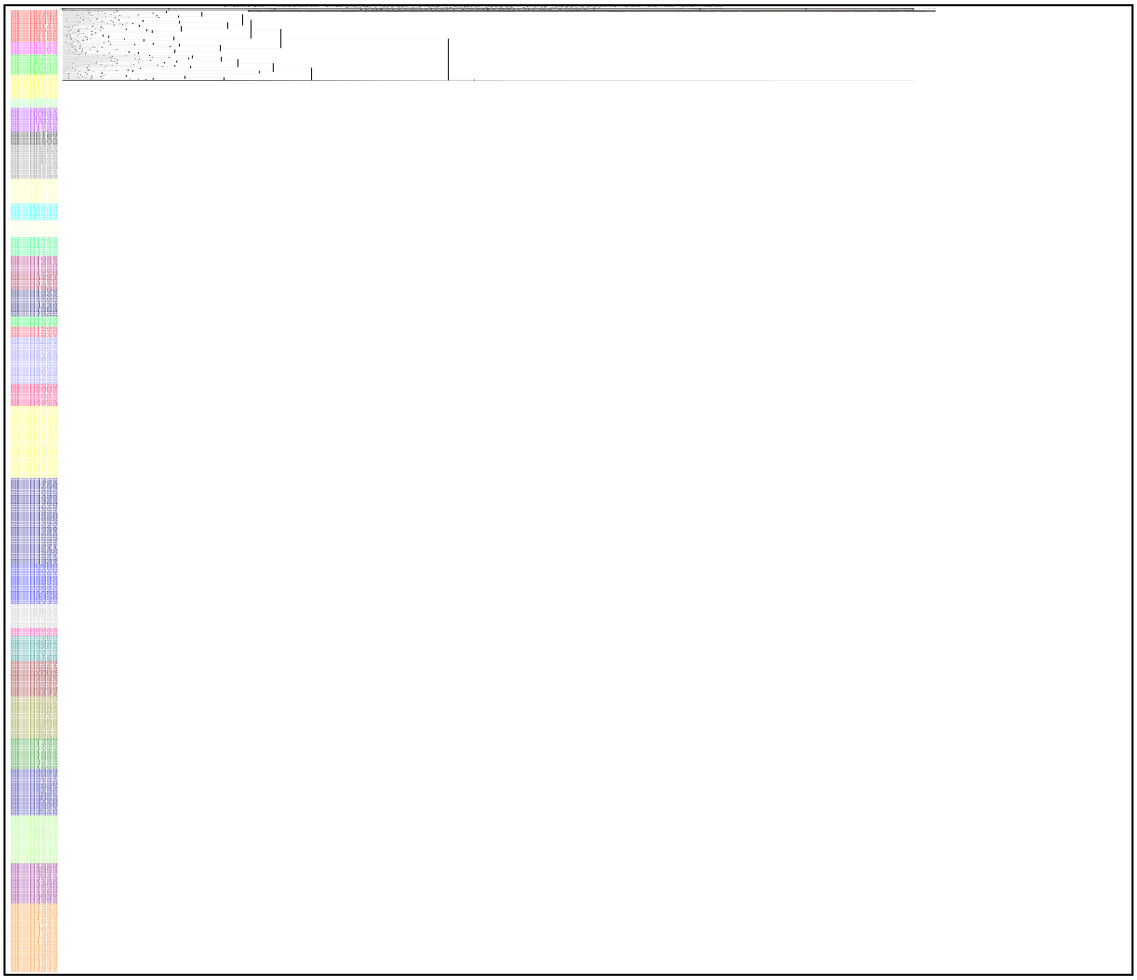
Developing a data-driven classification of South Florida plant communities



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Summary

A comprehensive, broadly accepted vegetation classification is important for ecosystem management, particularly for planning and monitoring. South Florida vegetation classification systems that are currently in use were largely arrived at subjectively and intuitively with the involvement of experienced botanical observers and ecologists, but with little support in terms of quantitative field data. The need to develop a field data-driven classification of South Florida vegetation that builds on the ecological organization has been recognized by the National Park Service and vegetation practitioners in the region. The present work, funded by the National Park Service Inventory and Monitoring Program - South Florida/Caribbean Network (SFCN), covers the first stage of a larger project whose goal is to apply extant vegetation data to test, and revise as necessary, an existing, widely used classification (Rutchey et al. 2006). The objectives of the first phase of the project were (1) to identify useful existing datasets, (2) to collect these data and compile them into a geo-database, (3) to conduct an initial classification analysis of marsh sites, and (4) to design a strategy for augmenting existing information from poorly represented landscapes in order to develop a more comprehensive south Florida classification.

