

6.0 *Best Management Practices and Recommendations*

Improving and Maintaining a Reliable Inventory of the Number and Location of OSTDS in each County

There are a number of practices that facilitate the process of creating and maintaining an OSTDS inventory. First, reliable information is essential for the inventory to be useful to the CEHD and other agencies. One of the best ways to create a reliable inventory is to have an established set of standardized processes for creation and maintenance. It is important to ensure that public and private participants in the inventory development and maintenance understand their stake in the integrity of the inventory and thus implement the standardized processes. It is also important to be aware of OSTDS efforts both within Florida and nationally so as to learn from and communicate to others creating inventories.

Below are eight recommendations, which have been developed from this project's survey results and research findings for OSTDS inventory management, best practices, and problem resolution as identified from within Florida and nationally. Specifically, our recommendations address known problems that arise in creating and maintaining an OSTDS inventory. We suggest that instituting certain changes in regulations and communication might resolve a number of potential problems.

The recommendations are divided into three categories : Creation of an Inventory, Improving and Maintaining an Inventory, and Establishment of OSTDS Management System as it relates to this Statewide Inventory.

1. Creation of an Inventory : The methods used to create and maintain an inventory are the same regardless of the goals for the inventory.

In most cases in Florida and throughout the U.S., the initial impetus for investigating the number and location of OSTDS is to assess the human health and environmental impacts on coastal areas, surface water, groundwater and other environmentally sensitive resources. But it actually the foundation for a number of important functions. An actively maintained and easily accessible inventory of OSTDS is essential for:

- Improving the permitting of OSTDS
- Determining the contribution of OSTDS to environmental impacts
- Establishing maintenance and operating permits for OSTDS
- Locating utility service areas where FDEP permitted sewer service is provided
- Planning for land uses and infrastructure provision

The process of creating and maintaining an inventory is the same regardless of which of these recognized needs is paramount.

- 2. Creation of an Inventory : An inventory of OSTDS includes a list of parcels, their location and the type of wastewater treatment in use. It is not a list of OSTDS permits. The critical feature of any OSTDS inventory is to align with Property Appraiser parcel ID and to link the permits to the parcels.**

An inventory should include a designated form of wastewater treatment, including “no treatment necessary” such as for vacant, undeveloped parcels. It is as important to establish whether a parcel has an OSTDS as it is to be sure that it does not because it is served by a FDEP permitted sewer system. Each OSTDS requires a permit, but an OSTDS is located on a parcel. It is simpler to track the number and location of OSTDS and to update this information if the record is associated with the parcel as a unit of measurement, in addition to its association with a permit. Many other databases relevant to development are also based on parcels - the Property Appraiser’s tax roll, provision of sewer service, building permits and development review. Also, environmental measurements are geographically based and can be easily displayed with parcel maps of OSTDS.

Creating and maintaining the quality of an OSTDS inventory should coordinate with these other sources of parcel information. Again, if the fundamental unit of the inventory database is a parcel, this task is relatively simple to accomplish because the Property Appraiser must produce an annual tax roll that accounts for all changes in parcel information. Updating the inventory with the parcel list allows the CEHD to be assured that the appropriate wastewater treatment is being permitted.

The inventory database should interact with the permit database. The permits should contain parcel IDs as provided in the DOR tax roll and addresses sufficient to link to the DOR GIS parcel maps. The inventory database can be linked to the permit database to provide information on the number and types of permits for a given parcel. This allows a count of the actual total number of OSTDS, not only the total number of parcels with OSTDS.

Parcels without OSTDS should remain in the inventory (for the reasons given above) but need contain only information as to their source of wastewater treatment such as a DEP WWTF identification number. The FDEP maintains a list of their WWTF permits and contact information¹⁷. If the permit database is well maintained, the inventory database is also easily maintained.

This recommendation does not ignore the fact that latitude and longitudinal coordinates offer a valid means of locating, mapping, and tracking OSTDS. We, in fact, believe that the exact position of the OSTDS on each parcel should be included as part of the permit and added whenever feasible (see suggestions below). In some cases it is the only feasible form of reporting location, such as on

¹⁷ <http://www.dep.state.fl.us/water/wastewater/facinfo.htm>

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very large parcels (military installations, parks and recreational parcels, etc.). In addition, if the components of OSTDS are well defined, then the location of their parts as well as the number of complete systems (by function) can be provided using GPS and as part of the permit. Then this permit information can be linked to the parcel inventory database.

However, we also believe that the use of a global position data form should not be used to the exclusion of parcel information. For the foreseeable future, only parcel data exist ubiquitously with legal standing in all counties throughout the state. As such, we contend that the use of parcel information remains the most viable solution for OSTDS locations in Florida for the inventory.

The next four recommendations are concerned with how to improve and maintain the Statewide Inventory. The Inventory is, even at this point, an extraordinary collection of data, database and GIS capacity. Yet its' integrity and utility can be greatly enhanced if it is well maintained.

