

Statewide Inventory of Onsite Sewage Treatment and Disposal Systems in Florida
Draft Report – June 1, 2009

Executive Summary

EarthSTEPS and GlobalMind of Tallahassee, Florida are pleased to provide the Florida Department of Health (FDOH), Division of Environmental Health (EHD), and the Bureau of Onsite Sewage Programs this Executive Report describing the Statewide Inventory of Onsite Sewage Treatment and Disposal Systems (OSTDS) in Florida. It serves as a brief overview of our project approach, methodology, resources, scope, and findings. Detailed information regarding each project task with accompanying tables and maps is found in the complete report.

To accomplish the inventory process, a database was constructed to facilitate the collection of existing onsite wastewater treatment systems (OTDS). This enabled the FDOH and County Environmental Health Directors a means to provide information on the number and location of OSTDS in every county in Florida.

Information collected through this effort serves as the baseline for all aspects of OSTDS management. It provides explicit OSTDS information and models for those charged with comprehensive planning and the growth management of urban infrastructure so that natural resources and human health can be protected and sustained.

Findings:

1. The project database utilized the Department of Revenue 2008 tax roll and Geographic Information Systems (GIS) information of nearly 9 million parcels. The development status of each parcel was determined using fields from the Florida Department of Revenue (DOR) data and resulted in 6,608,050 improved parcels.
2. Our team contacted all 2000 FDEP domestic wastewater treatment facilities (WWTF) and subsequently obtained data on the location of sewer parcels from approximately half of them. We accepted information in any electronic format that could be provided by the WWTF owners or managers. The results represent about 80% of the total permitted capacity of all WWTF. We identified 2,056,129 sewer parcels. Some vacant parcels were included in this accounting.
3. Using the permit data from the Environmental Health Database and from all other county permit databases that we located, we identified 564,026 parcels known to have an OSTDS. In addition from older and local county databases we identified 85,731 OSTDS parcels. This totals to 649,757 parcels known to have OSTDS. Some vacant parcels are included in this accounting.
4. We garnered other useful information on OSTDS using the linked permits from the EHDB and locally identified county databases. All of the information, including the source of identifiers was collected into a documented, relational database. The database includes field computed in subsequent analyses described below.

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5. The result of this data collection was approximately 4 million improved parcels for which no wastewater treatment method was known. In order to assign a treatment to these parcels we developed a logistic regression model based on the over 2.5 million parcels with known wastewater treatment. The model descriptors were: characteristics of the parcels themselves (lot size, year built, etc.), characteristics of their nearest neighbor parcels (mean lot size, proportion with OSTDS) and the proportion of OSTDS for the category of land use, taxing authority and lot size category to which the parcel belonged.
6. We computed models for each county individually. We determined the most statistically reliable combinations of descriptors for the prediction of the location of known OSTDS using three main indicators: statistical significance (Z score) of each descriptor in combination with others, the proportion of parcels correctly classified to their known wastewater treatment method and the lowest number of incorrect classification of known OSTDS parcels as sewerred.
7. The parameters of the individual county models were used to compute the probability of OSTDSs on all of the improved parcels for which independent information of wastewater method was not available. A parcel was classified as having an OSTDS if the probability from the model was ≥ 0.5 (50%). The total number of OSTDS for each county was computed as the sum of those classified by estimation and the known. Using different probability levels for parcel classification provided a range of predicted number of OSTDS. A higher estimate was computed using a probability of 0.25 and a lower estimate was computed using a probability of 0.75. The range of values, from high to low, was expressed as a percentage of the midpoint in order to more readily compare model reliability among the counties.
8. This Statewide Inventory estimates that there are 3,496,120 parcels with OSTDS in Florida (range: 3,317,152 to 3,652,276). The estimated range is 9.6% of the midpoint. This includes parcels that are currently (temporarily) vacant. The Inventory estimate is 3,446,132 improved parcels with OSTDS. There are estimated to be 3,129,708 sewerred parcels. Using these estimates, 52% of the improved parcels are using OSTDS as a wastewater treatment method. The estimates for each county and the reliability of these estimates are discussed.
9. Two maps are provided for each county showing 1) the location of known sewer, known OSTDS and improved parcels that require an estimation of wastewater method and 2) known and estimated sewer, known and estimated OSTDS and any remaining improved undesignated parcels for which an estimate could not be done. The utility of these maps is immediately obvious.
10. A brief review of other locales within the United States and in Florida that have also estimated the number and location of OSTDS is provided. A survey of all 67 County Environmental Health Directors was done to ascertain their state of knowledge of the number and location of OSTDS in their county. As a result, a detailed methodology for proceeding with an inventory and recommendations about how to maintain an inventory is also provided. We provide

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recommendations for further enhancement of the Statewide Inventory database and refinements to the modeling and estimation process.