Thirty five data sets, comprising vegetation data from 8,246 sites, were received from researchers working in various organizations. The structure and completeness of available data sets were examined in terms of sampling design, the number and size of sampling units, spatial distribution, taxonomic resolution, and method of estimating species abundance. The data were then summarized at the site level and were incorporated into a geo-database. Finally, vegetation classification for marsh sites was developed using a hierarchical cluster analysis of the sites-by-species matrix. The analytical summary of the datasets in geo-database provided the basis for identifying current gaps in the vegetation data needed to develop a comprehensive south Florida vegetation classification. The results from the cluster analysis of species data for marsh sites were used to cross-walk with the recently updated and hierarchical *Vegetation Classification System for South Florida Natural Areas* (Rutchey *et al*, 2006), to evaluate whether vegetation classes at various levels identified in this system were well substantiated by the classification achieved through field-data based cluster analysis.

While the existing vegetation data covers most of terrestrial natural areas and vegetation associations present in South Florida, some areas are more extensively represented than others and some vegetation types, in both woody and herbaceous groups, described in existing classification systems are missing in the datasets. Moreover, classification of herbaceous sites using agglomerative cluster analysis suggests that freshwater and salt marsh communities are arranged along hydrology and salinity gradients, respectively. In addition, plant communities in some localities are largely reflections of different types and levels of disturbance. To be most useful within the ecosystem restoration efforts currently underway in the region, a comprehensive classification system should incorporate those elements, so that tangible changes in community composition due to alterations in the environmental drivers can be easily assessed.

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Abbreviations and Acronyms

BICY	Big Cypress National Preserve
BISC	Biscayne National Park
EVER	Everglades National Park
FPNWR	Florida Panther National Wildlife Refuge
FSPSP	Fakahatchee Strand Preserve State Park
HID	Hole-in-the-donut
IRC	Institute for Regional Conservation
LOX	Loxahatchee National Wildlife Refuge
MDCEEL	Miami-Dade County Environmentally Endangered Land
NKDR	National Key Deer Refuge
NWR	National Wildlife Refuge
PSSF	Picayune Strand State Forest
REMAP	Regional Environmental Assessment and Monitoring Program
RWMA	Rotenberger Wildlife Management Area
SFWMD	South Florida Water Management District
SGWEA	Southern Glades Wildlife Environmental Area
TTINWR	Ten Thousand Islands National Wildlife Refuge
VEGMON	Vegetation monitoring
WCA	Water Conservation Area
WMA	Wildlife Management Area

1. Introduction

A comprehensive, broadly accepted vegetation classification is important for ecosystem management, particularly for planning and monitoring. Development of an inclusive vegetation classification is an iterative process that involves various quantitative and qualitative approaches. South Florida vegetation classification systems that are currently in use were largely arrived at subjectively and intuitively with the involvement of experienced botanical observers and ecologists, but with little support in terms of quantitative field data. In practice, this has led to a few problems: instances of confusion in terminology, difficulty in application to detailed mapping efforts, and lack of fit within regional, national or global classification systems. The need to develop a field data-driven classification that builds on the ecological organization recognized by generations of south Florida ecologists, and that also fits seamlessly into the US National Vegetation Classification (NVC), was recognized by the National Park Service and vegetation practitioners in the region. The present work, funded by The National Park Service Inventory and Monitoring Program - South Florida/ Caribbean Network (SFCN), covers the first phase of a large project whose a goal is to apply extant vegetation data to test, and revise as necessary, an existing, widely used classification (Rutchey et al. 2006), and ultimately to develop the revised classification in the National Vegetation Classification System format.

The objectives of the study were as follows:

1. To identify useful existing datasets,
2. To collect these data and compile them into a geo-database,
3. To conduct an initial classification analysis of seasonally flooded tropical or sub-tropical grasslands, and
4. To design a strategy for augmenting existing information from poorly represented landscapes in order to develop a more comprehensive south Florida classification.