Once parcels are connected to a centralized sewer, it is highly unlikely they will return to using OSTDS for wastewater treatment. Also, many, perhaps as much as three quarters of the FDEP WWTF are very unlikely to ever change their service areas unless it is to become subsumed into a much larger facility, annual updates on their parcel service areas is unnecessary. This means that the initial data collection will suffice. The rest of the parcels in the inventory SHOULD be monitored through existing permitting and notification policies. Therefore, much of the maintenance of the Statewide Inventory is the timely, reliable and consistent of communication among the agencies and departments which regulate construction, growth management and environmental protection, about changes in the number and location of parcels and their wastewater treatment systems.

3. Improving and Maintaining an Inventory : Elimination of parcels with "unknown" wastewater treatment methods

No inventory is ever completely accurate. The more important objective is to accurately assign a wastewater treatment method to each parcel in order to quantify the "known unknowns". Once these are identified, a process for determining the actual wastewater treatment type can be established and executed. However, this will be a long-term process for any county. Charlotte County expects the inventory verification process to take five years. Alachua County spent several months attempting to create an accurate inventory and wastewater treatment type still remains uncertain on a few thousand parcels. In jurisdictions outside Florida where OSTDS inspection and management plans are legal requirements, the inventory process has generally taken several years to reach a 95% level of accuracy.

Elimination of "unknowns" requires some point of contact with the property owner and/or other government entities with jurisdiction over the parcel. Below are contact points and notification elements that have succeeded in reducing the

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number of parcels with “unknown” wastewater treatments. These also are processes that will maintain the integrity of the inventory in general.

- Require annual communication with FDEP WWTF permittees regarding the parcels to which they provide centralized sewer service (recognizing that their cooperation is crucial to achieving any such goal).
 - Communicate with development review boards and building permit entities to establish a process of notification when new parcels/new buildings are created.
 - Update OSTDS inventory annually through Property Appraiser tax rolls.
 - Provide the wastewater treatment type on the Property Appraiser public database access.
 - Require identification of parcel wastewater treatment type at the point of sale.
 - Require inspections of OSTDS on parcels at the point of sale.
Provide mapping of the location of the OSTDSs on the property using GPS.
 - Conduct an annual review of the OSTDS inventory by direct comparison to the previous year’s inventory.
 - Contact owners of parcels with “unknown” status directly.
 - Identify where information regarding wastewater treatment type is missing by highlighting data gaps on the Property Appraiser’s database and on maps provided to the public.
 - Instituting rebate and/or incentive programs for OSTDS replacements for parcels to identify potentially unknown systems.
4. **Improving and Maintaining an Inventory: Require consistent, timely and well-documented communication between Environmental Health FDEP and the FDEP WWTF permittees regarding the provision of sewer service.**

The FDEP and FDOH are the government entities that regulate wastewater treatment in Florida. In order to manage their respective functions effectively, both departments must assure clear communication among the staff charged with implementing these regulations. It is critical that the staffing personnel be thoroughly informed about the activities of their counterparts. Unfortunately, according to the CEHDs, information on the location of FDEP permitted sewer service availability and service expansion is spotty. Changes are inconsistently communicated by FDEP WWTF permittees to the CEHDs. Only 40% report that they are regularly notified by FDEP permitted sewer service providers about the availability of FDEP permitted sewer service, and only 19% actually have documentation of service locations on hand for their own reference. This means that in many counties, either the homeowner or contractor must provide

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evidence of OSTDS, or staff must make individual phone calls and check with the local institutional memory.

It may also appear that knowledge of new sewer connections or the existence of OSTDS on a parcel would be communicated through plumbing permits or other construction permits. However, this does not appear to happen consistently or reliably so that the CEHD can use this as knowledge about the state of wastewater treatment on any given parcel. The circumstances under which this does happen quite effectively is when the Environmental Health Department is housed in conjunction with the building permit functions of the larger local governments.

Even though regulations for notification exist, such as through abandonment permits, the notification process is not executed consistently enough for most CEHDs to confidently report that they know which parcels are served by FDEP permitted sewer lines. Information on older OSTDS located either within sewer franchise areas or on the fringe of a rapidly developing area is often inadequately reported. Reconciliation of abandonment permits with the active permits for a parcel is often sporadic. CEHDs regularly have incomplete permit databases and/or poor permitting information, thus correlating the parcel location is difficult.

The communication between FDEP WWTF permittees and County CEHDs should, at a minimum incorporate the following requirements:

- Consistent, continuous notification when parcels are converted from OSTDS to FDEP permitted sewer service
- Capacity to reconcile abandonment permits with parcels having previously permitted OSTDS
- Notification of changes in FDEP permitted sewer service area and installation of new sewer lines
- Provision of regularly updated maps, in GIS format when possible, with **parcel identification** where FDEP permitted sewer service is provided;
- Provision of accurate maps, in GIS format where possible, delineating locations where future FDEP permitted sewer service is expected to become available within the time frame of the utility's current franchise or planning horizon

5. Improving and Maintaining an Inventory: Coordination with other local government agencies that control development on a parcel.

