Technical Memorandum

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Subject: Estimating Historical Reuse and Wastewater Flows in the North Florida Regional Water Supply Planning Area

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Introduction

To address potential recharge in the North Florida Regional Water Supply (NFRWSP) Planning Area, the St. Johns River Water Management District (SJRWMD) modeling staff requested that the Bureau of Water Supply Planning and Assessment assist in providing a data table with all reported reuse and wastewater data from 1996-2014. This technical memorandum details the source and development of the dataset.

Data Source

The Florida Department of Environmental Protection (FDEP) maintains and makes available geodatabases of points associated with Wastewater Facility Regulation (WAFR) facilities and their related distribution sites.

Names of Reference Files and Location of Geodatabases:

> *Wastewater Facility Regulation - Wastewater Facilities*
> *Wastewater Facility Regulation - Wastewater Sites*
> *http://geodata.dep.state.fl.us/datasets?q=wastewater&sort_by=relevance*

FDEP also publishes an annual reuse inventory report which includes reuse flows for domestic wastewater systems. The domestic wastewater systems in the annual reuse report have yearly flows equal to or greater than 0.100 million gallons per day (mgd) and as such are a subset of the wastewater facilities and distribution sites in the WAFR geodatabase files.

Names and Location of Reference Files:

> DEP Reuse Inventory Appendix Data 2015
> http://www.dep.state.fl.us/water/reuse/inventory.htm

> DEP Reuse Inventory Appendix Data Time Series 1996-2014
> H:\Engineering_and_Hydro_Science\Staff\tcera\From WUPR\Reuse\Reference File\Analysis_FDEP_Reuse_Inventory_1996-2014_all_appendices_data20160711.xlsx

Final Product

The final product delivered was developed in an excel file. The table below provides and explanation of the headers in the file and a description of the data. Yearly values or flows in the table are expressed in mgd.

Description of Fields

(blank)	an optional (arbitrary) row number field
WAFR_ID	WAFR_ID (not unique)
Type	A category variable organized into INJ = injection wells, OUT = outfalls, RIB = Rapid Infiltration Basin application areas, and Plant = all other types of wastewater disposal options
Appendix_Desc	Type of destination flow or reuse activity
Unique_ID	a concatenation of WAFR_ID and the Locational_ID (unique)
Locational_ID	a wastewater application site ID (not unique)
X_utm	X coordinate in NAD 1983 HARN UTM Zone 17N
Y_utm	Y coordinate in NAD 1983 HARN UTM Zone 17N
Count	a count of the number of application sites for a given WAFR_ID that share the same type
1996-2014	usage for the given Unique_ID at X_utm, Y_utm in 1996-2014

Notes Regarding Fields in the Table:

1.) Appendix_Desc – FDEP categorizes reuse into eight different types and 11 subtypes.
   a. PAA&LI - Public Access Areas & Landscape Irrigation
      i. GCI – Golf Course Irrigation
      ii. RI – Residential Irrigation
      iii. OPAA – Other Public Access Areas
   b. AI - Agricultural Irrigation (including edible crops as well as crops used for feed and fodder grown on Sprayfields)
      i. Edible Crops
      ii. Other Crops
   c. GWR&IPR - Ground Water Recharge & Indirect Potable Reuse
      i. AF – Absorption Fields
      ii. RIB – Rapid Infiltration Basins
      iii. INJ – Injection Wells
      iv. SWA – Surface Water Augmentation
   d. IND - Industrial
      i. ATP – At Treatment Plant
      ii. AOF – At Other Facility
   e. TF - Toilet Flushing
   f. FP - Fire Protection
   g. WL -Wetlands
   h. OTH - Other (other permitted uses either not fitting reuse types above or not specified in rule)

2.) Count – The total flow by type was distributed equally among the number of application sites.

Location of Table / Excel File:

H:\Engineering_and_Hydro_Science\Staff\tcera\From WUPR\Reuse\Wastewater Usage Summary 071416.csv

For reference, the final table is also included at the end of this technical memorandum.

Data Processing

To meet the needs of the model, the raw data files obtained from FDEP had to be altered. The steps identified below describe the changes made to the raw FDEP data.

Step 1: Data clean-up

The WAFR_ID is not provided in all of the appendices associated with the reuse inventory file. In the process of linking Reuse System Names to WAFR_IDs, inconsistencies were found in the names used between appendices and between years. There were also WAFR_IDs in the reuse inventory with no corresponding points in the geodatabase layer files. The WAFR_ID of a nearby facility was assigned for distribution purposes.

Step 2: Total usage data was gathered and aggregated from the FDEP Appendix file

In the file, only the D-Utilization, E-EffluentDisposal, and I-DisposalOnly tabs (which are associated with the respective appendices) listed detailed flow. Tabs B-Domestic Facilities Providing Reuse and L-List of Domestic Facilities, contain only summary information. In instances where it appeared flow data was missing or erroneous (potential rounding errors), the data was estimated.

In order to capture total flow, any summarized flow captured in tabs B or L that was not detailed in D, E or I was added into the total flow as “Disposal Only.”

If there were multiple disposal points for an aggregated flow value, the volume was split evenly amongst the points.

The final product delivered includes data from 163 wastewater treatment facilities in the FDEP Reuse Inventory. There are a total of 870 wastewater treatment plants in the NFRWSP Planning Area. At the time of this technical memorandum, flow data for non-reclaimed water producing facilities was not available from FDEP.

The final product delivered also contains flows for a category in the *Appendix_Desc* column with value = “D_PAA&LI_RI.” As noted above, this subtype represents flows for residential irrigation. The flows for this subtype should not be used in the modeling efforts, as recharge associated with residential irrigation were provided in a separate deliverable.

Step 3: File generation

Individual points in each of the geodatabase files are uniquely identified by LOCATIONAL_ID. This number is not unique between Geographic Information System (GIS) layer files, but can be forced into a unique identifier if needed by concatenating the WAFR_ID and the LOCATIONAL_ID.

A goal of this analysis included preserving the subtype categories listed on the FDEP Appendix tabs. This was provided in long-format along with WAFR, LOCATIONAL_ID and XY coordinates for mapping. Annual flow values were recorded in wide format. Preserving the subtypes creates a many-to-one join to the LOCATIONAL_ID.

Step 4: Include fields to link to GIS layers

The final product includes the following fields: X_utm and Y_utm. These fields can be used to geocode the data using ArcMap. The projection coordinate system used should be *NAD 1983 HARN Zone 17 North*.

Limitations

The FDEP Appendix file does not contain flow for all of the sites listed in the two geodatabase layers identified above. As noted, this dataset only includes annual flow values for wastewater treatment facilities that provide reuse and have flows equal to or greater than 0.100 mgd. For further clarification, wastewater treatment facilities that only dispose of wastewater and have no reuse applications are not included.