2. Methodology

2.1 Identifying Potential Datasets

The first foremost task was to identify the potential datasets that would be retrieved, evaluated, and used for developing the vegetation classification. Researchers have studied South Florida vegetation to achieve various objectives suited for their purpose of study. Results from their research either have been published in peer-reviewed journals or presented in the form of reports. After we carried out an intensive literature survey, we adapted both informal and formal approaches to identify and retrieve the potential datasets. Informally, we contacted researchers, explained to them the objective of the current project, and asked them if they were willing to contribute their vegetation data for developing a classification of plant communities in South Florida. The formal approach included the organization of a 2-day workshop at Florida International University, Miami, on December 10-11, 2007. In the workshop, twenty-eight participants, including several well-known South Florida vegetation experts, discussed the need for developing a field data-based classification, and the kind of datasets to be used for that purpose.

First, the participants discussed the need for a South Florida vegetation classification, its relevance to the National Vegetation Classification, the practical difficulties involved in developing the classification for mapping, and the importance of field data to address such difficulties in vegetation classification. Later, they discussed about the potential datasets that could be used for classifying South Florida plant communities. Several studies that have been carried out in South Florida in context of characterizing plant communities, monitoring the vegetation response to natural and anthropogenic environmental perturbations, or having any form of vegetation composition data, were discussed. Finally, the researchers or the people who might be able to contribute species composition data to be used in developing vegetation classification were identified.

2.2 Dataset acquisition and screening

Following the workshop, a formal request letter with an explanation of the purpose of the study and three forms with formats for the metadata summary, the plot attributes and data matrices were sent out to the researchers. All researchers were also assured that their vegetation data would not be used for any other purpose without their consent, except for vegetation classification. In several instances, they were personally contacted and were persuaded to participate in the process by contributing to the vegetation composition data. In response, we received 35 datasets from 18 researchers, representing several federal and state agencies, universities, and non-governmental organizations (**Table 1**). Vegetation data collected in Hole-in-the-Donut restoration area within the Everglades National Park were downloaded from the database available on the park website. Vegetation data were then examined for i) sample sites and their geographical coordinates, ii) sampling units used to record the species data, iii) species nomenclature, iv) type of species abundance measures, and v) sampling frequency,.

i) Sample sites and their geographical coordinates

Vegetation classification is the process of characterizing stands (releves), also termed as 'sites' or 'samples', primarily based on their species composition and structure. A 'site' for this classification purpose was defined as an entity or a set of entities, also referred as the 'sampling unit' that was used by researchers to record the species measures in the way that the values from those measurements could be simply summarized over the sampling unit to represent the vegetation characteristics of that particular location.

The vegetation datasets originally had the location of sample sites or sampling units geo-referenced in Geographic and/or Projected (UTM) coordinate systems, and in various forms of Datum (WGS1984, NAD1983 or NAD1927). The coordinates for all sites were converted to North American Datum (1983) using the 'Project' function in ArcMap 9.2. The sites are now geo-referenced in both the Degree-decimal (Geographic; NAD83) and UTM (Projected; NAD83 UTM Zone-17) coordinates. However, 602 sites (7.3%) spread over 5 datasets were not geo-referenced, and they do not have coordinates yet. The sites which have the vegetation data but no coordinates are in Barry_Vegemon (20), ENP_HID (500), IRC_AA (4), Smith_TI (72), and Trexler_Fishmon (6) datasets.

ii) Sampling units and species data

In the existing datasets, the shape and size of the sampling units, in which species data had been recorded by researchers, varied within and across the datasets. The use of plots (quadrats) either systematically or randomly placed or in nested design, was featured in majority of datasets (**Table 2**). However, transects within the plots and/or points on the transects were the only sampling methods used in some of the datasets.

