-through example of surface water recon. Status Network samples are collected from the following surface water resources:

Rivers and streams

- linear waterbodies that are Waters of the State (Chapter 403, F.S.; see [Waters of the State](#) below), (see [Figure 6](#), [Figure 7](#))
- must be continuous/not pooled and at least 10 cm deep
- water must be within banks/not flooded
- must be accessible by either public or private access (with permission).



Figure 6. An ideal river.



Figure 7. An ideal stream.

Waterbodies not included in the Rivers and Streams resource

- waterbodies that are artificially altered with loss of sinuosity and box cut banks
- stormwater conveyances
- agricultural ditches

Lakes

- natural bodies of standing water, and reservoirs that are designated as Lakes on the National Hydrography Dataset (NHD) coverage ([Figure 8](#))
- must be at least 4 hectares (40,000 square meters or ~10 acres) in size
- have at least 1000 square meters (0.1 hectare or ~0.25 acres) of open water (i.e., free of emergent vegetation and woody trees)
- are at least 1 meter deep at the deepest point
- are not directly connected to oceanic waters



Figure 8 An ideal large lake.

Waterbodies not included in the Lakes resource

- agricultural ponds
- streams/rivers impounded for agricultural use or private water supply
- borrow pits ([Figure 9](#))
- stormwater treatment areas
- lakes constructed for restoration projects
- coastal wetland lakes
- marine or industrial lagoons



Figure 9. Artificial lake (borrow pit). This site would be excluded as *Wrong Resource/Not Part of Target Population*. The exclusion criteria would be *Artificially Created Lake Other Than Established Impoundments*.

Canals

- are trenches, the bottoms of which are normally covered by water, with the upper edges of the two sides normally above water
- are at least 10 cm deep
- must have water within banks/not flooded

Waterbodies not included in the Canals resource

- waterbodies that are not included in the WMS Primary Canal GIS coverage
- stormwater conveyances
- agricultural ditches
- if there are any questions, contact your Project Manager

The following definitions come from section 62-330.021 of the Florida Administrative Code (F.A.C.).

- "**Canal**" means a trench, the bottom of which is normally covered by water, with the upper edges of its two *sides normally above water* ([Figure 10](#)).
- "**Channel**" means a trench, the bottom of which is normally covered entirely by water, with the upper edges of one or both of its *sides normally below water* ([Figure 10](#)).
- "**Drainage ditch**" or "**irrigation ditch**" means a man-made trench which is dug for the purpose of draining water from the land or for transporting water for use on the land and which is not built for navigational purposes.

Drainage ditches and irrigation ditches should be excluded as "Wrong Resource/Not Part of Target Population – Drainage / Irrigation Ditch". Channelized systems are acceptable for sampling in the streams, rivers, and canal populations and should not be excluded.

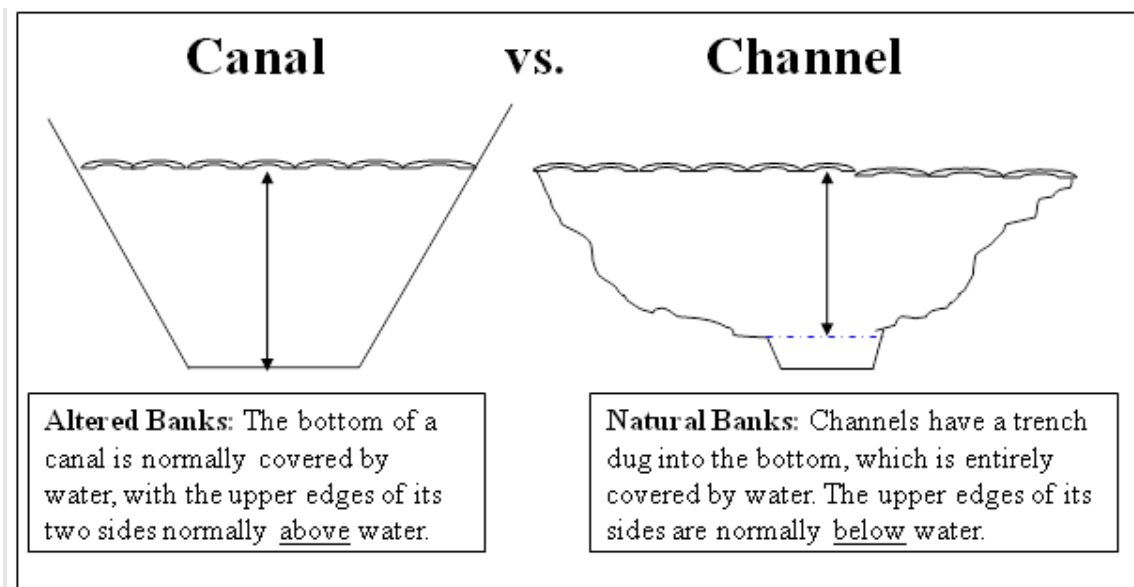


Figure 10. Canals vs. Channels.

Waters of the State

As a general rule, the WMS only collects samples in Waters of the State, because these are the waterbodies in which water quality criteria apply. There is one exception: lakes contained entirely on one person's property are not typically Waters of the State, but are still considered a part of the WMS Lakes

resource. This is due to the fact that, if the property is divided into multiple parcels in the future, the lake will become a Water of the State. Lakes that lie entirely within property owned by a single person, business or government entity are often used for stormwater treatment. Contact the property owner if a site falls into this category; and exclude as "Wrong Resource/Not Part of Target Population – Stormwater Treatment Areas" if it is determined that the lake is permitted for this purpose. Lakes that lie entirely within tribal lands should be taken on a case-by-case basis; contact your Project Manager if a site falls into this category.

The following paragraph gives a strict legal definition of Waters of the State. Beneath the paragraph is an italicized translation of the legal language, with a focus on how it relates to WMS sampling.

Chapter 403.031 (13) of the Florida Statutes (F.S.) says: “Waters” include, but are not limited to, rivers, lakes, streams, springs, impoundments, wetlands, and all other waters or bodies of water, including fresh, brackish, saline, tidal, surface, or underground waters. Waters owned entirely by one person other than the state are included only in regard to possible discharge on other property or water. Underground waters include, but are not limited to, all underground waters passing through pores of rock or soils or flowing through in channels, whether manmade or natural.

Translation: Waters of the State are any surface and groundwaters in Florida, except rivers or lakes which are contained entirely on private property.

2.1 Office Reconnaissance

A. Office Recon Flowchart

The Recon flowcharts illustrate the basic decision-making that guides the recon process, both in the office and in the field. The Office Recon flowchart ([Figure 11](#)) focuses on the steps conducted away from the site and is heavily dependent on media resources. The resources used in this process are covered in the following pages.

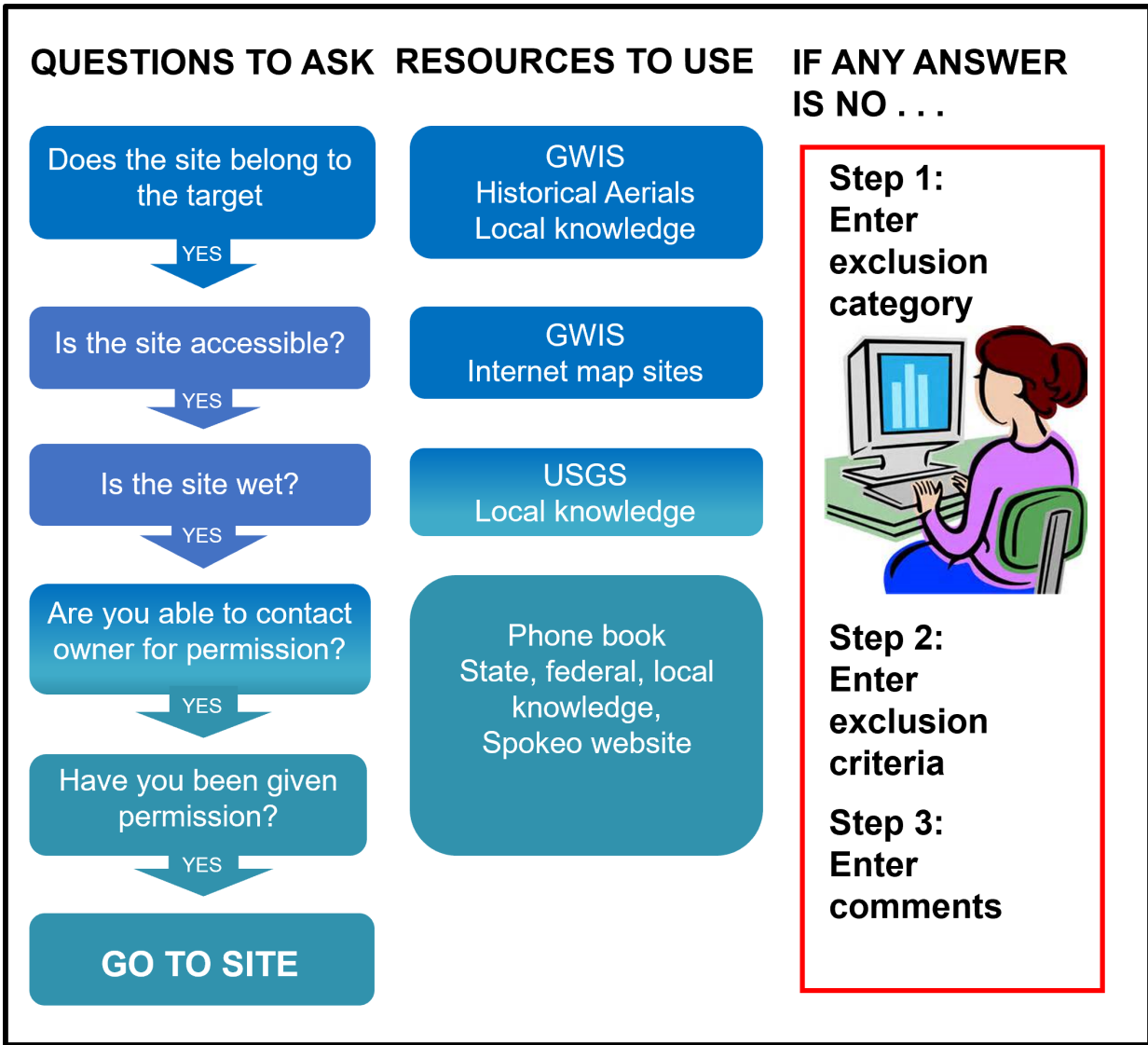


Figure 11 Office recon flowchart for surface water.

B. Generalized Water Information System (GWIS) Database Utilities / Map Direct

GWIS Database Utilities is an internet application, located at <https://prodapps.dep.state.fl.us/gwis/>, that interfaces with the department’s Oracle databases and the department's online mapping application, Map Direct. Contact Thomas Adams, WMS Data Coordinator, at (850) 245-8512 or Thomas.L.Adams@FloridaDEP.gov to obtain login credentials. This application was designed specifically by the WMS to manage site data for the Status Network and is the starting point for all Status Network recon. For additional information in using this application, see Chapter III “Reconning Sampling Sites” of the GWIS Database Utilities Manual, located at http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Standard%20Operating%20Procedures/GWIS%20Manual/WMS-GWISManual.pdf. A Map Direct Tutorial, Users’ Guide, and Quick Start guide are available in Map Direct by clicking on the question mark (?) at the top of the screen.

The different layers and tools in Map Direct provide information on the following features of the sampling site:

- location: county, Waterbody ID (WBID), and proximity to other resources, such as springs and sinkholes
- imagery: the Imagery Time Slider includes current and historical aerial photos that show historical uses and current development, such as mines and land modifications; United States topographic maps are also available.
- access: roads, trails, boat ramps
- land ownership: most recent cadastral layer (This shows the boundaries and ownership of land parcels.)
- impediments to sampling resources: dams and military base boundaries

If available, you may wish to use ArcGIS or Google Earth to complement the information in Map Direct.

C. Hardcopy References

Hardcopy references include maps of Florida and the Florida Atlas & Gazetteer. A current map of Florida comes in handy for navigating to a site via major highways. The Florida Atlas & Gazetteer provides detailed topographic maps containing water features as well as boat ramps, back roads and trails, and a cities index. Guides to city and regional roads are often available in bookstores. Brochures from state and national parks provide overview maps and directions to the park. Other useful hardcopy references include canoeing and kayaking guidebooks, which provide information on maintained and informal boat ramps, and stream conditions.

D. Internet and Phone Resources

Internet sites also serve as good resources, although the quality of the information may vary widely.

Listed below are commonly used web pages and resources that assist in surface water recon:

- <http://waterdata.usgs.gov/fl/nwis/rt> provides the latest river height and flow for waterbodies at which USGS gages are located.
- <https://www.spokeo.com/> is useful for obtaining phone numbers, but requires a subscription to access all content. Your Project Manager or the WQMP Administrative Assistant can provide assistance with obtaining login credentials is needed.
- Free 411 (1-800-FREE411) provides a free phone directory assistance service for commercial and residential listings.
- <http://floridarevenue.com/property/Pages/LocalOfficials.aspx> contains links to the property appraiser's website for each county. The cadastral (land ownership) layer in Map Direct is only updated once per year. The property appraisers' websites can be used to obtain updated or more in-depth information on a parcel's owner.

- <http://www.wateratlas.usf.edu/> contains atlas of Florida lakes, as well as specific county and regional surface water resource information.
- <http://dos.myflorida.com/sunbiz/> is the Florida Dept. of State website that allows you to access contact information on corporations, including upper management contacts, locations, and telephone numbers.
- <http://www.bing.com/maps/> and <http://www.google.com/maps> provide recent close-up aerials and street level views of a site.
- <http://ufdc.ufl.edu/aerials> is a great source for historical aerials, usually categorized by county. It also has a great “search by map” feature that allows you to type in an address or latitude and longitude, which will then provide a list of aerials to view.
- <http://www.fdot.gov/geospatial/aerialmain.shtm> is another source for aerial photos. Most imagery is from the 1970s through present day.
- <http://www.fs.usda.gov/florida/> provides USDA national forest maps and aerials for Florida
- <http://ocean.floridamarine.org/wma/entrances/> gives contact information for Wildlife Management Areas under the Florida Fish & Wildlife Conservation Commission (FWCC).
- <https://www.fws.gov/our-facilities> provides contact information for National Wildlife Refuges under the U.S. Fish & Wildlife Service (USFWS).
- <https://fl.water.usgs.gov/about/officelocations.html> provides contact information for the USGS in Florida.
- <https://www.fdacs.gov/Divisions-Offices/Florida-Forest-Service> links to contact information for state forests managed by the Florida Dept. of Agriculture & Consumer Services (DACS)
- <https://gis.myfwc.com/BoatRampFinder/> provides information about FWCC boat ramps with directions.

E. Historic Data

Historic data in the form of aerial imagery (see [Smathers Library at University of Florida website](#)) or published accounts of the area can be helpful, especially if you are uncertain whether the waterbody is natural. Historic data can also include actual sampling data results from previous visits to the site or nearby sites in the same waterbody.

F. Local Knowledge

It is important to establish contacts located physically near the resources to be sampled, or whose area of expertise includes the targeted resources. These can be DEP district or regional staff, local residents, or employees of WMDs, counties, cities, state parks, National Wildlife Refuges, national forests, etc.