The number and development status of parcels changes each day. Various local government agencies are involved in the authorization and recording of the

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subdivision and development of parcels. The county Property Appraiser is required by law to provide a certified tax roll of all parcels each year. This database provides a unique and stable identifier for each parcel and contains a large amount of information regarding development status. Parcels are “created” through the development review and the building permit process, altering the development status. Information about the wastewater treatment method on a parcel is an important component of assessing property values for taxation, development and sale.

As with effective communication with the FDEP as described above, there may appear to be sufficient regulation and policies in hand. However, the permitting processes such as rezoning or subdivision do not appear to effectively communicate information about wastewater treatment decisions to the CEHD.

In order to keep an OSTDS inventory up-to-date, communication among the Property Appraisers (PA), development review boards, building permit regulators and realtors is necessary or the inventory will quickly become inaccurate. The integrity of the most useful OSTDS inventory data is maintained through the following:

- Annual updates using the Property Appraisers tax roll
- Identification of wastewater treatment type in new subdivisions as part of the development review process
- Verification of wastewater treatment type that is installed as part of the building permit process
- Notification of the appropriate agency and the inventory at the point of sale of the wastewater treatment type that exists for the parcel and/or the structure being sold
- Sharing of information from the OSTDS inventory database with the Property Appraiser so that the wastewater treatment and any associated permits are available to the public on an ongoing basis

6. Improving and Maintaining an Inventory: Paper records – when to add them to the inventory and / or to make them electronically available.

The initial creation of an OSTDS inventory does not necessarily entail the entry of all existing paper permit data into an electronic format or the scanning of all permits. The Statewide Inventory provided by this project offers the initial version of the OSTDS inventory without, to date, any direct entry of data from paper records.

However, over twenty counties have records on legacy databases that have inconsistently linked with current parcel and GIS information, but could, potentially be enhanced by the addition of information from paper records.

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Eight counties have scanned most records from which key information could be extracted for the purposes of the inventory. The information content and number of years of paper recording varies widely among counties. Records from legacy databases supplied to this project have been included in the Statewide Inventory and reconciled with existing records in the EHDB database.

Turning the information in paper permits into an electronically accessible form requires staff time, equipment, software and funding to accomplish. However, if much of staff time is currently spent supplying routine permit information to the public, making this information available in a public electronic database, especially if it is shared with the Property Appraiser, may free up staff time and expertise for other responsibilities.

Each county should assess the sufficiency of the Statewide Inventory compared to the amount of permit information that was included and what remains available in paper form. The following considerations are recommended for records that are NOT in any form that allows electronic access:

- Records within the last twenty years should be the high priority.
- Records older than twenty years may not contain useful information because many of these OSTDS may have been issued permits for repairs, modifications or replacements since the initial installation. Some may have been abandoned.
- Records that contain clear locational information should be a high priority;
- Records that contain large format paper are more expensive to scan, are not essential to the inventory, but are essential to OSTDS management.
- Scanning paper records reduces physical storage requirements;
- Scanning records and providing them in a database accessible to the public can reduce staff time spent on routine public requests for information.
- For all scanned records, access also should be provided through the Property Appraisers database.

These last two recommendations concern the value of an inventory in establishing a management system for OSTDS. Education of the public AND government personnel, at all levels, is the key to using OSTDS as a cost effective and environmentally sound wastewater treatment system.

7. Establishing an OSTDS management system

A management system that seeks to track and maintain the functional capacity of OSTDS to treat wastewater relies upon an inventory. The management system can be instituted without a completely accurate inventory, as long as processes to

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eventually eliminate “unknown” parcels and to maintain the integrity of the inventory are established. In fact, a mandatory OSTDS management system, particularly one incorporating the requirement for an OSTDS operating permit, is an excellent way to quickly eliminate “unknown” parcels and to establish consistent communication among governmental and private entities involved in the sale and development of land.

The management system can target an environmentally sensitive area as a good reason for establishing , such systems, but the **process to create and maintain the inventory is the same everywhere**, regardless of environmental conditions on a given parcel or region.

- The Statewide Inventory provides the basis for creating a county inventory that is sufficient to establish an OSTDS management system.
- The Statewide Inventory should be improved using the recommendations provided herein.
- Residents must be informed of the value that having onsite wastewater treatment information as a component of development contributes to their own real estate holdings, their water resources and the local economy.

8. Educate the public, local governmental agencies and FDEP WWTF permittees.

The effectiveness of any OSTDS management system is fundamentally a product of the importance placed upon it by the public and other governmental entities involved in land development. Education on the positive environmental and fiscal impact that well sited and managed OSTDS can provide is essential to public understanding of the need for OSTDS inventory and management regimes.

Notifying property owners of parcels with unknown wastewater treatment methods is a straightforward means of obtaining up-to-date information. However, notifying thousands of property owners without a prior public discussion highlighting the value of maintaining an OSTDS inventory can potentially generate concern among the public. As Monroe County learned when over 16,000 property owners were notified as part of the Cesspool Elimination Program, requiring information without first educating people as to why this process is important can ignite a revolt. The Monroe County experience offers a valuable lesson that education must precede implementation of the inventory process.