For a field data-based vegetation classification, one basic requirement is that a sample represented as an entity (site) in cluster analysis needs to be placed in homogeneous vegetation. Hence, the details of the sampling methods used in each dataset were acquired from the researchers. The information so obtained was later used to evaluate the datasets, and to summarize the species abundance data for each sampling site. If a researcher expressed ambiguity regarding spatial homogeneity of vegetation in sample(s), data for those samples were not used in the cluster analysis. For instance, IRC_Intercept dataset has a record of species present at 60,000 points along 600 250-m long transects, which were not always laid within the uniform habitat (Keith Bradley, *personal communication*). For that reason, those data were not processed for use in the cluster analysis.

iii) Species nomenclature

All vegetation datasets, but one (Armentano_TI), had species data recorded using 2-12 letter codes for species, and they were spelled out in a separate species list. In Armentano_TI dataset, however, the species abundance was recorded using the scientific name of species. Usually, species list in most of the datasets had the details of all codes used in the data matrices. However, in some datasets, not all codes were spelled out. Later, those codes were interpreted either directly in consultation with the researchers or by comparing with the similar codes in other datasets and later confirmed with the researchers.

The datasets had species data collected by different researchers over more than two decades, and thus had the species nomenclature varied among datasets. As per a decision made by participants in Workshop-I, species names were standardized following Integrated Taxonomic Information System (ITIS) nomenclature. The procedures adapted to finalize the species list were as follows:

- A list of species with their codes used in each dataset was prepared, and merged together. The list had the name of dataset (Dataset_ID), species code used by researcher (SPCODEDS), 6-letter code (SPCODE) and, 8-letter code (TXCODE) created from genus and species names, and scientific name of species. The 6- and 8-letter codes were created for species in all datasets as those are the standard codes used by plant ecologists.

- The list was sent to Keith Bradley, Institute of Regional Conservation (IRC) for checking and updating the scientific names according to ITIS nomenclature.

- Keith verified the codes and scientific names, updated them, and added the TXCODE used by IRC (IRCTXCode) and ITIS scientific name and code number for each species. When a taxon was identified to only genus, the IRCTXCode was not given, and a note - 'could be several species' - was written. At several instances, Keith also consulted the researchers to verify certain codes and their interpretation.

- The updated list was again thoroughly checked and verified to be sure that all codes used in the datasets were listed.

- Finally, we created an 8-letter code, namely South Florida Vegetation Taxon code (SFVTXCode) for all species. The SFVTXCodes were same as the IRCTXCode in most of species. However, we had to adapt a slightly different strategy for two kinds of cases.

    a) When a taxon had the scientific name with sub-species or variety, IRCTXCode had 12 characters, 4 each from genus, species, and subspecies or variety. However, most computer programs, such as PCORD, PRIMER, CANOCO, SAS, etc. used for community data analysis, allow only 8-character names for both samples and species. For those taxa, 8-character codes were created by using 4 and 3 characters from genus and species names, respectively, followed by a number, as 2, 3, 4… etc. depending on the number of sub-species or variety of the same species.
    b) Since several datasets had some taxa identified only up to genus, we also created codes for them. However the number of characters for those codes was 8 or less, depending on the number of characters present in a Genus name.

iv) Species abundance

The datasets were examined for various measures of species abundance. Since species' presence/absence was common in all datasets, they were evaluated for quantitative measures.

In a dataset that had the record of species presence in two or more sampling units per site, the species frequency was calculated as the percentage of sampling units in which a respective species was present. Many of datasets, however, had the species abundance measures recorded as the estimates of species cover, either in form of absolute percent cover or in various forms of ordination scale. In the datasets that had the record of species cover along a range of ordinal scale, cover estimates of each species were obtained using the midpoint percentage value of the cover class.

In the datasets that had vegetation data for forest, woodlands and shurblands, the measures of species abundance were one or more parameters, such as percent cover, individuals per sample, diameter at the breast height (dbh), and plant heights. From the individual counts and the measures of dbh of a species, the density and basal area of species were calculated for each sample, and were included as two separate columns in the geodatabase.

v) Sampling frequency

Most datasets had the species data recorded only once, while some datasets, e.g. Barry_Vegemon, ENP_PIEL, ENP_Prairie, and Trexler_Fishmon, had species composition data recorded at multiple times at the same sites. In such instances, the data which were collected most recently, or prior to any anthropogenic interventions, such as prescribed fire, were used in the classification. However, the species data for multiple sampling events were retained in the Geodatabase (described in Section 3.2) for possible use in the future.

2.3 Geodatabase

To manage the geo-referenced vegetation data provided by researchers, a geodatabase (SF_Veg_Geodatabase) was developed in ArcCatalog 9.2. The geodatabase includes maps of natural area management entities, South Florida vegetation site attributes, species abundance data, species list, and vegetation characteristics of herbaceous sites stored in various forms as feature datasets, feature class, and data tables. For each feature class and data table in the geodatabase, a metadata was added describing its contents.