Local residents can be excellent on-site resources in determining ambient surface water conditions, such as the effects of flash events, hurricanes, or drought. Also, if unable to locate the owner of a parcel, people living in the surrounding area can often assist. Examples of questions to ask: Is there open water in the lake? Is there access to the stream or lake?

G. Documentation

At least three separate attempts must be made to contact each property owner, before the site may be excluded as “NO PERMISSION FROM OWNER - UNABLE TO OBTAIN PERMISSION FROM PROPERTY OWNER”. These attempts can include sending a letter in the mail (see [Appendix A.2. Permission Letter](#)) or by email, speaking to someone affiliated with the property on the phone, leaving a voicemail message, or speaking to someone affiliated with the property in person. All contact attempts must be documented and all written and verbal contact with the property owner must be documented, regardless of whether or not permission is granted to access a site (see [Appendix A.2. Permission Letter](#)). An Excel spreadsheet is useful for documenting pertinent information on the site (see [Appendix A.3. Site Tracking Spreadsheet](#)).

2.2 Field Reconnaissance

A. Field Recon Flowchart

The Recon flowcharts illustrate the basic decision-making that guides the recon process, both in the office and in the field. The Field Recon flowchart ([Figure 12](#)) focuses on the steps samplers take at or near the site. The approach used in this process is described in the following pages.

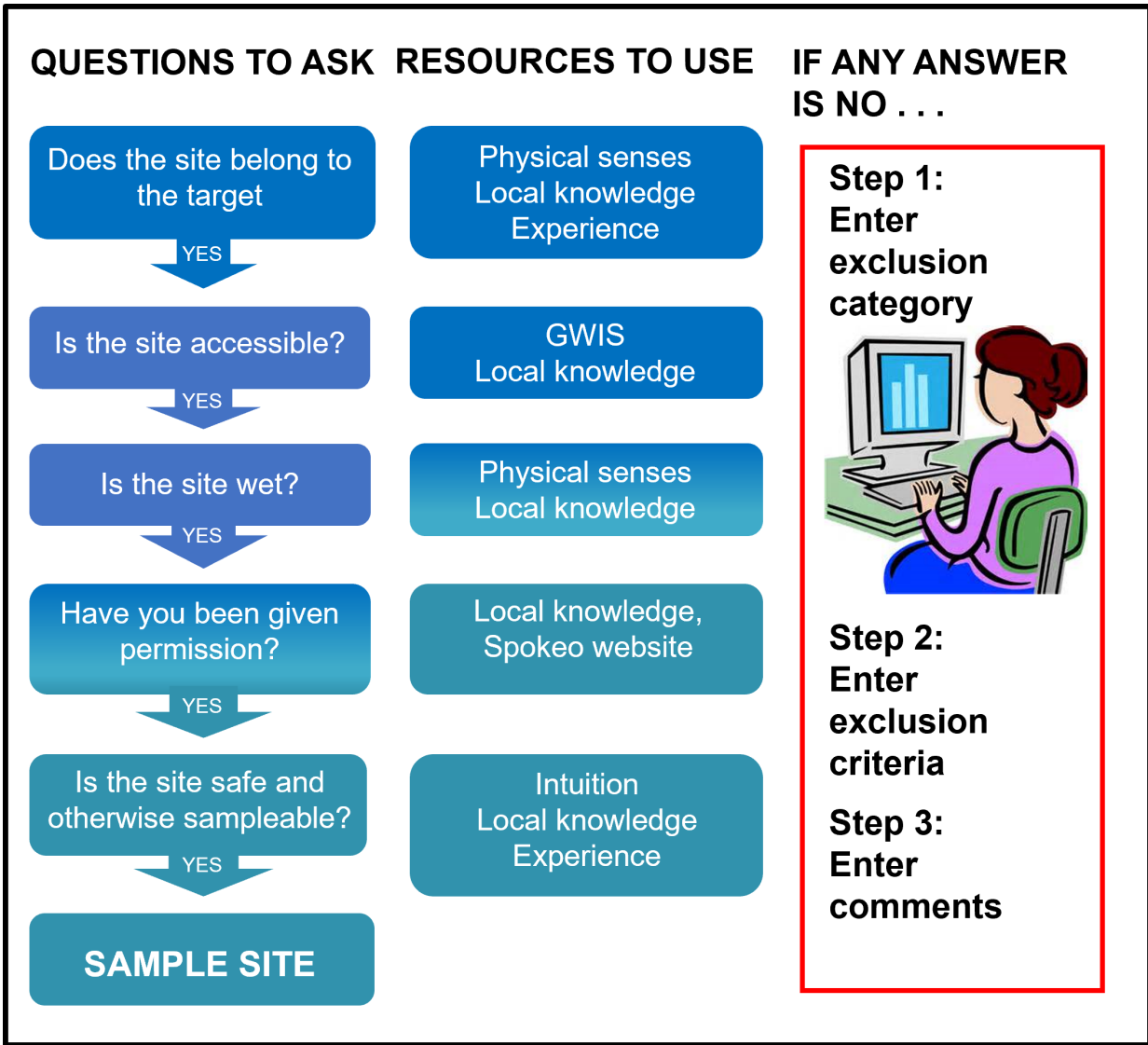


Figure 12 Field recon flowchart for surface water.

B. Planning and Conducting Site Visits

Site visits should be conducted only when needed information cannot be obtained from office recon. If field recon is deemed necessary, permission to access private sites must be obtained. If a private site can be observed from public property, no permission is necessary to recon. However, to collect a sample on private property, you will need to obtain access permission to avoid trespassing. Streams and rivers with public access points do not require access permission. Once permission to sample has been granted by the property owner, and field recon has been deemed necessary, take the proper steps to prepare for a recon trip. Prepare a checklist (see [Appendix A.4. Field Recon Checklist](#)) with items such as keys, camera, cell phone, and maps.

C. Driving Directions

Regardless of who is doing the recon/sampling, obtain driving directions from websites like Google Maps or Driving Route Planner (<http://www.drivingrouteplanner.com/>). The use of north, south, east, and west rather than left-right directions is preferable. Specific site directions should be documented from the intersection of a major road. Include as many maps from various sources as possible (owner sketch maps, Gazetteer pages, Google Maps, Map Direct maps, and so on). Always include a north-arrow and scale bar with each map. It is better to have too much information than too little.

D. Documentation

At least three separate attempts must be made to contact each property owner, before the site may be excluded as “NO PERMISSION FROM OWNER - UNABLE TO OBTAIN PERMISSION FROM PROPERTY / WELL OWNER”. Mail or verbal contact with the property owner should be documented whether or not permission is granted to access a site (see [Appendix A.2. Permission Letter](#)). An Excel spreadsheet is useful for documenting pertinent information on the site ([Appendix A.3. Site Tracking Spreadsheet](#)).

Refer to the current sampling manual

(http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Standard%20Operating%20Procedures/Sampling%20Manuals/WMS-SamplingManual.pdf) for inclusion requirements when determining whether a surface waterbody is sampleable. For streams, visible flowing water within a reasonable distance upstream from the site is a good indication that a sample can be obtained ([Figure 13](#)). Streams that become discontinuous or are shallower than 10 cm deep at the sampling point should be excluded as “Dry” ([Figure 14](#)).



Figure 13. Example of an ideal stream.



Figure 14. Example of a shallow stream that was excluded as dry. The exclusion criteria used was Dry During Index Period, Includes Small Lake Water < 4 Hectares Large Lake Water < 10 Hectares.

E. Photographing the Site

Whether the site is to be sampled or excluded (see [Table 1. Surface Water Exclusions](#)), photographs for documentation of site conditions are required. Photographs should be taken in each direction (north, east, south, and west, in this order). If the site must be excluded, take several additional photographs that best represent the exclusion criteria (dry, flooded out of banks, etc.).

F. Safety

If you can't safely recon due to a temporary condition, come back another day. Safety issues include potentially dangerous animals ([Figure 15](#), [Figure 16](#)) weather, and situational conditions. To sample safely from a highway bridge or near a busy highway, use safety equipment such as neon vests, cones, and strobe lights. Safety can also be compromised by bad weather, but you can usually return on another day. Exclude the site as "Otherwise Unsampleable – Unsafe Sampling Conditions" only if dangerous conditions are expected to last for the duration of the index period.



Figure 15 Water moccasins are sometimes sighted in surface waters. Photo courtesy of Jessie Taft and Sarah Seitz.



Figure 16 Other dangers may be of a more unusual origin. Photo courtesy of Jessie Taft and Sarah Seitz.
G. Contacting the Project Manager for Assistance

If you are unsure whether conditions are conducive to sampling, or desire additional input, do not hesitate to contact your Project Manager, who can discuss the question with the Administrator, the Data and Analysis Coordinator, the QA Officer or other Project Managers. Sometimes field conditions or events are unexpected, and it takes a “village” to develop the Best Professional Judgment in context.





Table 1. Surface Water Exclusions

EXCLUSION CATEGORY	EXCLUSION CRITERIA
DRY	SMALL LAKE OR LARGE LAKE DEPTH < 1 METER AT DEEPEST POINT
DRY	DRY DURING INDEX PERIOD, INCLUDES SMALL LAKE WATER < 4 HECTARES LARGE LAKE WATER < 10 HECTARES
DRY	STREAM/RIVER/CANAL FLOW POOLED AND DISCONNECTED AT RANDOM LOCATION
DRY	RANDOM LOCATION LESS THAN 10 CM DEEP
NO PERMISSION FROM OWNER	ACCESS DENIED BY PROPERTY OWNER
NO PERMISSION FROM OWNER	UNABLE TO OBTAIN PERMISSION FROM OWNER
OTHERWISE UNSAMPLEABLE	FLOOD CONDITIONS (FLOW OUT OF BANKS) AT STREAM/RIVER/CANAL RANDOM LOCATION
OTHERWISE UNSAMPLEABLE	UNSAFE SAMPLING CONDITIONS
OTHERWISE UNSAMPLEABLE	OPEN WATER IN LAKE LESS THAN 0.1 HECTARE
OTHERWISE UNSAMPLEABLE	LESS THAN 0.5 SQUARE METERS FREE OF ATTACHED VEGETATION AT SAMPLING POINT
UNABLE TO ACCESS	NO OPEN WATER AVAILABLE AT LAKE SAMPLING POINT
UNABLE TO ACCESS	UNABLE TO REACH RANDOM LOCATION WITHIN THREE HOURS FROM ACCESS POINT
UNABLE TO ACCESS	UNABLE TO GET EQUIPMENT TO RANDOM LOCATION (SAMPLER CANNOT GET NECESSARY SAMPLING EQUIPMENT TO SITE)
WRONG RESOURCE/NOT PART OF TARGET POPULATION	ARTIFICIALLY CREATED LAKE OTHER THAN ESTABLISHED IMPOUNDMENTS
WRONG RESOURCE/NOT PART OF TARGET POPULATION	STORMWATER TREATMENT AREAS
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WETLANDS
WRONG RESOURCE/NOT PART OF TARGET POPULATION	ROADSIDE BORROW PIT
WRONG RESOURCE/NOT PART OF TARGET POPULATION	CURRENT MINING OPERATION OR HISTORIC MINING OPERATION WITHOUT RESTORATION
WRONG RESOURCE/NOT PART OF TARGET POPULATION	STREAM/RIVER ARTIFICIALLY ALTERED WITH LOSS OF SINUOSITY AND BOX CUT BANKS (NOT A PRIMARY CANAL)
WRONG RESOURCE/NOT PART OF TARGET POPULATION	ARTIFICIAL LAKE, LAGOON, OR POND USED FOR AGRICULTURAL OR AQUACULTURE OPERATIONS
WRONG RESOURCE/NOT PART OF TARGET POPULATION	ESTABLISHED LAKE SIZE IS < 4 HECTARES, VIA BEST PROFESSIONAL JUDGEMENT, (NOT "DRY")
WRONG RESOURCE/NOT PART OF TARGET POPULATION	GIS COVERAGE INCORRECT, WATERBODY NOT PRESENT AT RANDOM LOCATION
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WATERBODY WITHIN FDEP PERMITTED FACILITY BOUNDARY
WRONG RESOURCE/NOT PART OF TARGET POPULATION	RANDOM LOCATION LIES AT OUTFALL OF DEP PERMITTED FACILITY (SITE LIES AT THE OUTFALL POINT OF EFFLUENT OR IN MIXING ZONE)
WRONG RESOURCE/NOT PART OF TARGET POPULATION	RANDOM LOCATION FALLS OUTSIDE REPORTING ZONE
WRONG RESOURCE/NOT PART OF TARGET POPULATION	ESTUARY
WRONG RESOURCE/NOT PART OF TARGET POPULATION	CHANGING RESOURCE TYPE (INCLUDING RESTORATION AREAS) (RESOURCE TYPE WILL DEFINITELY CHANGE PRIOR TO SCHEDULED SAMPLING. EXAMPLE: IMPOUNDMENT OF A FORMER RIVER TO FORM A LAKE.)
WRONG RESOURCE/NOT PART OF TARGET POPULATION	STREAM SEGMENT IS NOT CONNECTED TO WATERS OF THE STATE
WRONG RESOURCE/NOT PART OF TARGET POPULATION	DRAINAGE/IRRIGATION DITCH

2.3 Example: Recon of a Zone 4 River

OFFICE RECON

GWIS Database Utilities/Map Direct:

1. Open GWIS Database Utilities at <https://prodapps.dep.state.fl.us/gwis/>.
2. Click “Recon Tracking”.
3. In the drop-down boxes, choose Resource Type = LARGE RIVER, Reporting Unit = ZONE 4, Reporting Cycle = 11 (for 2017). Enter 1 – 15 for the range of sites you want to recon. (Leave the Site Location Range blank to return all records.) Click “View Results”.
4. To view a map of all sites, click “Show Map”. (To view a map of a single site, click on the site of interest first.)
5. Zoom in and out a few times by using the scrolling mouse wheel, or by changing the map scale to view the site in context of nearby roads, towns, and landmarks, and to determine the easiest route to access the site. You may also enter the lat/long of the site into <http://www.drivingrouteplanner.com/> to find the optimal route.
6. Click open the arrow  icon on the left, scroll down and locate the Cadastral Property Appraiser Parcels layer. If this layer is not present, click on the “More Data” icon , type “cadastral” in the search box, click the “Add Layer to Map” button next to the Cadastral Property Appraiser Parcels layer, and close the “More Data” popup. Select the parcel on the map to identify the property owner. This information will appear on the map’s right.
7. Check to see whether this river site lies within the boundaries of a nearby military base. This would prohibit access or require you to contact base personnel well ahead of field recon/sampling. The “Military Bases” layer² should be visible by default. If it is not visible, click on the layer's name under the arrow  icon on the left.
8. Determine whether there are any dams below or above the site, which may affect your ability to navigate to the site. The “Florida Dams” layer should be visible by default. If it is not visible, click on the layer's name under the arrow  icon on the left. Document findings from the above in the Recon tracking spreadsheet.
9. If you see any other issues that would prevent sampling, and you need guidance, contact your Project Manager.

Gazetteer

- Use the Florida Gazetteer to identify the nearest boat ramp to the site, and to double-check the easiest route to access it. Document in the Recon tracking spreadsheet.