Part of the education process is to clearly explain the goal of making the OSTDS inventory easily available in a context that provides value to the property owner. If the OSTDS inventory is effectively connected to the Property Appraiser database, it can provide information that buyers and sellers of property can use to assess the value of buildings and land. If the inventory is available in a GIS

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format, the map layers of OSTDS locations can be overlaid onto all sorts of other information: springsheds, coastal pollution problems, infrastructure expansion plans, well locations, etc.

An intriguing idea encountered in the research for this project was the suggestion from a staff member of the Washington State Department of Health to generate a parcel map, color coding the parcels to indicate the degree of data and management for OSTDS. The parcels with an “unknown” status of wastewater treatment type, the status designation that the CEHDs wish to eliminate, should be indicated in RED, the most attention grabbing color. The suggested color coding for such a parcel map is as follows:

- Undeveloped - white
- Parcels served by a FDEP permitted sewer system - blue
- OSTDS and established maintenance programs - green
- OSTDS lacking a maintenance program - yellow
- “Unknown” wastewater treatment method - red.

Such mapping can contribute invaluable visual assistance at public meetings on environmental and planning issues. Individuals will identify the color of their own parcel. Many people will not wish to be red and will offer to provide information about OSTDS on their parcels. They may be sufficiently motivated to establish a formal maintenance plan so that they can be “turned green”. This was a very successful method of increasing participation in OSTDS maintenance planning in Puget Sound.

Here are some suggestions culled from conversations with Florida CEHDs, environmental planners and other interested parties throughout the country:

- Require identification or inspection at point of sale, and provide the buyer with information on how the condition of the OSTDS affects property value.
- Provide easy access to parcel information about the wastewater treatment method through Property Appraiser’s database and online permit access.
- Collaborate with planning agencies and environmental impact projects to provide parcel maps indicating wastewater treatment type and allow these maps to be freely used on Web sites for established entities.
- Collaborate with large FDEP sewer service providers to obtain the location of OSTDS in the context of sewer provision and infrastructure planning.
- Encourage property owners to provide information by providing color-coded maps for public meetings that show parcels in RED for which information is needed on wastewater treatment type.

9. Most Important Overall Recommendations

The following recommendations appear multiple times throughout the report due to their fundamental importance to the creation and maintenance of an OSTDS inventory at the county or state level. Lists can become sophisticated structures given the availability of database software. But the value of the list is a function of the quality, source, and integrity of the information input and maintenance routines. These recommendations include ways to slowly but surely eliminate parcels with “unknown” wastewater treatment methods and to communicate with the public in order to accomplish this quickly and effectively.

- Maintain the OSTDS inventory independently, key it to the Property Appraiser parcel ID and link it to the EHDB.
- Maintain the parcel component of the inventory in concert with the Property Appraiser tax roll and provide unambiguous parcel and OSTDS location information in the EHDB.
- Use the Statewide Inventory as a standardized starting point for individual county inventories. Provide the CEHDs with the capacity to utilize the Statewide Inventory for management purposes and to provide feedback as to its accuracy.
- Initiate a program to scan and produce electronic files from those paper permit records that are essential to creating an effective inventory.
- Create a consistent manner for reporting changes in wastewater treatment method on parcels due to activities of the FDEP WWTF permittees, building permit regulators and development review boards. This will provide the best way to maintain the inventory.
- Develop points of contact with parcel owners and local environmental programs where applicable during development review and at the point of sale in order to ascertain the wastewater treatment method for each parcel.
- Provide direct access to and maps of the inventory results to the Property Appraiser, planning departments, real estate agents and any forum for public education.

7.0 *Refinement of the Inventory Database*

There are two scales at which the Inventory Database can be refined so as to greatly extend its robustness and utility. The first is the DOH need for assessing human and health impacts and threats that extend beyond political boundaries and are determined by geological and ecological phenomena. The second is for use by the County Environmental Directors to perform their duties.

In reviewing the survey results submitted by all 67 counties, several key issues emerged that provided invaluable insight into County needs, priorities, and operational concerns. To address these first, we found that 22 counties performed some form of estimation or inventory in order to:

- improve the permitting or management process of OSTDS,
- provide the capacity to participate in growth management and comprehensive planning within their respective counties and regionally to optimize their potential to inform and educate the public on environmental health issues thus reducing risks to public health and the environment
- assess the environmental impacts to water and other natural resources,
- respond in a timely to government mandates and requests, usually for one or more of the three reasons listed above.

These estimations and inventories were accomplished in different ways by each of the 22 counties. This is in part due to differences of need and intent but also because few counties have the resources to collect data and/or the expertise to create a quality controlled database and to perform the necessary statistical analysis. Most estimates merely provide an account of the number of permits for OSTDS, but unlike the statewide inventory provided herein, they not are reconciled with the number of improved parcels in the county that might require onsite wastewater treatment. This form of estimation may suffice as a response to a request for the number of OSTDS, but it does not provide for any further use.