2.4 Vegetation classification

Vegetation data were analyzed by both the cluster analysis and ordination methods. We used an agglomerative hierarchical cluster method with flexible beta (-0.5) linkage (Lance and Williams 1967), and non-metric multidimensional scaling (NMDS) ordination (Clarke 1993) for cluster and ordination methods, respectively. In both analyses, we used Bray-Curtis dissimilarity as distance measure.

i) Cluster Analysis

Considering heterogeneity across sample sites, which spread over a wide geographical area covering different habitats and included both woody and herbaceous vegetation sites, cluster analysis was completed in various steps using PC-ORD (MJM Software Design, version 5). First we performed the analysis on 5,249 sites, representing 32 datasets. Those sites represented 18 natural area management entities of the South Florida (**Figure 1**). Three datasets (IRC_Intercept, Rutchey_WCA3, and Rutchey_WCA_2) were not used in the classification. In the first level of classification, we identified the sites that were dominated by woody or herbaceous vegetation, hereafter termed as 'woody sites' and 'herbaceous sites'. In subsequent steps, we performed a cluster analysis on only herbaceous sites. Since species measures varied among datasets, particularly between woody and herbaceous sites, the types of species data used for in these two classifications, also differed. For classifying all sites together, we used species presence-absence data. In a large dataset that has the sites with different physiognomy and includes different measures of species abundance, use of presence-absence data is believed to have minimum noise (Westfall et al. 1997). However, if a site had more than one stratum, we used all species pooled from all strata recorded for the site. For instance, for a forest site, all species, whether present in tree, sapling, shrub or herb layer, were included.

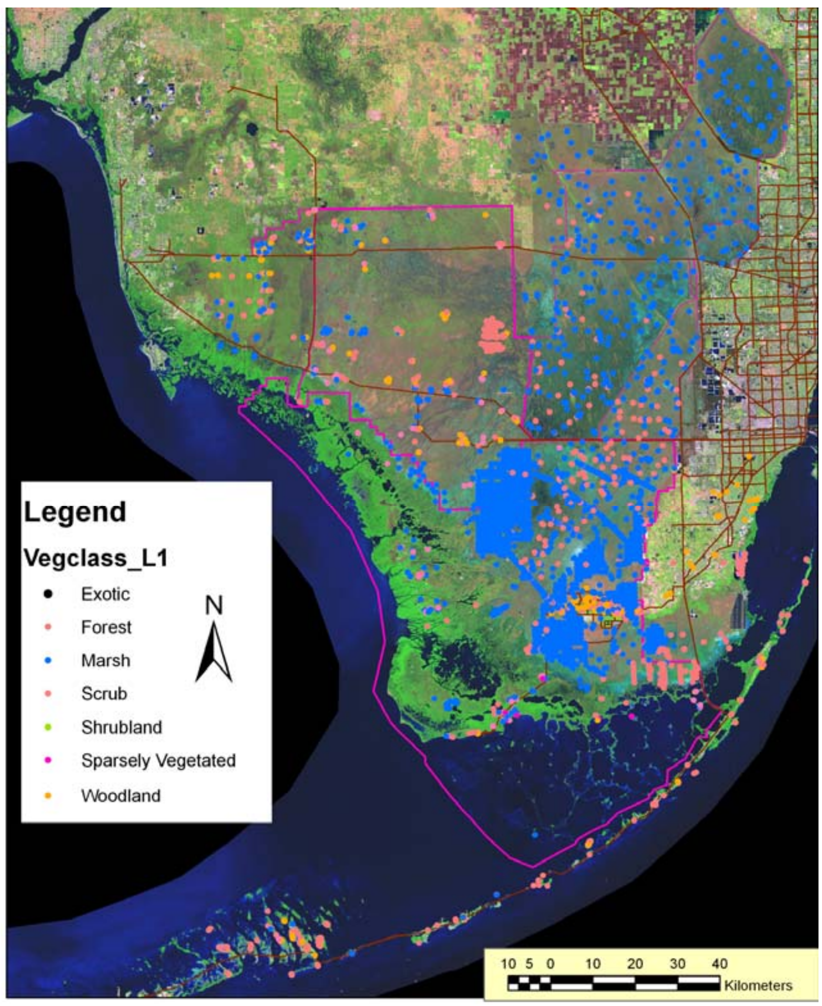

Figure 1: Location map of the sites that have vegetation data incorporated in the geodatabase, and were used for classifying 'woody' and 'marsh sites'. Grouping of sites into the Level 1 vegetation types (Rutchey et al. 2007) is based on information included in the datasets received from researchers working on South Florida vegetation.