GWIS Database Utilities / Map Direct

- Use the most recent Cadastral layer to determine the identity of the boat ramp owner or contact. Document in the Recon tracking spreadsheet.

Internet Resources

1. Obtain contact information for the boat ramp owner based on the information in the Cadastral layer, websites used for obtaining phone numbers, county websites, the WMD websites, the State Parks website, Fish & Wildlife Service website, or by other means.
2. Contact the party responsible (owner, resident, manager, etc.) for the boat ramp to obtain access permission. During all contact attempts, document contact name, date, permission given/denied, times available, locks, aggressive animals, and any relevant info about the area.

² This layer does not contain the Avon Park Air Force Range; to locate its boundaries, review the topographic map base map in Map Direct.

3. Check <http://waterdata.usgs.gov/fl/nwis/rt> to determine if there is a nearby real time gage on the river. River depth and conditions will determine the type of boat and engine you use. Document in the Recon tracking spreadsheet.

Local Knowledge

1. Contact staff from the appropriate DEP District Office, WMD, FWC Office, County, or municipality to learn about local conditions on the river. Document in the Recon tracking spreadsheet.

FIELD RECON

1. Travel to the boat ramp selected, and determine whether the river is sufficiently deep, flowing, and safe at the sample site. If site is far from the boat ramp, you may need to launch a canoe or boat with motor to access the site.
2. If the boat ramp cannot be located or is not suitable, contact a local bait shop, outfitter, boat dealer, or other local businesses that work with the boating community to find an alternate ramp.
3. After locating a usable boat ramp, document the correct location in the Recon tracking spreadsheet.

2.4 Real-World Examples and Tips

Example of surface water site excluded as “Dry”

During office recon, the aerial photo of the selected lake appeared to have sufficient water ([Figure 17](#)). However, field recon showed that the site did not have at least 0.1 hectares (~0.25 acres) of open water ([Figure 18](#)). This site was excluded as “OTHERWISE UNSAMPLABLE – OPEN WATER IN LAKE LESS THAN 0.1 HECTARES.”



Figure 17. Aerial photo of a small lake that appeared to have sufficient water.



Figure 18. Photo of lake taken during field recon, showing that the site did not have at least 0.1 hectares (~0.25 acres) of open water.

Example of surface water site excluded as “Unable to Access”

During office recon, the aerial photo showed that the selected lake appeared to be in close proximity to a road ([Figure 19](#)). However, field recon showed that undergrowth was so heavy that samplers were unable to get equipment to the lake ([Figure 20](#)). The site was therefore excluded as “UNABLE TO ACCESS – UNABLE TO GET EQUIPMENT TO RANDOM LOCATION.”

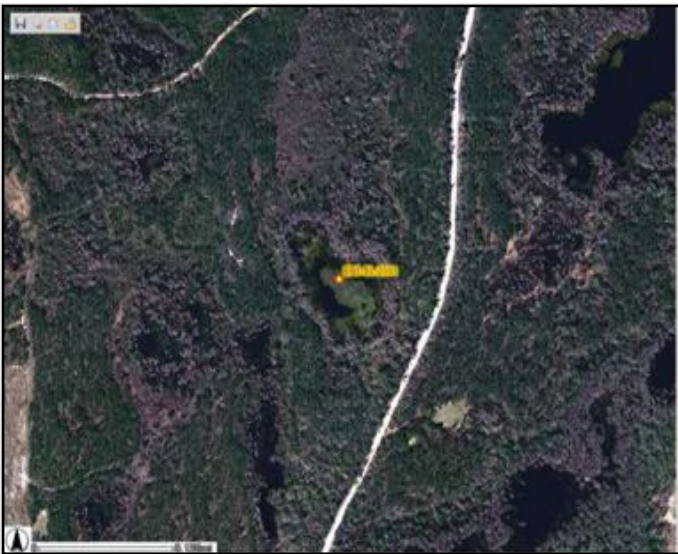


Figure 19. Aerial photo of a small lake that appeared to be in close proximity to a road.



Figure 20. Photo taken during field recon showing that undergrowth was so heavy that the samplers were unable to get equipment to the lake.

Lake or wide river channel?

In [Figure 21](#), this remnant of an oxbow lake could be considered either a lake or a wide river channel. The key here is whether this waterbody exchanges flow with the adjacent river. If there is flow, it should be sampled as a river resource (or excluded as Wrong Resource for the lakes population). If there is little flow or it is just barely attached, then it should be sampled as a lake (or excluded as Wrong Resource for the river population).



Figure 21. Lake or wide river channel? This Oxbow lake is sampled as part of the small lakes resource.

Estimating size of lakes and open water

For WMS purposes, Small Lakes are defined as being between 4 and 9.999 hectares (about 10-25 acres). Although the most recent aerial coverage can assist you in estimating the lake size, it is more difficult to determine size in the field. One way to estimate the lake's size is to compare it to the size of several football fields (see [Figure 22](#) for an illustration). One hectare is about 110 yards \times 110 yards, or the size of two football fields arranged adjacent to each other, including the end zones. Thus, 4 hectares would appear to be the size of 8 football fields side by side, or 220 yards \times 220 yards or 1/8 mile \times 1/8 mile in size. The lake must be at least 4 hectares to be sampled. If it is obviously smaller, exclude as "DRY – DRY DURING INDEX PERIOD, INCLUDES SMALL LAKE WATER < 4 HECTARES LARGE LAKE WATER < 10 HECTARES."

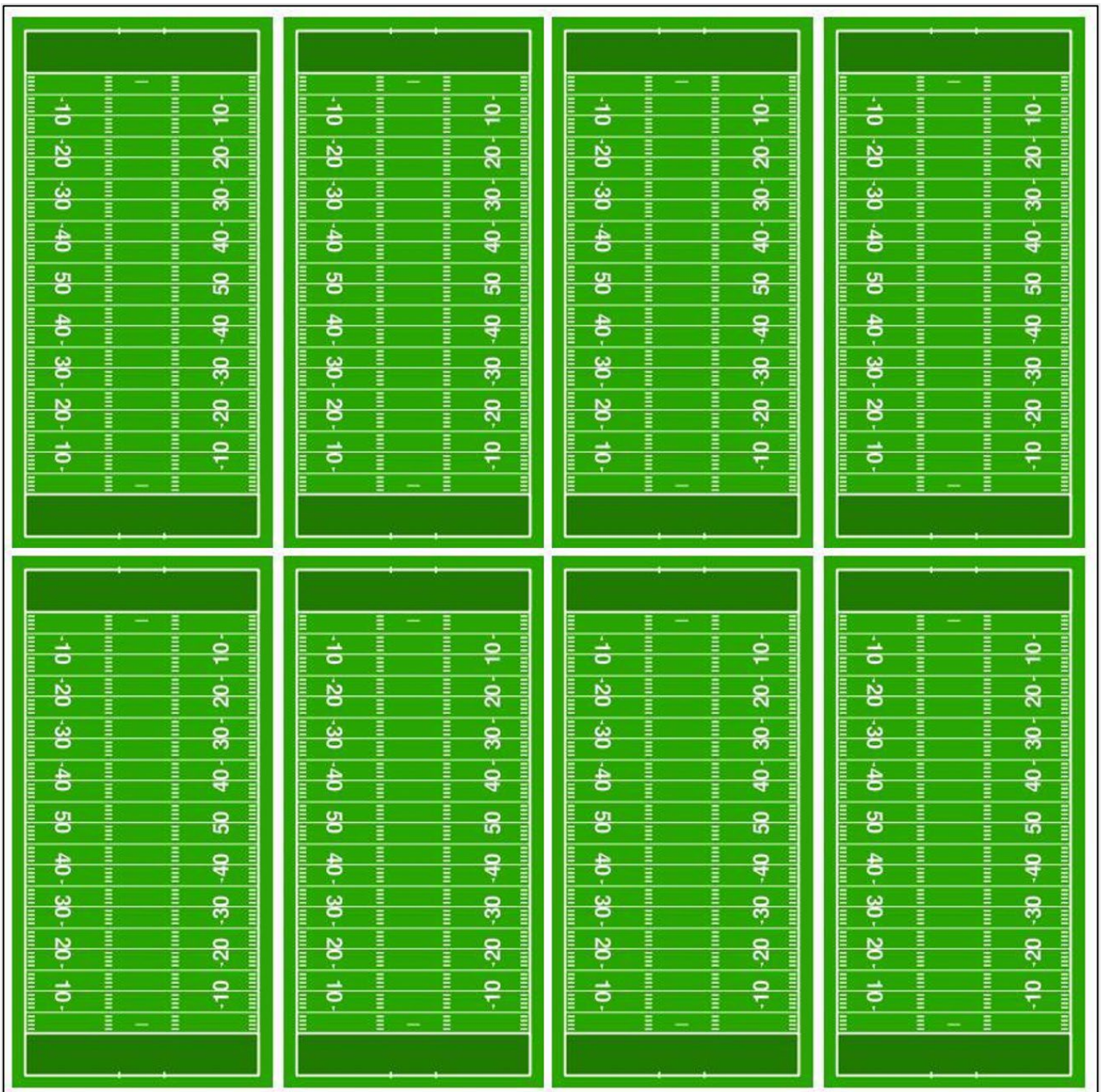


Figure 22. How to estimate the size of a small lake. One hectare is about two football fields side by side. Small lakes must be at least four hectares, or eight football fields side by side.

For WMS purposes, both Small and Large Lakes must have an open area of water, free of emergent vegetation. The sampling location should be at the center of open water for Small Lakes, and at a specific latitude and longitude for Large Lakes. At least 0.5 square meters of open water must surround the sampling point. There must also be at least 0.1 hectare (about ¼ acre) of open water in the entire lake. To determine if you have a large enough open area, estimate whether the area is the size of a baseball infield, or about 35 yards × 35 yards ([Figure 23](#)). Alternatively, 0.1 hectare can be thought of as the area of 2

rows of 20 parking spaces, with a 2-lane road in between the rows ([Figure 24](#)). If the area of open water is obviously smaller, exclude as “OTHERWISE UNSAMPLEABLE – OPEN WATER IN LAKE LESS THAN 0.1 HECTARE.”

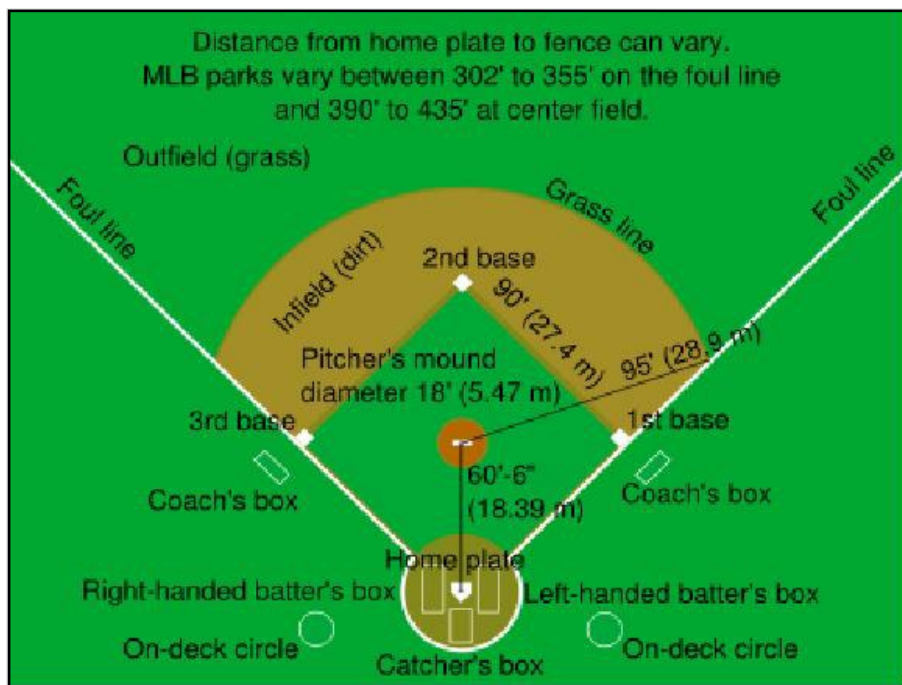


Figure 23. One way to estimate the size of open water in lakes. The area of open water should be at least the size of a baseball infield.

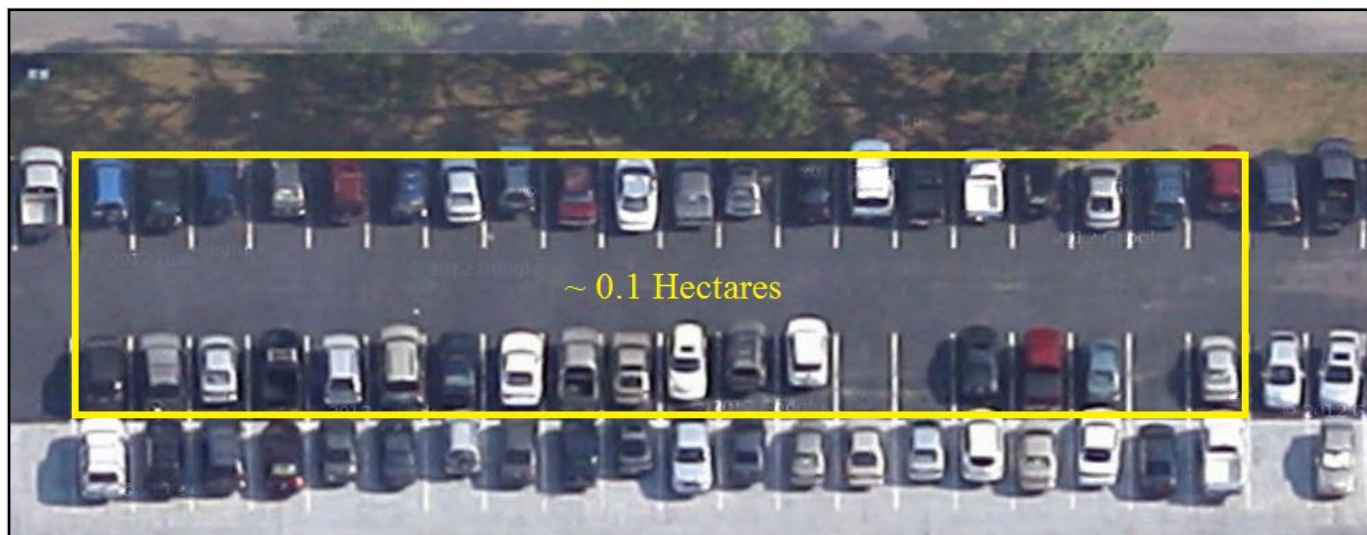


Figure 24. Another way to measure the area of open water in lakes. The area should be at least the size of 2 rows of 20 parking spaces, with a 2-lane road between them.

”Braided” areas: one large river or several small streams?

Near Lake Tsala Apopka, the Withlacoochee River widens out and contains many islands, which gives it a braided appearance ([Figure 25](#)). The question is whether the WMS considers these sites River or Streams resources. During Cycle 2 (years 2004-2008), the braided areas were considered part of the River resource, but because their functionality more resembled that of streams, the WMS began to classify them as Streams in Cycle 3 (year 2009).



Figure 25. The Withlacoochee River near Lake Tsala Apopka is considered a series of streams.