Alachua and Charlotte Counties are currently addressing their need for location and quantification of OSTDS. In Duval County, the Water and Sewer Authority has pursued a county level inventory. For these three counties, developing an adequate listing of sewerred and septic parcels has taken a year or more.

Additional effort is indicated for these three counties to address various refinements consistent with their respective priorities. Access to the statewide inventory utilizes modeling, data reconciliation, and county level GIS mapping as described in detail throughout this report. It affords each county a means to move beyond counting of permits for inventory creation. It enables each county to address management needs for planning and prioritization to improve their existing inventories.

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Table 7-1: Reasons listed by CEHD for performing an estimation or inventory.

County	Improvement of Permitting or Management Process	Growth Management	Environmental Impacts	Mandate from Local, State or Federal Govt.
Total	13	9	13	8
Alachua	Y	Y	Y	
Brevard	Y			Y
Calhoun	Y			
Charlotte	Y		Y	
Columbia	Y			
Miami Dade	Y			
Duval		Y	Y	
Flagler	Y	Y	Y	
Hardee			Y	Y
Hernando				Y
Hillsborough			Y	
Leon		Y	Y	
Martin			Y	Y
Monroe		Y	Y	Y
Okaloosa	Y	Y	Y	
Orange	Y	Y	Y	
Santa Rosa				Y
Sarasota				Y
St Lucie	Y	Y	Y	
Sumter	Y	Y		
Suwannee	Y			
Wakulla	Y		Y	Y

A number of counties clearly anticipate the need to expand their countywide management plans for OSTDS to include onsite inspection, either due to an impetus at the local level or in anticipation of regional or state directives or mandates. All of the EPA management programs rely on an actual inventory, not a count of permits. The distinction of an inventory developed solely through a count of existing permits and a comprehensive inventory is described in earlier chapters. Counties have self-identified the enormity of task and need to assess the extent to which their paper permit records need to be added to the existing EHDB. Methods for reconciling abandonment permits and efficiently identifying where and when a parcel changes from OSTDS to sewer are needed. Therefore, CEHDs are aware that they need an inventory and a clear priority list to pinpoint areas where OSTDS “probably” exist but for which there is no easily

accessible permit data. Their capacity and resources necessary to accomplish these tasks are limited; therefore few counties have made the attempt.

7.1 *Refinement of the Inventory Database*

Any information derived from a database is only as useful as the data itself. As discussed earlier, a robust and viable OSTDS inventory is both dynamic and flexible. Specifically, the statewide inventory is derived from multiple sources, each with elements driving our recommendations for refinement. We believe that information provided herein will illuminate the need to supply additional or expanded data in future endeavors. Counties and other stakeholders, upon review of information from this report, should be able to identify any missing, incorrect, or misleading information. To ensure that refinement efforts yield the desired outcomes, we submit the following recommendations that reflect our proposed data collection and model refinement procedures.

Data Collection

1. Provide the current synopsis of parcel wastewater treatments and maps to interested CEHDs for feedback on the assumptions and estimations made for this inventory, modeling and mapping. Provide maps in a format that can be enlarged on screen for detailed examination. A visit to each county and thorough discussion of the maps and database would greatly improve their content and utility to the CEHD.
2. Target those large WWTF that to date have failed to provide parcel data on their service areas. There are 130 municipal and/or large WWTF that have never responded to requests for parcel information. Approximately are ten additional retail customers of large regional WWTF. These entities were unknown through state sources and not compelled to participate. Although identified and contacted, they have not yet furnished information. Though our efforts to identify and develop a working relationship with these sources, we believe that their participation is probable and realistic. If data from these sources alone were obtained, the inventory would contain parcel information for 96% of the total effluent permitting capacity of FDEP WWTF, serving approximately 61% of the population of Florida.

During the course of this project, researchers have found direct contact with previously nonresponsive WWTF through emails and phone calls to be effective in data gathering (this approach enabled the us to garner over 2 million parcels). Such targeted contacts with the remaining large and municipal WWTF could yield a 95% response rate and identify an additional half million sewered parcels.

3. Target small municipalities, especially in the rural counties of groups A and B. Some of these are smaller than the 0.5 MGD limit and may have difficulty providing data in an electronic format. Data entry or OCR conversion may be necessary. When these rural WWTF provide parcel lists, the identification of

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OSTDS will be statistically reliable due to the process of elimination. This phenomenon is unique to rural areas with highly defined WWTF service areas.

4. Identify parcel of WWTF that serve a very limited number of parcels using other resources. There are many hundreds of very small WWTF that provide wastewater treatment to a recreational vehicle park, an apartment building, a restaurant or school. In addition, the address of the WWTF, provided by the FDEP permittee contact database, is often the same address as the served parcel. This can be identified and verified by “hand”, using available web based information and phone calls. This is time consuming but will allow identification of small sewered areas in what is usually a large expanse of OSTDS.
5. As we worked to identify unmatched records in the EHDB, we found when linking the EHDB permitted systems to the DOR tax roll that not all records were successfully linked. We attempted to maximize the success rate by utilizing various string queries; however there were several counties with severely deficient data. To resolve this matter, it would be advantageous to perform more manual approaches in order to yield higher match rates for these counties. Where DOR data is deficient, it may be crucial to acquire alternative data sources to supplement the tax roll - E911 addresses or other high accuracy data.

