TECHNICAL MEMORANDUM

TO: Stormwater Rule Working Group

FROM: Harvey H. Harper, Ph.D., P.E.

DATE: September 21, 2009

SUBJECT: Natural Vegetation Runoff Characteristics

Issue

An evaluation of the runoff characteristics of natural vegetation was conducted by ERD which provided runoff characterization data for different natural vegetation communities. The characterization study by ERD generated a total of 304 runoff samples from 12 different vegetation communities. These data are intended for use with pre- vs. post development runoff loading calculations. However, this analysis will require a biological assessment to identify the biological communities which exist, or were reasonably thought to exist, under natural conditions so that the appropriate runoff characteristics could be selected. At the August TAC meeting we were assigned the task of evaluating the feasibility of relating vegetation communities and associated runoff characteristics to an easily identified characteristic of the site, such as soil types. This analysis included an evaluation of soil types for each of the monitored natural communities and a subsequent evaluation of natural runoff characteristics as a function of soil types.

Analysis

Soil types were identified for each of the natural area monitoring sites based upon Hydrologic Soil Group (HSG). Each of the natural communities monitored by ERD was assigned to the dominant HSG within each vegetative community. An analysis of variance (ANOVA) test was conducted to evaluate statistical similarities and differences between the runoff characteristics for natural areas within each HSG. This analysis indicated that there are no statistical similarities in runoff characteristics between natural vegetation communities associated with the same HSG. Both low and high runoff concentrations of TN and TP were observed in runoff from natural communities in the same HSG. These data indicate that runoff characteristics for natural areas are not related to soil types.

A subsequent analysis was conducted to identify natural areas with statistically similar runoff characteristics. Several of the vegetation types monitored during the characterization study have overlapping species and similar physical characteristics which can complicate identification of vegetation types. The purpose of this analysis is to reduce the number of vegetation groups needed to estimate runoff characteristics by grouping natural areas with statistically similar runoff characteristics. An ANOVA comparison was conducted to identify statistical similarities between runoff characteristics for different vegetation communities. This analysis was conducted for both total N and total P using log transformed data since the data were found to exhibit a log-normal distribution.

The ANOVA analysis indicated that there are four statistically similar groupings for TP and two statistically similar groupings for TN. A summary of these groupings is given in Tables 1 and 2.

TABLE 1

Statistically Similar Groupings For Total P In Natural Vegetation Communities

Group 1

Community Type	Log TP	Mean TP (µg/l)
Wet Flatwoods	1.207	16
Wet Prairie	1.094	12
Marl Prairie	0.973	9
Mean Value	1.091	**12**

Group 2

Community Type	Log TP	Mean TP (µg/l)
Dry Prairie	2.030	107
Xeric Scrub	1.981	96
Ruderal/Upland Pine	1.924	84
Mesic Flatwoods	1.595	39
Scrubby Flatwoods	1.369	23
Mean Value	1.780	**60**

Group 3

Community Type	Log TP	Mean TP (µg/l)
Mixed Hardwood Forest	2.704	506
Upland Hardwood	2.433	271
Mean Value	2.569	**370**

Group 4

Community Type	Log TP	Mean TP (µg/l)
Xeric Hammock	3.450	2818
Upland Mixed Forest	3.356	2270
Mean Value	3.403	**2529**

The analysis indicated that the groupings summarized in Tables 1 and 2 are statistically similar. The mean of the community types in each group is used to represent the mean runoff concentrations for all community types in each group. Additional details concerning this analysis are contained in the ERD report titled “Runoff Characteristics of Natural Vegetation Characteristics in Florida” dated September 2009.

TABLE 2

Statistically Similar Groupings For Total N In Natural Vegetation Communities

Group 1

Community Type	Log TN	Mean TN (µg/l)
Dry Prairie	3.288	1941
Ruderal/Upland Pine	3.195	1567
Xeric Hammock	3.120	1318
Xeric Scrub	3.064	1159
Wet Flatwoods	3.056	1138
Scrubby Flatwoods	3.045	1109
Wet Prairie	3.023	1054
Mesic Flatwoods	2.997	993
Upland Hardwood	2.954	899
Mean Value	3.082	**1209**

Group 2

Community Type	Log TN	Mean TN (µg/l)
Upland Mixed Forest	2.834	682
Marl Prairie	2.824	667
Mixed Hardwood Forest	2.456	286
Mean Value	2.705	**507**

Recommendations

It is recommended that the natural area runoff characteristics summarized in Tables 1 and 2 be used to reflect runoff characteristics from natural areas. Runoff characteristics for all community types in a given grouping will be assigned a runoff concentration equivalent to the mean TN or TP value for each group. The natural vegetation data should be updated as additional data become available.