Lake sites “on the shoreline”

If a Large Lake site falls on dry land, including the shoreline ([Figure 26](#)), you must exclude the site. If the Large Lake site was historically part of the lake, but this part of the lake has been filled, exclude the site as “WRONG RESOURCE / NOT PART OF TARGET POPULATION – GIS COVERAGE INCORRECT, WATERBODY NOT PRESENT AT RANDOM LOCATION.” If the Large Lake site is dry, but you can determine from water rings on vegetation that there is usually water present, exclude the site as “DRY - DRY DURING INDEX PERIOD, INCLUDES SMALL LAKE WATER < 4 HECTARES LARGE LAKE WATER < 10 HECTARES”.

If the same situation occurs in a Small Lake, do not automatically exclude the site. If the distance from the point to the nearest part of the lake is ≤ 50 m, then the Small Lake should be sampled in the center of open water. If the distance from the point to the nearest part of the lake is > 50 m, then you must exclude the site as either “DRY – DRY DURING INDEX PERIOD, INCLUDES SMALL LAKE WATER < 4 HECTARES LARGE LAKE WATER < 10 HECTARES” or “WRONG RESOURCE / NOT PART OF

TARGET POPULATION – GIS COVERAGE INCORRECT, WATERBODY NOT PRESENT AT RANDOM LOCATION.”



Figure 26. Large Lake sites that fall on the shoreline or other dry land must be excluded. See text for rationale

Is this a real or fake lake?

Manmade lakes are not appropriate for WMS sampling. A small lake may look natural ([Figure 27](#)), but could be an excavated wetland or strictly manmade. Using the Imagery Time Slider in Map Direct or historical aerial photographs from other sites ([Figure 28](#)) can show the region prior to development, thus determining whether a resource is natural or manmade. If it is clear that the lake is manmade, the site should be excluded as “WRONG RESOURCE / NOT PART OF TARGET POPULATION – ARTIFICIALLY CREATED LAKE OTHER THAN ESTABLISHED IMPOUNDMENTS”.



Figure 27. Current aerials showed the presence of a lake.

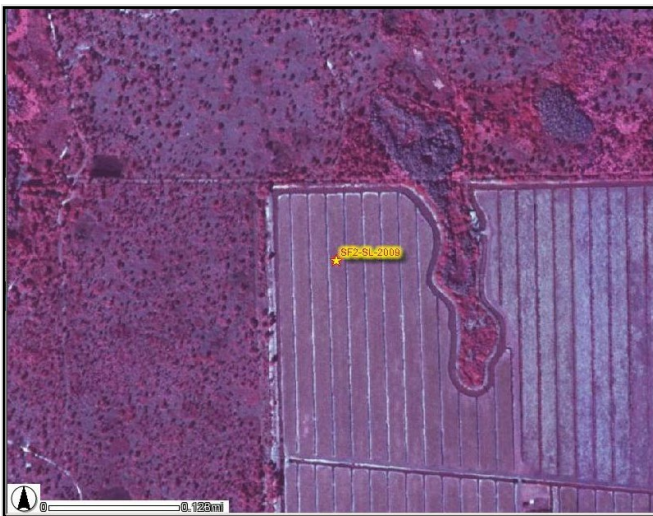


Figure 28. However, historical aerials showed that the lake is manmade.

One large, shallow lake, many small, interconnected lakes, or one big wetland?

Located in St. Lucie and Martin Counties, the Savannahs were once ancient coastal lagoons that are now shallow fresh waters ([Figure 29](#)). Some are linked intermittently, which confounds their resource type for WMS sampling purposes. After reviewing historical documents and speaking with local experts, the WMS determined that we consider the Savannahs to be a series of small lakes, so they are sampled as such.

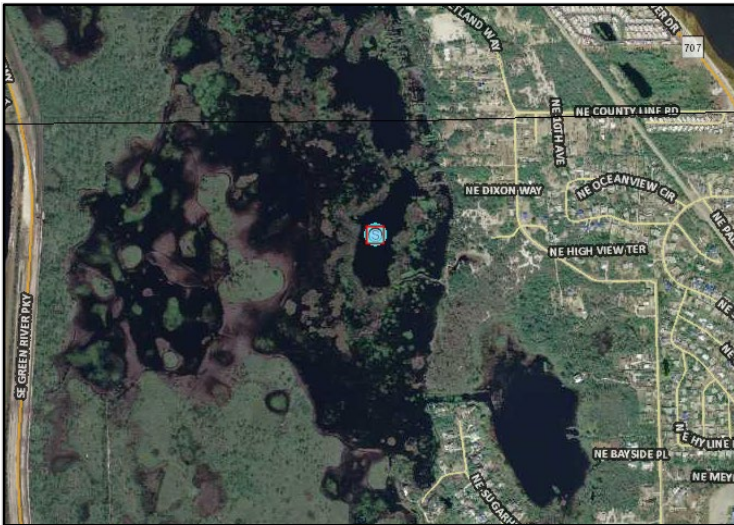


Figure 29. The Savannahs: one large, shallow lake, many small, interconnected lakes, or one big wetland?

Example of surface water exclusion due to incorrect resource type

A site was categorized as a small stream, but office recon showed it to be a wetland ([Figure 30](#)).

Therefore, this site was excluded as “WRONG RESOURCE / NOT PART OF TARGET POPULATION – WETLANDS.”



Figure 30. Quad map and aerial photo of a small stream site that was excluded as “Wrong Resource/Not Part of Target Population - Wetlands.”

III. Groundwater Resources

This chapter provides information about aquifers, notes on the use of Global Navigation Satellite System (GNSS) units, well types, recon procedures, useful media resources, well criteria, well confirmation information, a walk-through example of groundwater recon, and a list of groundwater exclusions.

The Status Network samples water from both confined and unconfined aquifers in Florida. Confined aquifers, which are usually deeper, include portions of the Biscayne and Floridan Aquifers. Unconfined

aquifers, often shallower than confined, are comprised of surficial aquifers and sand and gravel aquifers. For sampling purposes, the WMS considers the Intermediate Aquifer System (IAS) as a Confined Aquifer. The WMS considers semi-confined portions of any aquifer as part of the Unconfined Aquifers resource.

Due to the many groundwater programs and well types and layouts, it is important to have background knowledge of the well prior to conducting recon. Wells found in the Status Network list frame include monitoring, private, and facility wells in the programs and networks listed below. For more in-depth information on these networks and aquifers, see [Appendix B. Aquifers and Groundwater Programs](#).

GNSS Coordinates

GWIS provides site locations in the form of latitude and longitude along with a locational method. Beware of cases where the locational method is MMAP (Manual Map Interpolation) or DMAP (Digital Map Interpolation) because the coordinates can be significantly inaccurate. For MMAP coordinates, the actual site may be located anywhere from 50 meters to 1 kilometer from the coordinates listed in GWIS. This is known as an accuracy level of 6 (see below). For DMAP, the accuracy level is 4-6. The coordinates listed in GWIS should have a minimum accuracy of level 6. Sites in GWIS that do not meet this accuracy requirement (i.e. actual site location is > 1 km from coordinates listed in GWIS) should be excluded as "OTHERWISE UNSAMPLEABLE – REQUIRED PHYSICAL AND/OR GEOLOGICAL INFORMATION NOT AVAILABLE FOR WELL."

All locational data collected for the Status Network should be collected using GNSS equipment in Autonomous Global Positioning System (AGPS) or Integrated Satellite-Based Augmentation System (SBAS) mode.

GNSS Coordinate Accuracy Levels

1 = <0.02 meter (+/- 0.01 meter)

2 = 0.02 to 1.0 meter

3 = >1.0 to 10 meters

4 = >10 to 20 meters

5 = >20 to 50 meters

6 = >50 to 999.99 meters

Minimum Data Requirements for Wells

For a well to be included into the WMS database, the following minimum information as defined in the current Stations Table Data Dictionary is required:

STATION NAME
COUNTY
AGENCY
WATERBODY NAME
WATER RESOURCE
LATITUDE
LONGITUDE
LOCATION METHOD
LOCATIONAL DATUM
CASING DIAMETER
CASING MATERIAL
CASING DEPTH
TOTAL DEPTH
ALL CONTACT INFORMATION

Additional research may be required to complete the underlined items. If the total depth is unknown, contact the appropriate WMD staff to determine if they have this information or know the identity of the well driller. If a well needs to be excluded due to lack of data, enter “OTHERWISE UNSAMPLABLE” as the exclusion category and “REQUIRED PHYSICAL AND/OR GEOLOGICAL INFORMATION NOT AVAILABLE” as the exclusion criteria in GWIS Database Utilities. Always supply further information in the comments box.

3.1 Office Reconnaissance

A. Office Recon Flowchart

The recon flowcharts illustrate the basic decision-making that guides the recon process, both in the office and in the field. The office recon flowchart ([Figure 31](#)) focuses on the steps conducted away from the site, and is heavily dependent on media resources. The resources used in this process are covered below.

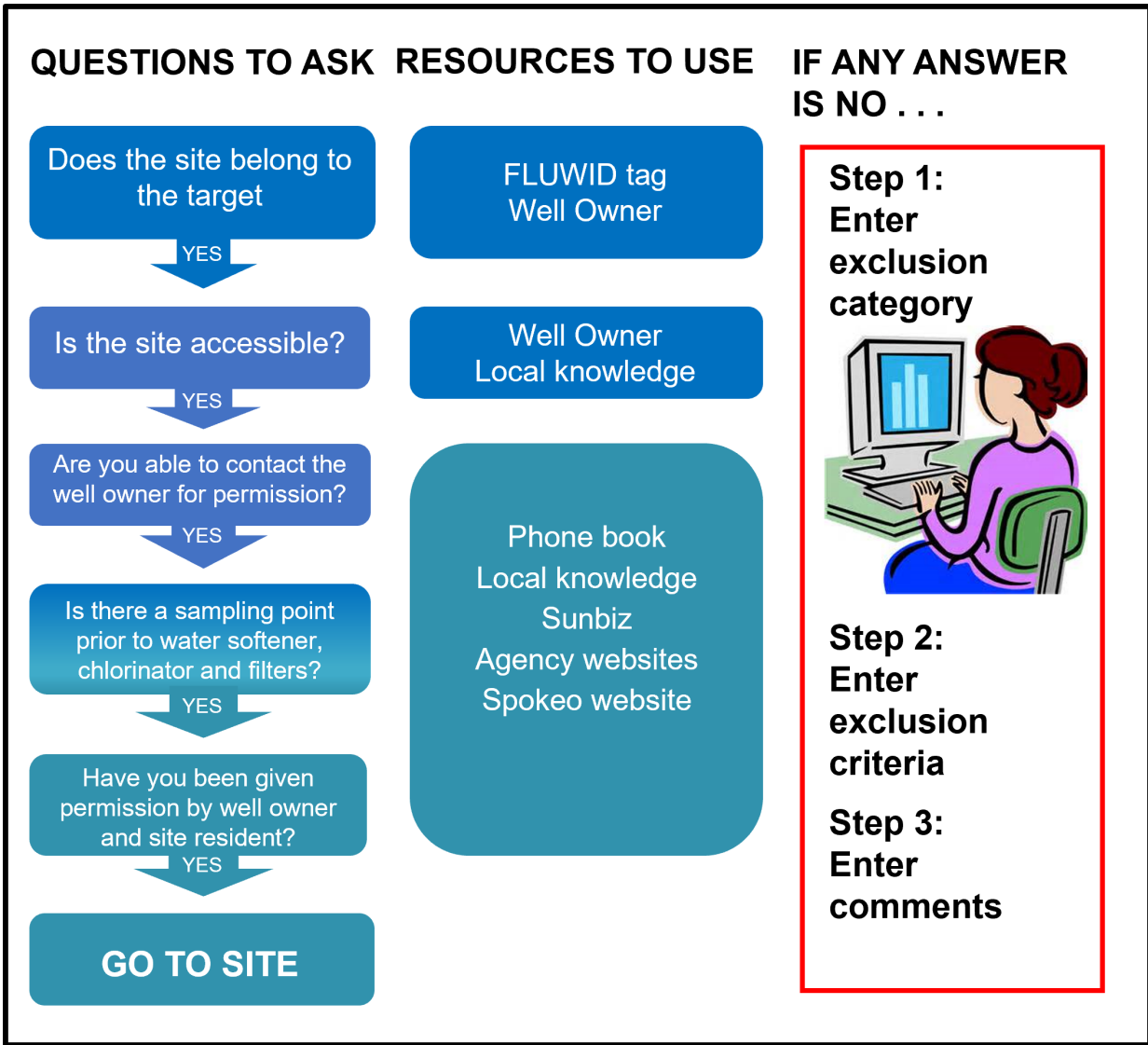


Figure 31. Office recon flowchart for groundwater.

B. Generalized Water Information System (GWIS Database Utilities)/Map Direct

GWIS Database Utilities is an internet application that interfaces with the department’s Oracle databases and the department's online mapping application, Map Direct. GWIS Database Utilities is located at <https://prodapps.dep.state.fl.us/gwis/>. Contact Thomas Adams, WMS Data Coordinator, at (850) 245-8512 or Thomas.L.Adams@FloridaDEP.gov to obtain login credentials. This application was designed specifically by the WMS to manage site data for the Status Network and is the starting point for all Status Network recon. For additional information in using this application, see Chapter III “Reconning Sampling Sites” of the GWIS Database Utilities Manual, located at http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Standard%20Operating%20Procedures/GWIS%20Manual/WMS-GWISManual.pdf.

A Map Direct Tutorial, Users' Guide, and Quick Start guide are available in Map Direct by clicking on the question mark (?) at the top of the screen.

The different layers and tools in Map Direct provide information on the following features of the sampling site:

- location: county, distance, Waterbody ID, and proximity to other resources, such as springs and sinkholes
- imagery: the Imagery Time Slider includes current and historical aerial photos that show historical uses and current development, such as mines and land modifications; United States topographic maps are also available.
- access: roads, trails, boat ramps
- land ownership: most recent cadastral layer (This shows the boundaries and ownership of land parcels.)
- impediments to sampling resources: dams and military base boundaries

If available, you may wish to use ArcGIS or Google Earth to complement the information in Map Direct.

C. Hardcopy References

Hardcopy references include maps of Florida and the Florida Atlas & Gazetteer. A current map of Florida comes in handy for navigating to a site via major highways. The Florida Atlas & Gazetteer provides detailed topographic maps containing back roads and trails, and a cities index. Guides to city and regional roads are often available in bookstores. Brochures from state and national parks provide overview maps and directions to the parks.

D. Internet and Phone Resources

Internet sites also serve as good resources, although the quality of the information may vary widely.

Listed below are commonly used webpages and resources that assist in groundwater recon:

- <https://www.spokeo.com/> is useful for obtaining phone numbers but requires a subscription to access all content. Your Project Manager or the WQMP Administrative Assistant can provide assistance with obtaining login credentials is needed.
- Free 411 (1-800-FREE411) provides a free phone directory assistance service for commercial and residential listings.
- <http://floridarevenue.com/property/Pages/LocalOfficials.aspx> contains links to the property appraiser's website for each county. The cadastral (land ownership) layer in Map Direct is only updated once per year. The property appraiser's websites can be used to obtain updated or more in-depth information on a parcel's owner.