Model Refinement

1. Some WWTF may never be forthcoming with provider data. In these cases the relationship between the permitted capacity of the WWTF and the number of parcels that the facility could potentially serve can be modeled through existing information in the database. Use this relationship and the physical location of the WWTF to estimate the parcels served by the facility. This will work well for those WWTF constructed to serve specific developments as such facilities are not apt to expand.
2. Customize models for each county by including local regulatory limits on the capacity for developments to use OSTDS for wastewater treatment. Florida has certain longstanding requirements that apply statewide. Local jurisdictions can also implement more stringent rules. Such regulations usually relate directly to land use density and intensity allowances for OSTDS. These rules can be captured in a model by a decision tree.
3. Separately model residential and nonresidential land uses. In many instances, nonresidential land uses have clearly distinct characteristics if they are sewered or using OSTDS. The distinctions among residential parcels are less obvious. Separating the two groups would provide better models that account for the unique differences among counties in their pattern of provision of wastewater treatment to residences.

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4. Adjust for large difference in the known number of sewer and OSTDS parcels using a form of Bayesian analysis. Bayesian analysis is a method of providing a weighting to the final result when it is known that there are actually many more OSTDS or sewer parcels in a county or that the data collected is heavily biased towards one treatment form.
5. Even when WWTF provide parcel data, not all parcels can be linked to the GIS database. Therefore, modeling should be done even when all WWTF for a given county have supplied service area data. Municipal sewer service areas commonly have scattered OSTDS still in use. These parcels often fail to link up in OSTDS permit databases. Models tend to assume that any improved parcel within a sewer area is also sewer. These WWTF should be modeled individually by comparing the number of parcel records provided, the number linked to the GIS maps, the capacity of WWTF, the jurisdiction-specific regulations relating to the retention of OSTDS when sewer is available, and septic system use relative to land use regulations. Only a small number of WWTF in certain counties require such treatment.

This expanded data collection and model refinement will yield more reliable estimates of the number and location of OSTDS statewide. Such a product will provide each CEHD a specific listing of parcels for which OSTDS information has been estimated. They can then prioritize where to apply resources to locate OSTDS and ensure compliance with local and state regulations.

More data collection and modeling will yield significantly more reliable estimations. Reaching a higher level of data and model exploration should be possible to achieve in a twelve-month period using the above steps.

7.2 *Areas of Future Study*

The second scale is to provide cross-jurisdictional geographically explicit information about the number and distribution of OSTDS in relationship to other geographically displayed information. A statewide inventory based on county specific data collection methods and estimations that allow for direct comparison of reliability would enhance the assessment of impacts from OSTDS. As the measure of reliability of estimation is captured directly in the probability that any given parcel has an OSTDS, that reliability can be factored directly into any geographical accounting done with the Inventory Database. These probabilities can be mapped by color coding to identify areas of low or high quality information.

1. Environmental data on springsheds (as in Wakulla and Wekiva, the Ichetucknee), coastal seepage zones, areas threatened by storm surge can be overlaid onto the Inventory maps and the impact of OSTDS on these features quantified. The Wekiva Study Area and the Wakulla karst plain offer opportunities for the first comparisons because substantial work has been done in estimating the location and number of OSTDS. Through such calibration,

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other defined sensitive areas can be assessed for the number of OSTDS located there. Assessments for flood plains (FEMA maps) and potential storm surge areas would allow DOH and local CEHD to take preventative action to mitigate harm to human health and to initiate OSTDS removal or replacement in these high risk areas.

2. Properly sited and maintained OSTDS provide sanitary wastewater treatment, but conventional systems and drain fields may not provide adequate denitrification, potentially contributing to nonpoint source nutrient pollution. With a thorough inventory, the relative contribution of OSTDS to nutrient pollution can be more accurately assessed in a geographical manner. It would also be possible to link details of permits to parcels and improve assessments of impact base on age, performance and local siting conditions. In addition, as nitrogen reducing systems are installed, their effectiveness in reducing the nitrogen load from OSTDS can be evaluated.
3. Water quality impacts from OSTDS can affect the resources of a neighboring county. A sound inventory and estimation can identify pollution sources and provide evidence that is unbiased by the capacity of the given jurisdiction to perform an analysis.
4. Costs and benefits of infrastructure expansions could be assessed more adequately with a reliable OSTDS inventory. Comprehensive planning for future land use designations can be facilitated if the locations of existing OSTDS are identifiable and identification of where it should be used can be done. With a statistically qualified inventory, allows the use of OSTDS as a permanent, planned component wastewater treatment. OSTDS can be effectively for development in areas where low density should be retained due to land use efficiencies or environmental sensitivity,
5. The capacity exists to identify the wastewater treatment method on improved parcels and also on platted and unplatted parcels currently undeveloped. With improvement in the base data (as described in Chapter 7.1) the Inventory Database can be employed to predict the location and estimate of the future number of OSTDS or sewerred parcels for a given location. This would be helpful to comprehensive planning and growth management, as well as in assessing environmental impacts.
6. The inventory can be maintained in a variety of ways. The most important is the enhanced use of existing regulation for communication among the wastewater providers within a county. In addition, a third party could provide annual “checkups” of the Inventory when the new DOR tax roll is available. The existing Statewide Inventory includes an extensive contact database for greater ease of updating sewer parcel information from very large WWTFs.
7. This is the first statewide OSTDS inventory to be attempted in the US, though legislation is now emerging to accomplish this effort in other states. With the