11. In summary, the efforts of EarthSTEPS and GlobalMind provide a database that provides: 1) an inventory consisting of the number and location of existing OSTDS; 2) statistically based qualification of the OSTD inventory; 3) a foundation for the investigation of regional and local impacts of existing systems to identify where mitigation is needed; 4) a framework for the appropriate location of future development using OSTDS for the protection of public health; and recommendation for maintaining and updating resulting information resulting for currently contract tasks.

1.0 Introduction and Description of Report Contents

This report makes up a portion of the Statewide Inventory of Onsite Sewage Treatment and Disposal Systems (OSTDS) in Florida as defined by the Florida Department of Health (FDOH), Division of Environmental Health (EHD), and the Bureau of Onsite Sewage Programs. The report was prepared by EarthSTEPS, LLC and GlobalMind of Tallahassee, Florida.

Chapter 2 describes several salient experiences from regions, states and communities in the United States. These entities have concluded the environmental impact from OSTDS to be serious enough to warrant the implementation of more effective management methods. This section includes examples in Florida.

Chapter 3 is a discussion of the results of a questionnaire that was distributed to every County Environmental Health Directors (CEHD) to ascertain the current state of knowledge regarding the number and location of OSTDS in each Florida county and to learn of any estimates and inventories that had been done. Brief descriptions of estimations of OSTDS done for Wekiva and Wakulla spring sheds are also included.

Chapter 4 describes the Statewide Inventory including the database contents and methods that were used to create it and modeling methodology and results. Modeling was used to provide a probability of the existence of an OSTDS on developed parcels for which we did not obtain information from other sources such as the Florida Department of Environmental Protection (FDEP) permitted wastewater treatment facilities (WWTF), CEHD databases or EHDB. The estimated total number of OSTDS and comparison of this number of other estimations is provided in the final part of Section 4.

Chapter 5 contains the steps to take to perform an inventory which were derived from the survey and extensive conversations with Florida CEHD and staff from equivalent agencies in other states. A summary of the current state of knowledge of the number and location of OSTDS in relationship to the results from the Statewide Inventory modeling and the CEHD survey is provided for counties.

Chapter 6 contains recommendations for management of an inventory and maintaining its integrity. Chapter 7 provides recommendations for refinement of the database and areas of future study.

The Appendices contain table and figures with legends that are not directly incorporated in the text and information related to database structure and content.

A DVD with the questionnaire and responses from CEHD and a copy of this report is included with this final draft.

2.0 *The Inventory of OSTDS: Experiences from around the United States*

In 1997, the U.S. Environmental Protection Agency publicly recognized “onsite systems ...as potentially viable, low-cost, long-term, decentralized approaches to wastewater treatment if they are planned, designed, installed, operated, and maintained properly.”

Approximately 25 percent of the U.S. population and one third of all new development utilize onsite systems for wastewater treatment¹. These systems were once thought to provide temporary treatment solutions, placeholders until sanitary sewage treatment infrastructure was built. OSTDS are becoming an increasingly important form of wastewater treatment in part due the rapid development that has occurred more quickly than urban infrastructure can be constructed. Development located far from existing urban infrastructure is also dependent on OSTDS. While the provision of centralized sewer service has never been an option for many rural and exurban areas, the costs of centralized sewer service, even for large, dense communities, have grown tremendously¹. It has also been recognized that centralized sewer systems may not always provide the highest level of treatment, spills can impair nearby water resources and treatment systems can become significant point-source polluters. It is now evident that onsite systems *can* provide a permanent and effective wastewater treatment that adequately protects public health and surface and ground water quality. As the EPA states, OSFDS are effective if they are properly designed, sited, constructed, operated and maintained.

When OSTDS are not properly sited or maintained, operational and functional failures occur. The U.S. Census (2000) reports that 10 percent of onsite systems fail outright¹. The most commonly reported failure is an operational failure, when a toilet fails to flush, the pipes back up or the drain field becomes soggy and begins to emit an unpleasant odor. Functional failure, when the OSTDS does not provide sufficient treatment of effluent to remove pathogens, probably occurs more often, but is not reported or repaired until it creates a clear public nuisance or great inconvenience to the property owners. Failure rates are difficult to determine, but recently in Florida, counties with inspection programs have reported rates from 8% to 11% per year⁵.

While functional OSTDS can protect human health, the most commonly used technology and installation practices are not designed to provide high rates of denitrification of effluent. Individual site conditions largely dictate the capacity of drainfields to provide denitrification and therefore generalizations about nitrogen removal rates are hard to provide. Anderson (2006)² provided a summary of the

¹ Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems. Office of Water Office of Research and Development U.S. Environmental Protection Agency. EPA 832-B-03-001 March 2003

² Anderson, D.L. 2006. A Review of Nitrogen Loading and Treatment Performance Recommendations for Onsite Wastewater Treatment Systems (OWTS) in the Wekiva Study Area. Hazen and Sawyer, P.C., 29 pp.