- <http://dos.myflorida.com/sunbiz/> is the Florida Dept. of State website that allows you to access contact information on corporations, including upper management contacts, locations, and telephone numbers
- <http://www.bing.com/maps/> and <http://www.google.com/maps> provide **recent** close-up aerials and street level views of a site
- <http://ufdc.ufl.edu/aerials> is a great source for historical aerials, usually categorized by county. It has a great “search by map” feature that allows you to type in an address or latitude and longitude, which will then provide a list of aerials to view.
- <http://www.fdot.gov/geospatial/aerialmain.shtm> is another source for aerial photos. Most imagery is from the 1970s through present day.
- <http://www.fs.usda.gov/florida/> provides USDA national forest maps and aerials
- Web reports for facility (wastewater and solid waste) background wells available on https://fldep.dep.state.fl.us/wafr_main/ and https://fldeploc.dep.state.fl.us/www_wacs/.
- <http://ocean.floridamarine.org/wma/entrances/> gives contact information for Wildlife Management Areas under the Florida Fish & Wildlife Conservation Commission (FFWCC).
- <https://www.fws.gov/our-facilities> provides contact information for National Wildlife Refuges under the U.S. Fish & Wildlife Service (USFWS).
- <https://fl.water.usgs.gov/about/officelocations.html> provides contact information for the USGS in Florida.
- <http://nwis.waterdata.usgs.gov/fl/nwis/gwlevels> gives information on groundwater levels of USGS wells in Florida
- <https://www.fdacs.gov/Divisions-Offices/Florida-Forest-Service> links to contact information for state forests managed by the Florida Dept. of Agriculture & Consumer Services (DACS)

E. Historic Data

Historic data for a sample site can provide valuable information. Existing historic data includes access points, previous owners, photos of the site, the well drilling report, and maps (drawn or aerials). [Figure 32](#) provides an example. Historic data can be obtained from records of previous site visits by WMS, or from other agencies or entities that monitor the site. DEP headquarters or field offices may keep previous recon notes as either hardcopy or electronic files.

Typically, historic data for old HRS and Background Network wells are kept in notebooks in Tallahassee. While some station names have changed, well information generally can be located by county, oversight agency, or drilling dates. Historical data for wastewater treatment, landfill, or water treatment facility wells are kept by the local DEP District office. These data are accessed by contacting the local DEP District office facility inspector. To properly identify the contact person at the district office, you will need to know the data source of the well (WACS, Potable Water System [PWS]). Sometimes, the owner has a copy of the well drilling report, but this is the exception. Even if the owner indicates she/he knows the exact well depth, official documentation is necessary for entry into the database.

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

The Suwannee River Water Management District (SRWMD) is assisting the Department of Environmental Regulation (DER) in establishing an ambient groundwater monitoring network to locate the protection of Florida's high quality groundwater resources.

This network will consist of wells that meet the SRWMD's well construction and location criteria.

The 4 inch diameter well location is Township 15, Range 14 East, and Section 36, in Suwannee County and owned by: Tommy L. Cashner

Address: Rt. 2 Box 248-22 L.O.
Phone: 904-362-6645

has been selected for this network.

If you will permit the DER or its agent to sample this well in 1987, and possibly in the future, please sign giving permission at the bottom of this page. The water will be analyzed for the parameters on the attached sheet and the results will be made available to you.

I give the DER or its agent permission to sample my well.

Tommy L. Cashner
1-23-86

WALF & BROWN THE CIVIL ENGINEERS TELEPHONE SERVICE UNIT

Micro-Landuse Field Sheet
Page 3

7. LOCATION MAP:

8. PHOTOGRAPHS:

ON 12/13/87

011435003

9

Site ID 011435003 L&D Elevation 70
Well Size 4 in inches HD Elevation 71
PUMP (H.P. BRAND) 5.16
CASING DEPTH 55 TOTAL DEPTH 60
MAXIMUM WATER LEVEL IN WELL 4 FT BELOW V.O.C. 41
MINIMUM WATER LEVEL IN WELL 26 FT BELOW V.O.C. 41

TOTAL DEPTH 60
- (MINUS) MAXIMUM WATER LEVEL 41
= MAXIMUM FEET OF H₂O IN WELL 19

MAXIMUM FEET OF H₂O 19 X (K) .667 = 12.7 MAX. VOL. OF H₂O IN WELL
MAXIMUM VOLUME 31.9 X 4 = 128 GALLONS TO PURGE FOR SAMPLING

SAMPLING POINT _____

WELL DIAMETER	(IN)	DATE SAMPLED
1 1/4	= .044	1. <u>2/11/86</u>
2	= .143	2. _____
3	= .367	3. _____
4	= .453	4. _____
6	= 1.47	5. _____
8	= 2.41	6. _____
10	= 4.08	7. _____
12	= 5.88	8. _____
		9. _____
		10. _____

OWNER - Tommy Cashner
ADDRESS - Rt 2 Box 248-22 Linn Co
PHONE - 904-362-6645
COMMENTS:

Figure 32. Examples of historic well documents, such as drilling permits and reports and prior sampling visits. Page 44 of 75

F. Local Knowledge

It is important to establish contacts located physically near the resources to be sampled, or whose area of expertise includes the targeted resources. These can be DEP District or regional staff, local residents, or employees of WMDs, counties, cities, state parks, national wildlife refuges, national forests, and so on. If you are unable to locate the owner of a parcel, people living in the surrounding area can often assist.

WMDs can serve as a productive source of information on monitoring wells, since they may approve consumptive use and well-drilling permits. In addition, the USGS, drinking water and wastewater utilities, and landfills may have monitoring wells, and can be contacted for keys, access, or additional information. Most wells with a county code and a four-digit station name (e.g., V-0100 or SJ0333) are monitoring wells owned by WMDs or USGS, or public supply wells owned by utility companies. To obtain missing well information, keys, or information on who owns the well, contact the appropriate agency or utility.

Monitoring wells are often placed in state parks, golf courses, wildlife preserves, or on school property. For wells located in public places such as a park or refuge, contact the manager or maintenance staff. For public supply wells owned by cities or towns, contact their public works department, which will send representatives to accompany samplers.

For cases in which the property owner/occupant differs from the well owner or manager, both parties generally must be contacted for access. For permission to sample, contact the property owner (as well as the tenant, if it is a rental property). Important questions to ask are: Is there access to the well? Is there a sample point on the well prior to any filters, softeners or chlorinators? Is the well easily located? Is the well placed behind a locked gate? Are there dogs or aggressive animals at the site?

G. Documentation

At least three separate attempts must be made to contact each property owner, before the site may be excluded as “NO PERMISSION FROM OWNER - UNABLE TO OBTAIN PERMISSION FROM PROPERTY / WELL OWNER”. These attempts can include sending a letter in the mail (see [Appendix A.2. Permission Letter](#)) or by email, speaking to someone affiliated with the property on the phone, leaving a voicemail message, or speaking to someone affiliated with the property in person. All contact attempts must be documented and all written and verbal contact with the property owner must be documented, regardless of whether or not permission is granted to access a site (see [Appendix A.2.](#)

[Permission Letter](#)). An Excel spreadsheet is useful for documenting pertinent information on the site (see [Appendix A.3. Site Tracking Spreadsheet](#)).

3.2 Field Reconnaissance

A. Field Recon Flowchart

The Recon flowcharts illustrate the basic decision-making that guides the recon process, both in the office and in the field. The Field Recon flowchart ([Figure 33](#)) focuses on the steps samplers take at or near the site. The approach used in this process is described in the following pages.

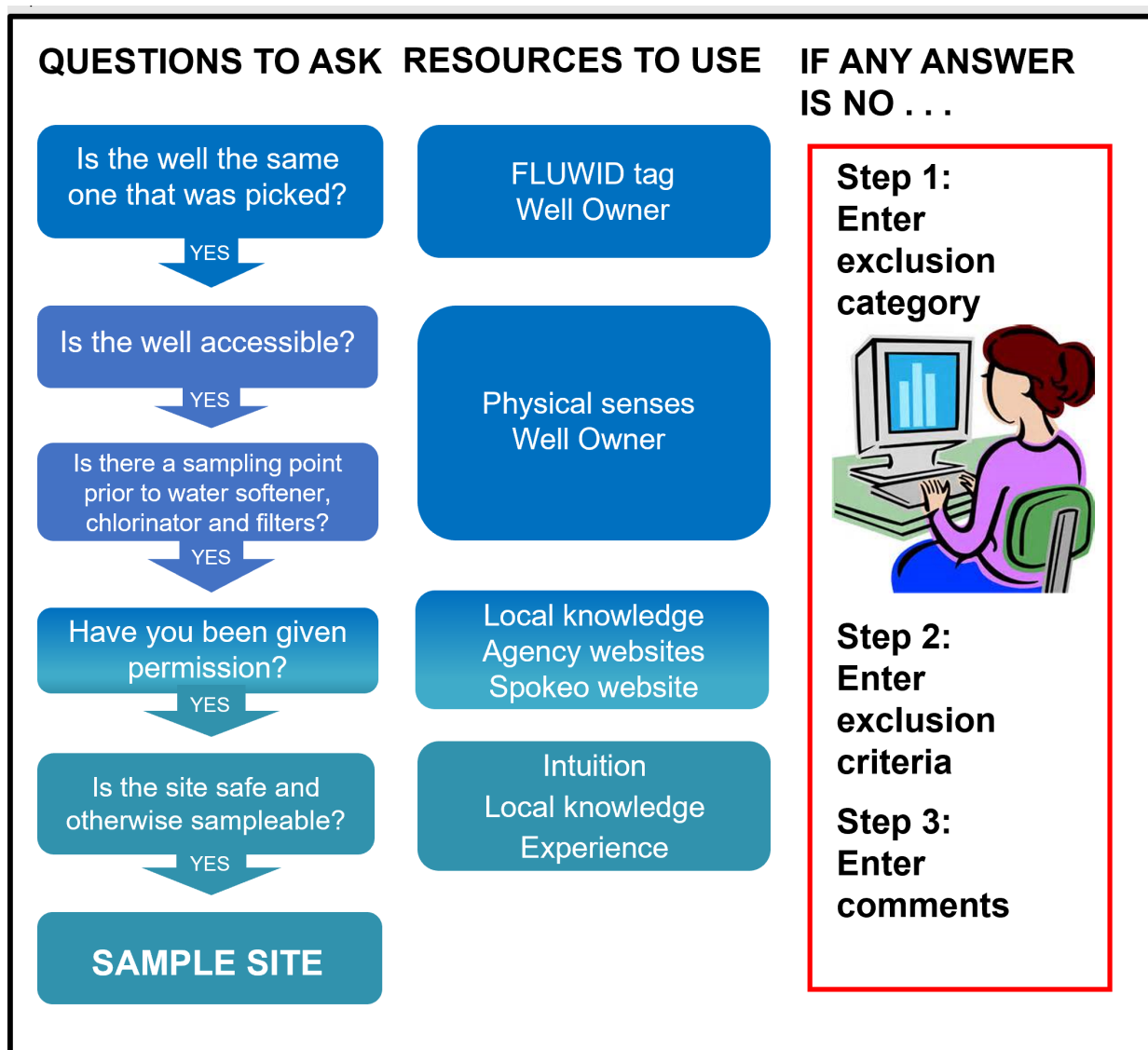


Figure 33. Field recon flowchart for groundwater.

B. Planning and Conducting Site Visits

Site visits should be conducted only when needed information cannot be obtained from office recon. If field recon is deemed necessary, permission to access private sites must be obtained. If a private site can be observed from public property, no permission is necessary to recon. However, to perform a close inspection of the well or collect a sample on private property, you will need to obtain access permission to avoid trespassing. Once permission to sample has been granted by the property owner, and field recon has been deemed necessary, take the proper steps to prepare for a recon trip. Prepare a checklist (see [Appendix A.4. Field Recon Checklist](#)) with items such as keys, camera, cell phone and maps.

There are slight differences in preparation of reconnaissance for groundwater versus surface water trips. For example, many surface waterbodies are easily located, whereas wells may require additional time for locating the well; samplers may need to tote several different types of pumps or pipe fittings and adapters ([Figure 34](#)) while conducting recon, to determine what equipment will be needed when sampling the well. Regardless of the resource type, try to obtain as much site-specific information as possible, including the size of the pipes and configuration of any in-place plumbing.

[Figure 34](#) shows a flowing artesian well that contains a two-inch gate valve. This valve has female threads that require a threaded male PVC adapter with a reducer and hose barb fitting to allow for connecting sampling tubing to this well. The adapter should be removed in order to purge to 1.00, 1.25 and 1.50 well volumes. The adapter would then need to be reinstalled in order to collect data sonde readings at 1.00, 1.25, and 1.50 well volumes for stability determination. Another option in this case is to open the other valve for purging the well.

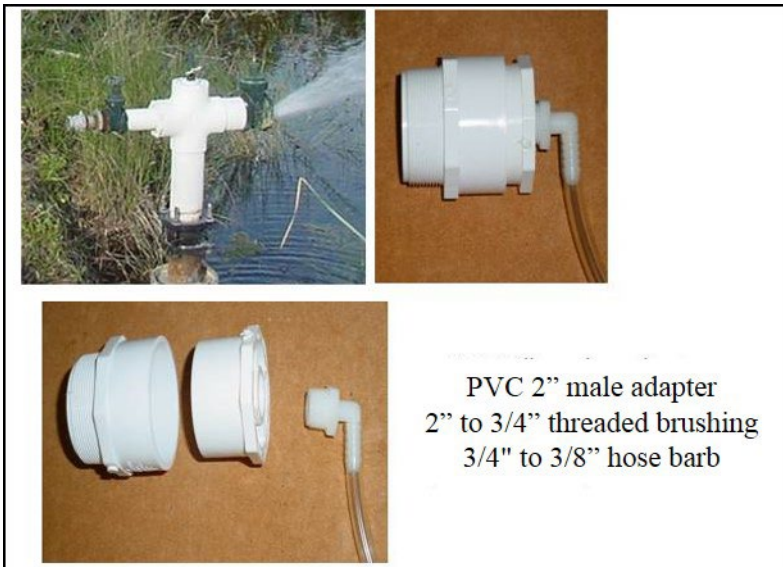


Figure 34. Example of a well that needs a PVC adapter. It is important to note specific requirements, such as the size of needed adapters, during field recon.

C. Driving Directions

Regardless of who is doing the recon/sampling, obtain driving directions from websites like Google Maps or Driving Route Planner (<http://www.drivingrouteplanner.com/>). The use of north, south, east, and west rather than left-right directions is preferable. Specific site directions should be documented from the intersection of a major road. Include as many maps from various sources as possible (owner sketch maps, Gazetteer pages, Google Maps, Map Direct maps, and so on). Always include a north-arrow and scale bar with each map. It is better to have too much information than too little.

D. Confirmation Criteria

A well in the field can be confirmed as the correct one by using several combined characteristics:

- Florida Unique Well Identifier (FLUWID) tag
- casing diameter
- casing material
- well name

To be certain that the well is the correct one, all of these characteristics must match the documentation. Familiarity with the various forms of identification makes recon of the wells more efficient. Some wells are identified with metal tags or FLUWID tags. FLUWID tags ([Figure 35](#)) can be attached to the outside of the well, to the inside cap or structure, or sometimes even to adjacent tanks. While some wells have identification located on the well casing, private wells may not. In some cases, the well drill date can be helpful for confirmation, especially if it was drilled recently.