proposed improvements in the baseline data, Florida will become a leader in exploring methods for creating a database that 1) provides consistent data to establish uniformity in OSTDS management, 2) improves assessment of environmental impacts from OSTDS nutrient loading, 3) helps in mitigating harmful effects from OSTDS on human health and welfare due to catastrophic weather, and 4) improves growth management through knowledge of the distribution of wastewater treatment methods.

7.3 *Future Integration with Existing Databases*

Through this project, the ability to obtain information on wastewater treatment methods from a range of sources has been established. Such information can now be incorporated into a database, its quality assessed and then linked to GIS parcel information. The information can be used to model the parcels for which a wastewater treatment method has previously not been identified. This project has successfully identified 6.6 million improved parcels, 2 million sewer parcels, and nearly 650,000 parcels with OSTDS. The project has successfully developed models to estimate the wastewater treatment method on the remaining improved parcels and via that model, provide a direct measure of the probability (re. reliability) of that estimate. The project has mapped all improved parcels, known sewer and OSTDS parcels and estimated many for each category of wastewater treatment. Much has been accomplished in six months.

This is the first statewide inventory of the number and location of OSTDS in the United States. The Florida DOH now possesses a very important tool with which to carry out its mission of protecting public health and environment.

8.0 *Appendix – Tables and Figures not in text*

8.1 **Legends for Tables and Figures in the Appendix**

Table 3-1 : Years of OSTDS Permit Data for Existing Electronic Databases as reported by CEHD

Description of the years of permit records in three categories of electronic databases: EHDB, CENTRAX, and legacy databases. A legacy database is any database that has permit records from past years which has not be integrated into the database currently in use, usually EHDB. The dates are truncated to the year reported by the CEHDs. The summary is the maximum range of all databases combined but does not yet reflect whether the legacy data is or is not useful or usable. The Access column refers to whether or not the database has been provided for integration into the Statewide Inventory. These legacy databases are being actively sought as they potentially contain valuable information. This table will be updated for the final version of this report.

Table 3-3 : FDEP Wastewater Treatment Facilities, Number and Capacity by County

This table contains information on the wastewater treatment facilities (WWTF) in each county. WWTF supply centralized sewer services to developed parcels and thus play an important role in determining which parcels have OSTDS. The larger facilities are often public or municipal facilities, but can also be operated by private authorities. They provide the majority of the effluent treatment and hence serve the largest number of parcels. The smaller facilities are more numerous, and do not often expand. Municipalities may also provide centralized sewer services which can be operated by a public or private entity. Municipalities are also included in the columns for Public and Private WWTF. This information is important for understanding the different challenges counties face in creating and maintaining an OSTDS inventory.

- # WWTF : Number of domestic wastewater treatment facilities
- Total MGD : WWTF permitted effluent capacity in millions of gallon per day
- Municipal WWTF : Number of WWTF owned or operated for municipalities
- Public WWTF : Number of WWTF owned by a public entity
- Private WWTF : Number of WWTF owned by a private entity
- Public % of Total MGD : % of Total MGD that are permitted to Public WWTF
- Large WWTF : Number of WWTF with capacity of ≥ 0.5 MGD
- Large WWTF % of Total MGD : % of Total MGD permitted to Large WWTF
- Small WWTF : Number of WWTF with capacity of < 0.5 MGD

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- Small WWTF % of Total MGD : % of Total MGD permitted to Small WWTF

Table 3-7 : Description of County Estimations of Number of OSTDS

Twenty-two counties that reported performing or planning to perform an inventory or estimate of OSTDS. The information presented is taken directly from the survey responses and edited only for formatting purposes. The Method and Reason columns are the items chosen as “very important” or “somewhat important”. Onsite verification as a method of performing the inventory and the establishment of an RME as a reason for doing the inventory are highlighted.