WMDs' background well identification is specific to the WMD, while facility wells have identification unique to the facility. Facility wells may not be tagged and can be more problematic to identify. Facilities may sometimes name a new ambient or background well with the name of the previous background well, causing confusion. This being the case, it is important to make good contacts with the DEP District office and with facilities.

If there is no FLUWID tag on the well, this may be because the well was never tagged before or the tag was removed in the past. Double check the information in GWIS to see if the well has a FLUWID number associated with it (If you do not have access to this information in the field, call your Project Manager and have them check GWIS for you.) Do not place a different FLUWID tag on the well if there is any record of it being tagged before. **If the FLUWID tag has been lost or worn, contact your Project Manager to order a replacement FLUWID tag.**



Figure 35. Well with a FLUWID tag.

E. Documentation

During all three attempts at contacting the property or well owner, or tenant, document contact name, date, permission given/denied, times available, locks, aggressive animals, and any relevant info about the well. All written or verbal contact with the property owner must be documented, regardless of whether or not permission is granted to access a site (see [Appendix A.2. Permission Letter](#)). An Excel spreadsheet is useful for documenting pertinent information on the site ([Appendix A.3. Site Tracking Spreadsheet](#)).

Refer to the current sampling manual

(http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/Reports_Docs_SOPs/Standard%20Operating%20Procedures/Sampling%20Manuals/WMS-SamplingManual.pdf) for inclusion requirements when determining whether a well is sampleable.

F. Photographing the Site

Whether the site is to be sampled or excluded (see [Table 2. Groundwater Exclusions](#)), the SOPs require photographs for documentation of site conditions. Photographs should be taken in each direction (north, east, south, and west, in that order); for reference, also include a photo of the well, and a close-up of the FLUWID tag. If the site must be excluded, take several additional photographs that best represent the exclusion rationale (damaged well, area paved over, etc.).

G. Safety

If you can't safely recon or collect the sample, come back another day. Safety issues can include potentially dangerous animals, weather, and situational conditions ([Figure 36](#)). To sample safely near a busy highway, use safety equipment such as neon vests, cones, and strobe lights. When safety is compromised by bad weather, return on a different day when the weather is better.

Exclude the site as "OTHERWISE UNSAMPLEABLE – UNSAFE SAMPLING CONDITIONS" only if dangerous conditions are expected to last for the duration of the index period.



Figure 36. Always address safety, whether it is a roadside well or an attack chicken.

H. Contacting the Project Manager for Assistance

If you are unsure whether conditions are conducive to sampling, or desire additional input, do not hesitate to contact your Project Manager, who can discuss the question with the Administrator, the Data and Analysis Coordinator, the QA Officer or other Project Managers. Sometimes field conditions or events are unexpected, and it takes a “village” to develop the Best Professional Judgment in context.



Table 2. Groundwater Exclusions

EXCLUSION CATEGORY	EXCLUSION CRITERIA
DRY	WELL DRY DURING INDEX PERIOD (WELL CONSISTENTLY DRY, PURGES DRY OR DOES NOT RECOVER WITHIN 6 HOURS.)
NO PERMISSION FROM OWNER	ACCESS DENIED BY PROPERTY/WELL OWNER
NO PERMISSION FROM OWNER	UNABLE TO OBTAIN PERMISSION FROM PROPERTY/WELL OWNER
OTHERWISE UNSAMPLEABLE	REQUIRED PHYSICAL AND/OR GEOLOGICAL INFORMATION NOT AVAILABLE FOR WELL
OTHERWISE UNSAMPLEABLE	WELL DAMAGED
OTHERWISE UNSAMPLEABLE	UNSAFE SAMPLING CONDITIONS
OTHERWISE UNSAMPLEABLE	SAMPLER CANNOT RUN IN-PLACE PLUMBING
OTHERWISE UNSAMPLEABLE	SAMPLE WITHDRAWAL LOCATION AFTER FILTER OR SOFTENER
OTHERWISE UNSAMPLEABLE	WELL NONFUNCTIONAL AS SAMPLING DEVICE (WELL NO LONGER SERVES AS AQUIFER SAMPLING DEVICE (I.E, DESTROYED).)
OTHERWISE UNSAMPLEABLE	CANNOT LOCATE WELL (WELL CANNOT BE FOUND AFTER GROUND TRUTHING)
OTHERWISE UNSAMPLEABLE	DEPTH TO WATER TOO DEEP FOR PURGING WITH AVAILABLE EQUIPMENT.
OTHERWISE UNSAMPLEABLE	MINIMUM PURGE TIME GREATER THAN 6 HOURS.
UNABLE TO ACCESS	UNABLE TO GET EQUIPMENT TO RANDOM LOCATION
UNABLE TO ACCESS	SAMPLER UNABLE TO GET EQUIPMENT INTO WELL
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WELL TAPS WRONG RESOURCE
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WELL IN ZONE OF DISCHARGE OF PERMITTED FACILITY
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WELL IS NOT UPGRADIENT WELL AT FACILITY
WRONG RESOURCE/NOT PART OF TARGET POPULATION	WELL FALLS OUTSIDE OF REPORTING UNIT

3.3 Example: Recon of a Zone 2 Unconfined Well

OFFICE RECON

GWIS Database Utilities/Map Direct:

1. Open GWIS Database Utilities at <https://prodapps.dep.state.fl.us/gwis/>.
2. Click “Recon Tracking”.
3. In the drop-down boxes, choose Resource Type = UNCONFINED AQUIFER, Reporting Unit = ZONE 2, Reporting Cycle = 11 (for 2017). Enter 1 – 20 for the range of sites you want to recon. (Leave the Site Location Range blank to return all records.) Click “View Results”.
4. To view a map of all sites, click “Show Map (To view a map of a single site, click on the site of interest first.)
5. Zoom in and out a few times by using the scrolling mouse wheel, or by changing the map scale to view the site in context of nearby roads, towns, and landmarks, and to determine the easiest route to access the site. You may also enter the lat/long of the site into <http://www.drivingrouteplanner.com/> to find the optimal route.
6. Click open the arrow  icon on the left, scroll down and locate the Cadastral Property Appraiser Parcels layer. If this layer is not present, click on the “More Data” icon  type "cadastral" in the search box, click the "Add Layer to Map" button next to the cadastral Property Appraiser Parcels layer, and close the “More Data” popup. Select the parcel on the map to identify the property owner. This information will appear on the map’s right.
7. Document findings from the above in the Recon tracking spreadsheet.
8. If you see any issues that would prevent sampling, and you need guidance, contact your Project Manager.

Internet Resources

1. Obtain contact information based on the information in the Cadastral layer, websites used for obtaining phone numbers, county websites, the WMD websites, the State Parks website, the USGS, or by other means.
2. Document in the Recon tracking spreadsheet.

Local Knowledge

1. Contact the owner or the party responsible (owner, resident, manager, etc.) for the well to obtain access permission. During all three contact attempts, document contact name, date, permission given/denied, times available, locks, aggressive animals, and any relevant info about the well.
2. Contact staff from the nearest DEP District Office, WMD, County, or municipality to learn about the exact location of the well and condition of the well. Document information obtained in the Recon tracking spreadsheet.

FIELD RECON

1. Travel to the well area, and determine whether the well is the correct one, if it is in good condition and appropriate to sample, and site conditions are safe.
2. To determine if the well is the correct one, compare the well diameter, well identification tag (if it has one), and FLUWID tag (if it has one) to the information in GWIS.
3. Note: If there is no FLUWID tag on the well, this may be because the well was never tagged before or the tag was removed in the past. Double check the information in GWIS to see if the well has a FLUWID number associated with it (If you do not have access to this information in the field, call your Project Manager and have them check GWIS for you.) Do not place a different FLUWID tag on the well if there is any record of it being tagged before.

4. If the well cannot be located, do the following:
 - a. If it is on company property, belongs to an agency, or is located at a facility, contact the staff to double-check the well location.
 - b. If it is on private land, exclude it as “OTHERWISE UNSAMPELABLE – CANNOT LOCATE WELL” and move on to the next unconfined aquifer well.
 - c. Under no circumstances should you sample a well that is not in the listframe, even if it is adjacent to or near a well in your list of wells selected for sampling.
5. After locating the correct well, document the correct location in the Recon tracking spreadsheet. Note any anomalies.

3.4 Real-World Examples and Tips

Locating the correct well

Some wells may be difficult to locate due to the presence of other nearby wells ([Figure 37](#)), structures that resemble wells ([Figure 38](#)), man-made or natural barriers ([Figure 39](#), [Figure 40](#)), or the contours of the surrounding landscape ([Figure 41](#)). It is important to ask the well property owner if the well is easy to locate and if there are any other wells located nearby. It is also helpful to note the presence of any obstacles that may make it difficult to see the well or get sampling equipment to the well.



Figure 37. Which well is the correct one? It is important to ask the well owner if there are multiple wells clustered together.



Figure 38. *Is this a well? No, it is a faucet connected to a municipal water supply at a county park.*



Figure 39. *Example of a hidden well. This well is inside a wooden structure.*



Figure 40. *Example of hidden well. This well is in a stand of grasses.*

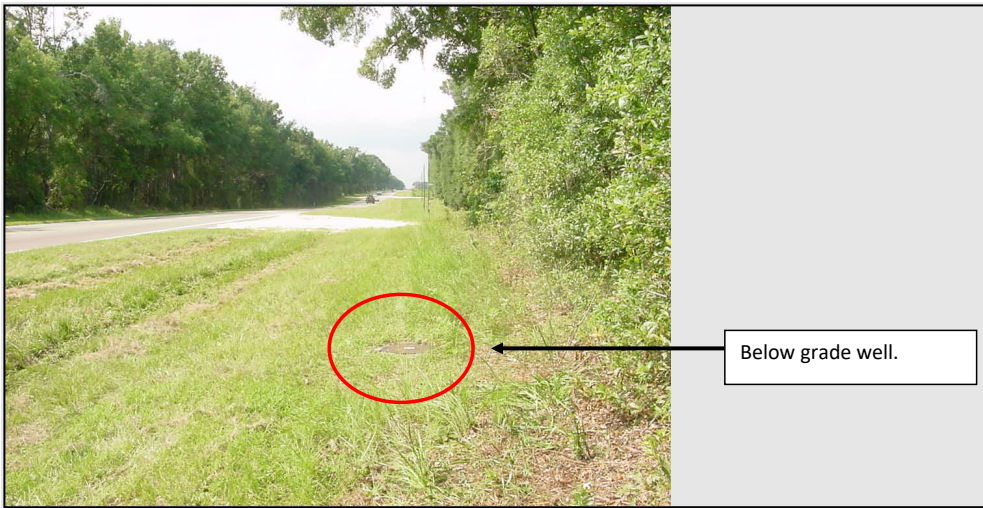


Figure 41. Example of a below grade well.

Private wells

Private wells may have storage tanks ([Figure 42](#)). Ideally, the sample should be collected from a spigot or other access point before the storage tank. However, if the only access point is located after the tank, but before any other devices described in the next paragraph, that point may be used for sampling if the volume of the storage tank is added to the minimum required purge volume.

Some wells have softeners, filters, chlorinators, or aeration chambers. A representative sample of the aquifer cannot be obtained if collection is done after water flows through such devices. Filters and softeners look like cylinders plumbed into the water lines near the well ([Figure 43](#), [Figure 44](#)). Aeration and chlorine chambers usually resemble round basins that rest directly on the ground ([Figure 45](#)). These devices may be identified during office recon, during phone calls to owners, or later documented during field recon. If you find one of these devices on a well, you must sample from a spigot or well access prior to the device. Contact your Project Manager if you encounter any device that you cannot identify before you decide a well is sampleable.



Figure 42. Private well with tank, but no softener or filter.



Figure 43. Private well with tank, softener, and filter.

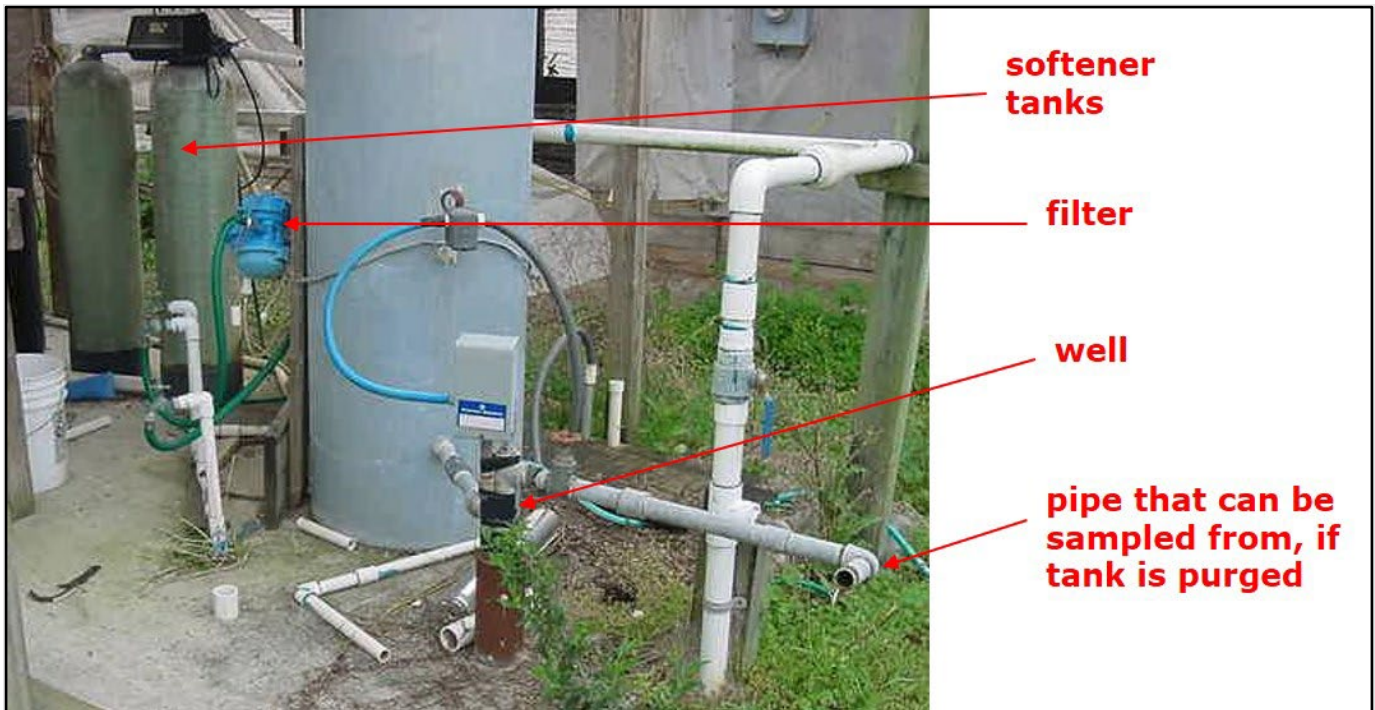


Figure 44. Example private well with softener tanks, a filter, and a storage tank. Look for a connection before any filters or tanks.

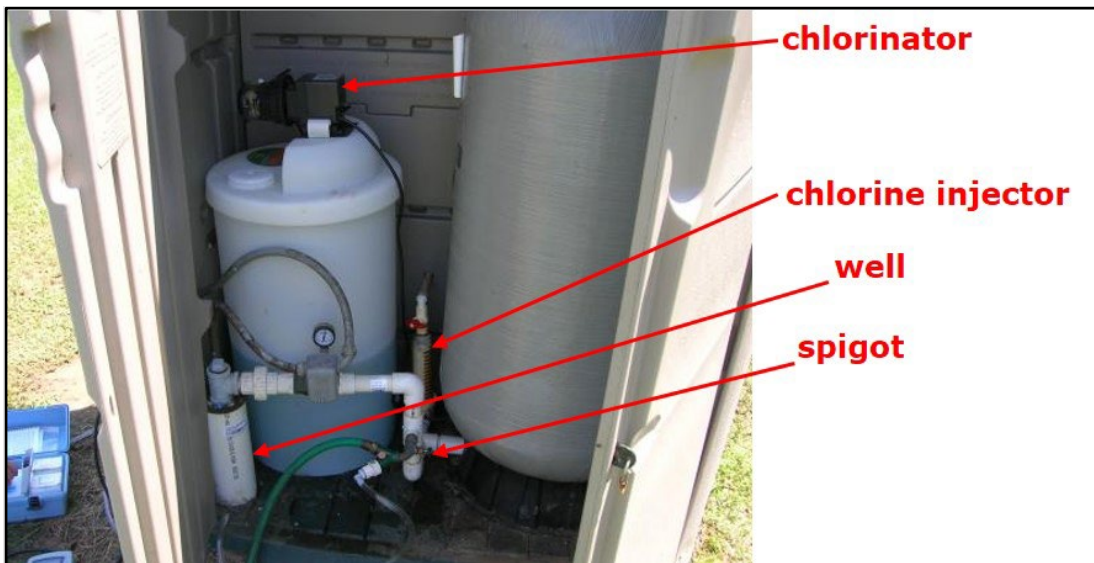


Figure 45. Tanks that have a chlorinator prior to or concurrent with the spigot should be excluded as “OTHERWISE UNSAMPLEABLE – SAMPLE WITHDRAWAL LOCATION AFTER FILTER OR SOFTENER”.

Wells with incorrect coordinates listed in GWIS

Sometimes a well is not where GWIS shows it to be (Figure 46). However, the nearest adjacent well to the location listed in GWIS should never be sampled in lieu of the targeted well. Additional information such as historic data, well drilling documents, and property records can be helpful for locating the targeted well. If the targeted well is located far from the coordinates listed in GWIS, it is extremely important to

verify the wells identity using tags, historic photos and documents, and physical measurements. Sites in GWIS that are located > 1 km from coordinates listed in GWIS should be excluded as "OTHERWISE UNSAMPLEABLE – REQUIRED PHYSICAL AND/OR GEOLOGICAL INFORMATION NOT AVAILABLE FOR WELL."



Figure 46. Example of a well that was actually located over 200 meters from the location listed in GWIS.

IV. Documentation

4.1 Field documentation

Accurate and thorough documentation on recon tracking spreadsheets and field sheets is critical to agency efforts to obtain quality data. The WMS and its contractors use several forms and spreadsheets for recon ([Appendix A.3. Site Tracking Spreadsheet](#)), although there is no agreed-upon standard; sampling teams may develop region-specific recon forms if desired.

4.2 Record keeping in GWIS Database Utilities application

Accurate and timely record-keeping is a critical part of the recon process for a variety of reasons. Record keeping:

- Verifies the accuracy of the data collected;
- Documents any anomalies that may affect the data values;
- Assists in determining the parent population of both surface water and ground water resources for the next sampling cycle;

- Provides critical information to the Standards and Assessments Section in evaluating biological metrics field-tested by samplers;
- May provide additional insight into statewide or area trends such as drought, over pumping, hurricane effects, and salt-water intrusion.

The Recon Tracking area of GWIS Database Utilities should be updated within 30 days of completing the project so that critical details of sampling and exclusions are retained and documented. Records should be updated as described in Chapter IV of the [GWIS Database Utilities Manual](#).

4.3 Exclusion documentation

Exclusion information should be completed in GWIS Database Utilities, including the site-specific Comment field. This field is intended for additional information for either sampling or exclusions. If the site is excluded, make sure to complete the Comments box with details such as whether the exclusion determination was made in the office or the field, date, and name of the person conducting recon. Providing a sufficient description of the surrounding site characteristics is imperative. Make every effort to fully describe the situation that is resulting in the exclusion of a site. If possible, note how far an observation extends away from a particular sampling site. Photo documentation is extremely valuable for sites excluded in the field. Such documentation is critical to the Project Managers and GIS Analysts when exclusions are reviewed for the following year's sampling.

4.4 Documenting more than one exclusion

If there are multiple reasons to exclude a site, record the most important exclusion category first. For example, "Wrong Resource/Not Part of Target Population" has the highest priority because it will remove the specific site from the following year's listframe, whereas "Dry" or "Unable to Access" may return the specific site to the listframe the following year. All exclusions should have details documented in the site-specific Comments field in the Recon Tracking section of GWIS Database Utilities. In addition, any information that would be important for other samplers, such as the presence of aggressive dogs, livestock, difficult locks ([Figure 47](#)), and landmarks, etc. should be added to this Comments field.

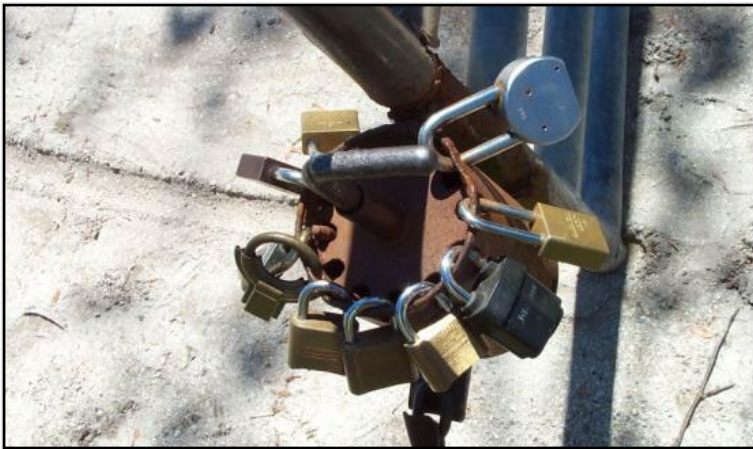


Figure 47. Example of a difficult access situation. Photo courtesy of Jessie Taft and Sarah Seitz.

4.5 Closing the Loop: How Documentation Shapes the Next Year’s Resource Population

Documenting exclusions is critical to the Project Managers and GIS Analysts when resource exclusions are reviewed for the following year’s sampling. The following actions are taken for each Exclusion Category.

- **WRONG RESOURCE** – the site will be removed from the incorrect listframe, and (if it represents a resource we sample), it will be placed into the proper listframe for the next year. **EXAMPLE:** A small lake that was originally listed as a stream will be included in the next year’s small lake listframe.
- **DRY** – will be included in the next cycle, as this is usually a temporary condition.
- **UNABLE TO ACCESS** - will be included in the next cycle because the resource access might change (e.g. newly constructed roads or trails might allow access to the site).
- **OTHERWISE UNSAMPLEABLE** – depends on whether the inability to sample is a temporary or permanent condition.
- **NO PERMISSION FROM OWNER** - will be included in the next cycle, unless the owner is known to prohibit sampling on the property holding.

4.6 Well Additions to the Database

Private owners may have new wells that are not in the listframe. They may prefer for you to sample the newer well, but to maintain the integrity of the Network, the well that was selected from the listframe must be sampled. In this case, you and the owner can add the new well to next year’s listframe by completing the form in [Appendix A.5. Ground Water Well Addition Form](#).

V. Frequently Asked Questions

5.1 Streams, Rivers, and Canals

A. How far from the “Waters of the State” can the site be and still be considered connected to Waters of the State?

There is no set length, but as long as the streams or canals eventually connect to Waters of the State, then the entire system is considered a Water of the State. If the waterbody has a control structure, contact your Project Manager to assist in making the decision.

B. Is a stream or canal with no or little flow still sampleable?

If there are no interruptions in water in the feature, and it is at least 10 cm deep, the site is sampleable.

C. Does the WMS collect samples on Native American Tribal lands?

Flowing waters (rivers, streams, and canals) that begin outside of tribal territory but flow through tribal lands are still considered Waters of the State. In those cases, the WMS would sample if granted permission. If a lake site falls on tribal land, consult your Project Manager.

5.2 Small Lakes

A. If the shape of the lake looks natural, but it lies entirely on a single property owner's land, is it considered sampleable?

Yes, it is sampleable, although it would not be considered Waters of the State. A lake like this would need permission from the owner for access for sampling. This is one of the few exceptions to the rule that we do not sample waters that aren't Waters of the State. The rationale is that if the land were divided and sold to multiple owners, the lake would become a Water of the State.

B. If it is a natural lake but now receives storm water runoff, is it sampleable?

It depends on whether its primary function is as a lake or a stormwater feature. Many natural lakes in Florida receive some stormwater runoff, so this should not be cause for exclusion. However, lakes that are for permitted stormwater treatment should be excluded as "WRONG RESOURCE / NOT PART OF TARGET POPULATION – STORMWATER TREATMENT AREAS".

Lakes that are stormwater treatment areas and are also manmade should be excluded as "WRONG RESOURCE / NOT PART OF TARGET POPULATION – ARTIFICIALLY CREATED LAKE OTHER THAN ESTABLISHED IMPOUNDMENTS".

C. When field reconning a lake site, what are some ways that one can tell it is a natural lake?

- First, conduct office recon and use the Map Direct Imagery Slider to review historical aerials. In addition, review other historical aerials and topographic maps to determine if the lake is natural. Consider the following in recent aerials:
 1. Shape – no hard edges; many times, just portions of a lake are square, or rectangular. It is harder to determine when only a portion of the lake has been modified. When in doubt, speak with the Project Manager.
 2. Presence/absence of fountain(s), outfalls, and box culverts.
- Next, during field recon, note:
 1. Presence/absence of fountain(s), outfalls, and box culverts and fences (manmade stormwater ponds are typically fenced for safety reasons).

All of these offer clues, but are not the final determination of whether a “lake” is natural or not. Use office and field recon, as well as local knowledge, to shape your best professional judgment and always contact the Project Manager when there are questions.

VI. Appendix A. Helpful Forms and Documents

Appendix A.1. Status and Trend Networks Brochure

Document also available at <http://publicfiles.dep.state.fl.us/dear/DEARweb/WMS/status-trend-brochure.pdf>.

Results and Reporting

Data from the Status Network and Trend Network are included in Florida's biennial Integrated Water Quality 305(b)/303(d) Report to the U.S. Environmental Protection Agency. This report informs Congress and the public about state water quality conditions. The data also are summarized and presented in annual reports on the condition of Florida waters.

Results from previous years' monitoring are posted on the WMS web page:

<https://floridadep.gov/dear/watershed-monitoring-section>

For further information, please visit our website or call us at (850) 245-8080.

We are grateful to the citizens and public and private entities that provide us access to collect water quality data.

Florida Department of Environmental Protection
Watershed Monitoring Section
2600 Blair Stone Road
Mail Station 3560
Tallahassee, FL 32399-2400



2023



Water Quality Status and Trend Monitoring Networks



Division of Environmental Assessment and Restoration



Background

The Florida Department of Environmental Protection (DEP) is committed to protecting and conserving our state's surface water (rivers, streams, canals, and lakes) and groundwater (confined and unconfined aquifers) resources. Central to this goal is the collection of scientifically defensible data from Florida's surface and groundwaters. Measurements of chemical, physical, and biological water quality indicators are used to advise DEP and other agencies on the status of Florida's water quality.

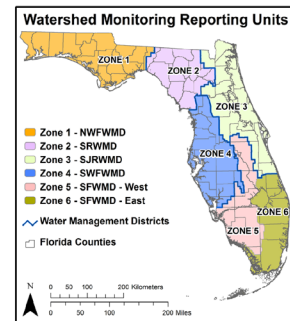


Collecting data at a Status Network groundwater monitoring well.

DEP's Watershed Monitoring Section (WMS) has developed two statewide networks to monitor Florida's ambient freshwater quality. The Status Network provides a snapshot of current water conditions in the state. The Trend Network measures long-term patterns in water quality.

Status Monitoring Network

The purpose of the Status Network is to broadly characterize Florida's water resources with known statistical confidence. A random-site monitoring design is used because it is not practical to sample every waterbody and well in Florida each year. In this type of design, water sampling sites are chosen in a random and unbiased manner from six geographic zones (see map). In each zone, samples are collected from rivers, streams, large lakes, small lakes, unconfined groundwater aquifers, and confined groundwater aquifers. Canals are sampled in peninsular Florida (zones 3-6).



Over 600 water samples are collected from all waterbody types statewide each year. All Status Network samples are analyzed at the DEP lab in Tallahassee. The data generated from these samples are used in statistical models to infer water quality condition. The Status Network addresses statewide and regional questions; it is not designed to evaluate or determine impairment of specific waterbodies or wells.

Trend Monitoring Network

The Trend Network is split into surface water and groundwater categories. Surface water resources include rivers, streams, canals, and spring runs. Groundwater resources include confined and unconfined aquifers and springs. All Trend Network samples are analyzed at the DEP lab in Tallahassee.

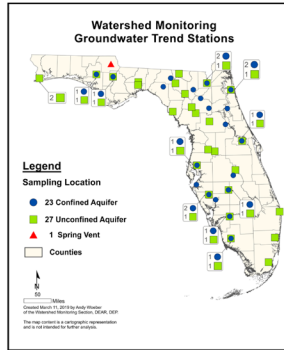


Trend Network sampler collecting river data.

Groundwater Trend Network

The Groundwater Trend Network (GT) began in 1986 and consists of 51 fixed sites. The sites are monitored to obtain chemical, microbiological, and field data from confined and unconfined aquifers. These groundwater resources are the predominate source of drinking water for the state. The data generated are used to assess trends in groundwater resources over time. GT sites are sampled by DEP, county, or water management district (WMD) staff.

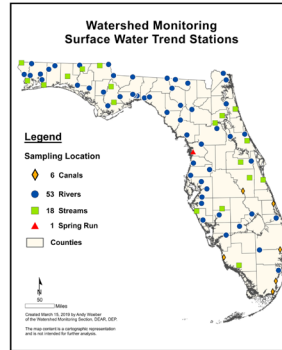
All GT sites are sampled every three months. Additionally, GT unconfined aquifer wells are visited monthly to collect field data.



Surface Water Trend Network

The Surface Water Trend Network (ST) began in 1998 and consists of 78 fixed sites. Most of the sites are located near the downstream end of a watershed. When possible, sites are placed at or near a flow gauging station. These sites enable DEP to collect water quality and water flow data at a point representative of the watershed's land use activities. In addition, some ST sites are located at or near the state boundary with Georgia and Alabama. These latter stations are used to measure the water quality of rivers and streams entering Florida.

Each ST site is sampled monthly by DEP or WMD staff.