Table 4-4: Response from FDEP Permitted Wastewater Treatment Facilities (WWTF) and the number of Sewered Parcels in Florida Counties

- # of Parcels
- # of Improved parcels
- Total number of WWTF
- Total permitting capacity in million gallons per day (MGD)
- Percent of WWTF that provided some form of data on sewer service
- Percent of total MGD the reporting WWTFs represent
- Number of sewer parcels collected by March
- Final number of known sewer parcels for the Statewide Inventory

Table 4-5: Number of OSTDS Permits in Databases and Number of Parcels with OSTDS in Florida Counties

- # of Parcels
- # of Improved parcels
- Active permits found on EHDB
- Closed permits found on EHDB
- EHD permits that were successfully linked to parcels by March. There can be more than one permit/parcel
- Final Number of unique septic parcels identified by at least one EHDB permit
- Number of permits from a CEHD database (not EHDB)
- Final Number of unique septic parcels identified by at least one CEHD database permit
- Final total number of known OSTDS parcels for the Statewide Inventory

Table 4-6 : Number of Known and Estimated Parcels with OSTDS or Sewer

- # of Parcels
- # of Improved parcels
- Total known sewer parcels for the Statewide Inventory
- Estimated number of sewer parcels using Inventory models
- Total number of sewer parcels, sum of known and estimated
- Total known OSTDS parcels for the Statewide Inventory

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- Estimated number of OSTDS parcels using Inventory models
- Number of parcels for which wastewater treatment cannot be estimated
- Total number of OSTDS parcels, sum of known and estimated

Table 4-7: Comparison of The Statewide Inventory estimate of the number of OSTDS with other estimates for Florida Counties

- # of Improved parcels
- Total improved parcels with sewer , sum of known and estimated
- Total improved parcels with OSTDS, sum of known and estimated
- DOH estimate of OSTDS, July 1, 2008
- CEHD estimate of OSTDS as provided from the Inventory survey
- Total improved parcels – total improved parcels with sewer

These three values include all identified OSTDS parcels, including currently vacant ones and all estimated OSTDS parcel

- Low value estimate of OSTDS, probability threshold =0.75
- Mid value estimate of OSTDS, probability threshold = 0.50
- High value estimate of OSTDS, probability threshold = 0.25

Table 4-8 : Grouping of Counties by Characteristics that affect Estimations and and Measures of Reliability

- Number of large (MGD ≥ 0.5)
- Number of small WWTF (MGD < 0.5)
- Number of improved parcels
- Number of known sewer parcels
- Number of known OSTDS parcels
- Number of variables in categories of self, neighbor and group that were retained in the final model

Measures of model quality

- % of parcels with known wastewater treatments that the model correctly predicted
- % of parcels known to be OSTDS that the model predicted to be sewer
- Range from low to high estimate of OSTDS (From Table 4-7) as a percentage of the mid value estimate (standardized for comparison)
- Descriptive label of model quality

Table 4-9: Details of Modeling Results

Variables used for each county model indicated with “Y”

- Percent of parcels in each taxing authority category with OSTDS
- Percent of parcels in each land use category with OSTDS
- Percent of parcels in each neighborhood code with OSTDS (DOR field)
- Percent of parcels in lot size class categories with OSTDS
- Year structure built (DOR field)
- Number of buildings on parcel (DOR field)
- Total square feet of structures on parcel (DOR field)

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- Parcel size in acres (DOR field)
- AIC – Akaike’s information criterion, a measure of the reduction in model explanatory power when adding or deleting independent variables or interaction terms
- Number of parcels (with known wastewater treatment) used in the model
- Percent of total parcels that the model correctly classified
- Percent of total OSTDS parcels that the model incorrectly classified
- Number of vacant parcels
- Number of estimated OSTDS parcels
- Number of estimated sewer parcels
- Number of parcels for which an estimation cannot be calculated
- Number of known OSTDS parcels
- Number of known sewer parcels
- Number of known sewer parcels that are not improved (vacant)
- Number of known OSTDS parcels that are not improved (vacant)
- Number of known improved OSTDS parcels
- Number of known improved sewer parcels
- Total number of OSTDS when probability threshold = 0.25
- Total number of OSTDS when probability threshold = 0.50
- Total number of OSTDS when probability threshold = 0.75
- Range from high to low estimate of OSTDS as a percentage of the mid value estimate
- Total number of parcels for which a wastewater treatment was estimated
- Total number of parcels for which a wastewater treatment was known
- Total number of improved parcels with OSTDS
- Total number of improved parcels

8.2 List of Appendix Contents

Appendix: Database Information which contains diagrams of database design, database views and recommendations for refinement of the Statewide Inventory Database.

- Total number of OSTDS parcel by DOH : cumulative number of permits
- CEHD estimate as reported from the Inventory questionnaire
- Number of improved parcels minus number of known sewer parcels

Appendix : Information provided on the DVD

Folder : Survey of County EHDs

The survey provide to each County Environmental Health Director is provided only in an electronic format because of its size (300+ pages). The questions are in a separate file. The answers are provided in two formats. The first is as a spreadsheet which contains all responses to all questions. The second is a series of pdf, labeled according to the questions and responses that are in each one. They are divided into topical groups as described in the survey. For instance,

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SurveyAnswers_4to12.pdf contains the questions and responses to questions 4 to 12 which all relate to the EHDB. There are a total of 12 files in this folder.

Folder : Model Results

This folder contains a file of the raw results as generated by software written for the Inventory analysis. Each county is done separately and are presented in county ID order (alphabetical).

Folder : DraftFinalReport_June042009

This report include Database Information from the Appendix.