Status and Trend Network Indicators

Indicator Group	Indicator	Sampled Resource
Field Indicators	Dissolved Oxygen, pH, Specific Conductance, Temperature	All
Field Indicators	Total Depth, Sample Depth, Secchi Depth	Surface Waters
Field Indicators	Depth to Water, Micro Land Use, Turbidity	Aquifers
Microbiology	Escherichia coli Total Coliform	Aquifers
Biology & Microbiology	Chlorophyll a, Escherichia coli	Surface Waters
Biological Assessment	Habitat Assessment	Status Rivers, Streams
Biological Assessment	Habitat Assessment, Stream Condition Index, Rapid Periphyton Survey, Linear Vegetation Survey	Appropriate Trend Rivers, Streams, Canals
Biological Assessment	Lake Vegetation Index	Lakes
Organics & Nutrients	Ammonia, Nitrate + Nitrite	All
Organics & Nutrients	Total Organic Carbon, Total Phosphorus	All
Organics & Nutrients	Total Kjeldahl Nitrogen	Surface Waters
Organics & Nutrients	Total Nitrogen	Aquifers
Organics & Nutrients	Orthophosphate	Trend Aquifers
Metals	Aluminum, Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Zinc	All + Lake Sediments
Metals	Barium, Thallium	All
Metals	Mercury	Lake Sediments
Major Ions	Calcium, Chloride, Fluoride, Magnesium, Potassium, Sodium, Sulfate	All
Physical Properties	Alkalinity, Hardness, Specific Conductance (Lab), True Color, Turbidity (Lab)	All
Physical Properties	Total Suspended Solids	Surface Waters
Physical Properties	Total Dissolved Solids	Aquifers

Appendix A.2. Permission Letter

Document also available at <https://publicfiles.dep.state.fl.us/dear/watershed%20monitoring/permission-forms/letter-legal-agreement/>.



FLORIDA DEPARTMENT OF Environmental Protection

Choose an item.
Choose an item.

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

Click here to enter a date.

Property Owner Name.

Owner Mailing Address.

City, State Zip Code

Dear Property Owner Name

In a cooperative effort, the Florida Department of Environmental Protection (DEP), Florida's five Water Management Districts and county governments are working together to effectively and efficiently monitor Florida's water resources. As part of this effort, DEP's Water Quality Assessment Program samples water resources to determine the condition of the state's ground water and surface water quality. The enclosed brochure provides more information about the Department's Monitoring Program. You can also visit the Department's Watershed Monitoring and Watershed Assessment websites for additional information at <https://floridadep.gov/dear/watershed-monitoring-section> and <https://floridadep.gov/dear/watershed-assessment-section>.

DEP would like to collect a sample at a on or near your property (see enclosed map). In order to access the site, we will need permission from you to enter your property. The samples will be collected by DEP staff. The condition of the water will be determined by the DEP laboratory in Tallahassee *at no cost to you*. The sampling is scheduled to take place:

January February March April May June
 July August September October November December

If access is granted, please let us know if the waterbody is dry or flooded to help us determine if the site is appropriate for sampling. If you do not have such information, we would like the opportunity to have our field staff visit the before the sampling event to make this determination.

If you agree to participate in this program, please complete and sign the attached form authorizing DEP staff to enter and cross your property. Return the completed form in the self-addressed, stamped envelope to the address listed below. We will contact you prior to visiting the site to confirm the proposed dates of the monitoring activities. There is also an option to decline permission by checking the appropriate box on the permission form and returning it in the enclosed envelope.

Results of the chemical condition from water samples collected at this site will be sent to you if you check the box on the permission form. Please do not hesitate to call me at Staff phone number if you have any questions. You can also email me at Staff email address.

Sincerely,

Signature

(Typed NAME)
(Typed TITLE)

Property Owner Name

Owner Mailing Address

City, State Zip Code

Permission to Enter Property

Please make any corrections needed and sign below.

1. The undersigned real property owner, **Owner Name** (“Undersigned”), hereby give(s) permission to the State of Florida Department of Environmental Protection (“DEP”) to enter the Undersigned’s property located at **Property Address** (“the property”).
2. This permission is specifically limited to the following activities which may be performed by DEP: **description of site activities. For example: Ingress and egress across the property to make observations and take samples**
3. This permission expires in 4 months unless extended by the **Owner Name** (“Undersigned”).
4. DEP employees are authorized to enter the property during normal business hours after confirming specific dates for site visits, and may also make arrangements to enter the property at other times with agreement from the Undersigned.
5. The Undersigned shall not be liable for any injury, damage or loss on the property suffered by DEP or its employees not caused by the negligence or intentional acts of the Undersigned, the Undersigned’s agents or employees.
6. DEP acknowledges and accepts its responsibility under applicable law (Section 768.28, Florida Statutes) for damages caused by the acts of its employees acting within the scope of their employment while on the property.

Accepted by the following authorized person:

Signature of Undersigned (Property Owner)

Telephone Number

Print Name

Date

Others who may be contacted for confirming specific dates for access:

Print Name

Print Name

Telephone Number

Telephone Number

Property Owner Name

Owner Mailing Address

City, State Zip Code

Permission declined: **NO** I do not wish for my waterbody to be sampled by DEP.

Accepted by the State of Florida Department of Environmental Protection by the following authorized agent:

Signature of DEP Representative

Print Name

Date

Additional Information to be completed by Property Owner:

Comments: (locked gates, new wells recently installed, dogs, stream or lake is dry, etc.)

I would like a copy of the analytical results from my waterbody.

YES **NO** Please mail a hard copy of the results to the following address:

YES **NO** Please email an electronic copy of the results to the following address:

Please send this form to:

Name

Florida Department of Environmental Protection

Choose an item.

Choose an item.

Email Address

Site Id

Appendix A.3. Site Tracking Spreadsheet

Random ID: <u>Z2-UA-6003</u>		Date Sampled: <input style="width: 150px;" type="text"/>	Initials: <input style="width: 150px;" type="text"/>		
Station ID	Station Name	County	Main Contact Name	Mailing Address	Location Address
	MAS2-11	Dixie	Jimmy Yellow	See Notes	Same
Permission Yes Written	Date Granted 10/4/2012 Rcv'd by JY	Grantor Jimmy Yellow	Phone Numbers: Home 352-123-1234		
Does owner want test results? YES		Yellow			
SAMPLING AGENCY: <u>DEP</u>		FLUWID: <u>None</u>	OWNER: <u>Mr. Jimmy Yellow</u>		
STATUS RANDOM ID: <u>Z2-UA-6003</u>		Well Type: <u>Domestic</u>	PROJECT: <u>Status</u>		
LAND SURFACE ELEV. (LSE): <u>36.5 ft</u>		CASING MATERIAL: <u>Steel</u>	TOTAL DEPTH: <u>65 ft.</u>		
MEASURING POINT ELEV. (MPE): <u>38.5 ft</u>		CASING DIAMETER: <u>4in.</u>	CASING DEPTH: <u>49 ft.</u>		
NOTES: <u>Jimmy Yellow 12345 SE 349 Hwy. Old Town 32680</u>					
Directions: From Tallahassee take: US 19 to Old Town. Turn right (south) onto CR 349. Drive 12.3 miles. The well is on your left/east side. (See maps)					
LAT / LONG: <u>29 26 12.000 83 02 02.000</u>			Gazetteer Page: <u>98 A3</u>		
Comments To Samplers: <u>The lat/long may be off. The well should be a 4" steel drinking water well. Need appt. Appt. time: Appt. date: Notes:</u>					

Appendix A.4. Field Recon Checklist

- GNSS unit and charger
- Recon notebook with field paperwork and maps
- Digital camera and charger
- Field phone and charger
- Gazetteer
- Laptop or Tablet Computer and charger
- Clipboard with...
 - Permission letters
 - Brochures
 - Envelopes
 - Business cards
- Pens
- Keys (if needed to access the site)
- Extra locks
- Bolt cutters
- Small set of tools
- Potentiometer (for Groundwater recon only)
- Boat and trailer (for Surface Water sites only)
- Safety equipment for boat, including personal flotation devices (pfd), extra paddles, large spotlight, etc. (for Surface Water sites only)

Appendix A.5. Ground Water Well Addition Form

Form also available at

<http://publicfiles.dep.state.fl.us/dear/watershed%20monitoring/Well-Addition-Form/>.



FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Shawn Hamilton
Secretary

WELL ADDITION FORM

The following information is required for a well to be listed as a candidate to be randomly sampled for Florida's Ground Water Quality Status Monitoring Network.

Please enter as much of the following information as possible to have your well considered for sampling. Completion of this form does not guarantee your well will be added to the database or sampled.

Owner Information

Owner's Name: _____

Owner's Address: _____

City: _____ State: _____ Zip Code: _____

Owner's Phone Number: (____) _____

Contact Person Information (if other than Owner)

Contact's Name: _____

Contact's Address: _____

City: _____ State: _____ Zip Code: _____

Contact's Phone Number: (____) _____

Well Information

County: _____ Construction Date: _____

Well Driller's Information:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Number: (____) _____

Well Information (Continued)

Water Management District Permit Number: _____

*Location: Latitude _____ Longitude _____ Datum/Source _____

Section-Township-Range: _____

Physical Address: _____

Aquifer: Confined Floridan Intermediate Biscayne
(Circle one) Sand & Gravel Unconfined Floridan Surficial Unknown

Total Well Depth (feet): _____ Total Casing Depth (feet): _____

Casing Diameter (inches): _____

Casing Material: Steel PVC Plastic Iron Rock Concrete None
(Circle one) Tile Brick Stainless Steel Galvanized Metal Unknown

Is the Well Screened? (Circle one) Yes No Don't Know

Screen Length (feet): _____

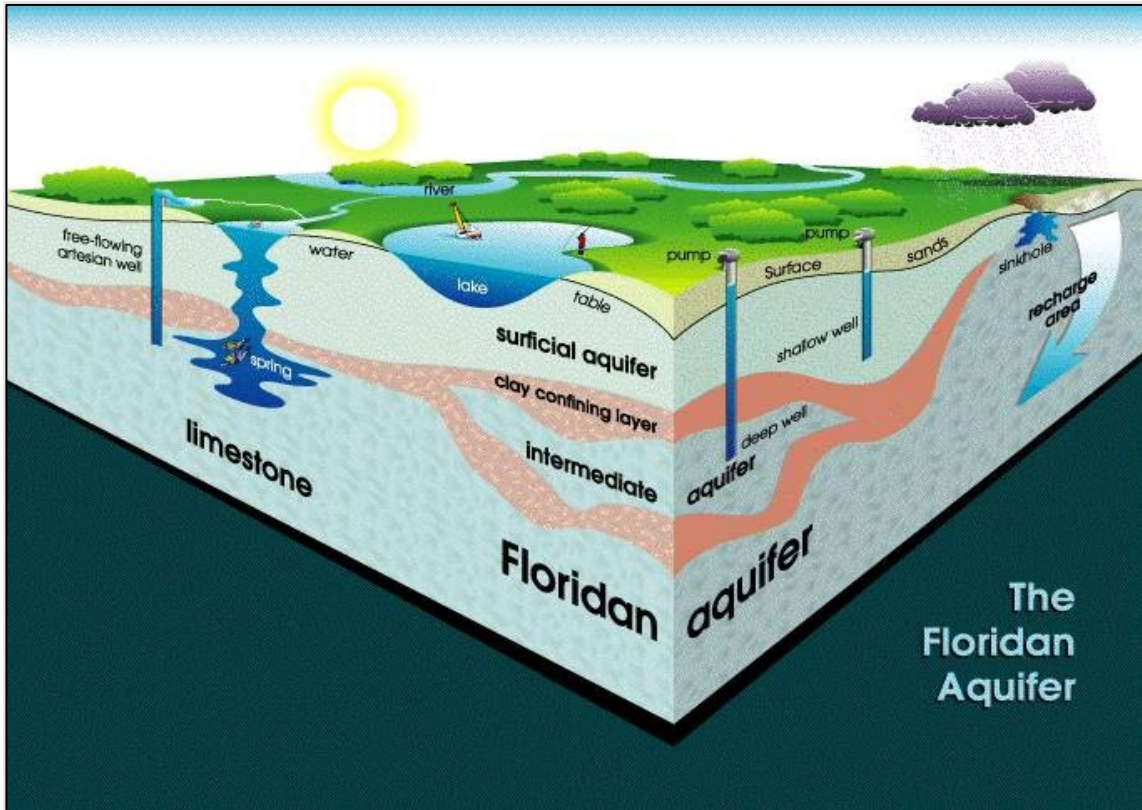
Well Use: Private Drinking Water Irrigation Agricultural Supply Monitoring
(Circle one) Public Drinking Water Industrial Supply Other

* Please draw a sketch map of the location of the well, roads, and other items such as gates. Also include any other comments.

Please return this form to:
Florida Department of Environmental Protection
Watershed Monitoring Section
2600 Blair Stone Road, MS 3560
Tallahassee, Florida 32399-2400
Phone (850) 245-8533; Fax (850) 245-7601

VII. Appendix B. Aquifers and Groundwater Programs

Appendix B.1. Aquifers



Appendix B.2. Well Programs and Networks

A. Background Network

The Background Network, established in the 1980s, was designed to provide baseline ground water data from wells deemed to have little potential for contamination. The wells for this network are comprised of water management district monitoring wells, private drinking water wells, and other wells with a low potential for contamination. Information on Background wells is stored in binders in the Watershed Monitoring Section.

B. VISA Network

The Very Intense Study Area (VISA) Network was established in the late 1980's and contained wells that were considered, based on land use, to have a high potential for contamination. The VISA Network wells were also comprised of water management district monitoring wells, private drinking water wells, and other wells having a high potential for contamination within a study area. Information on VISA wells is located in binders in the Watershed Monitoring Section.

C. HRS Network

The Human and Rehabilitative Services (HRS) Network, developed in the late 1980s and early 1990s, was designed to have at least 50 wells per county. These wells are documented with well completion reports submitted by the well drillers and kept at DEP and water management districts. Sampling was conducted by DER (Department of Environmental Regulation, now DEP) samplers, and analysis was performed at the HRS laboratory. A large number of the wells were never sampled and the current owner data, as with the other legacy networks, is long outdated.

D. WAFR

Wastewater Facility Regulation (WAFR) wells monitor the treatment and disposal of domestic wastewater (sanitary sewage), industrial wastewaters, and contaminated stormwater from domestic and industrial facilities. The Status Network uses a listframe that contains WAFR upgradient background wells. Information on the wells can be found in WAFR reports, the WAFR database, or by contacting the local DEP District office. In some cases, only facility personnel or staff contracted to conduct well monitoring will have current well information.

E. WACS

Water Assurance Compliance System (WACS) wells are located at solid waste facilities, such as landfills, or solid waste recycling stations. Information on these wells can be found in WACS reports, the WACS database, or by contacting the pertinent DEP District office. In some cases, only facility personnel or staff contracted to conduct well monitoring will have current well information.

F. USGS

United States Geological Survey (USGS) wells have been installed, maintained, and sampled for groundwater studies and surface water-groundwater interaction analyses. Data on these wells can be obtained by contacting the local USGS office.

G. Water Management District Well Networks

Each of the Water Management Districts (WMD) maintains a groundwater network to track groundwater levels and analyte values within its permitting area. The WMDs may also drill and maintain additional wells for special studies. Information on WMD well networks and individual wells can be located by contacting the appropriate WMD office.