For classifying the herbaceous sites, species abundance measures were converted to an importance value of species. Unlike the woody sites, herbaceous sites had species data that were summarized in forms of percent frequency, percent cover, or both. Consequently, we relativized frequency and/or cover of species by site total, and used relative frequency and relative cover values to calculate importance value (IV) of the species. However, the meaning of importance value of species was not the same for all sites, and it varied among the datasets depending on whether they had both frequency and percent cover values of species or had only one of them. Majority of the herbaceous sites (58%) had both frequency and percent cover, 24% sites had only frequency, and 18% sites had only percent cover of species. When a site had both frequency and percent cover of species, we calculated importance value of species as follows:

IV = (Relative frequency + Relative cover)/2.

But when a site had only frequency or percent cover of species, importance value was simply relative frequency or relative cover, respectively.

Before analyzing the data by cluster analysis and ordination, we identified outliers and removed them to avert the problems associated with outliers. Outliers usually dominate the ordination and compress the remaining sites in the ordination space (Gauch 1982) while in cluster analysis outliers unnaturally increase the number of clusters. To identify an outlier, we used mean Bray-Curtis dissimilarity and 2-standard deviation as a cutoff (default in PC-ORD). In both presence-absence and IV data matrices together, 166 (4.5%) of 3,681 sites were identified as outliers, resulting in each data matrix with 3,515 sites and 448 species. Cluster analysis was carried out using Bray-Curtis dissimilarity as distance measure coupled with flexible beta linkage, as this method has space conserving properties. In general, beta-value = -0.25 is recommended (Lance and Williams 1967; Legendre and Legendre 1998). However, in the error free datasets, researchers did not find any better results with recommended beta-value (-0.25) than with beta = -0.5 (Scheibler & Schneider 1985; Milligan 1989). In contrast, for dataset with outliers, somewhat smaller beta-value (-0.4>beta>-0.7) is suggested (Milligan 1989). In the present analysis, since the heterogeneous large dataset had the probability of possessing some clusters with only few sites (potential outliers), the value of flexible beta = -0.5 was chosen over beta = -0.25 for maximizing within-group similarities and minimizing between-group similarities.

Initially, the dendrogram was pruned at 75% information remaining, and 32 clusters were identified. Subsequently, we calculated within- and between-clusters mean Bray-Curtis dissimilarity. When a cluster had very high (>65%) within cluster mean dissimilarity, it was considered heterogeneous and was flagged as the conglomeration of several potentially identifiable, homogeneous vegetation associations. To identify the relatively homogenous associations within those clusters, we followed the linkages, and at each node we calculated within cluster-dissimilarity of sub-clusters. We repeated the process until we reached the cluster that had the mean within-cluster dissimilarity of <65% or at least 5 sites within it. Finally, we identified 55 clusters. Some of them, however, had very low within- and between-clusters dissimilarity, indicating that they were not only homogenous but also not much different from each other in vegetation composition. We realized that some of those clusters which would be practically impossible to identify in the field needed to be merged together i.e. to use cut off level in the dendrogram at higher level for those particular clusters. However, prior to obtaining final clusters, we also classified the 166 sites that were identified as outliers in the large dataset. Even though, those were singled out as outliers in the large dataset, many of them potentially had the vegetation associations, particularly represented by 5 or less sites (e.g. salt marshes) that were not represented in the large dataset used for cluster analysis.

For identifying which species primarily contribute most to the average similarity within a group of sites, and to the average dissimilarity between all pairs of groups identified in cluster analysis, we used Similarity Percentage (SIMPER) analysis included in the PRIMER Software (Clarke and Gorley 2001; Clarke and Warwick 2001). The first set of results included the overall average similarity between sites from within each cluster group, average abundance of species, percent contribution made to the group average similarity by each characterizing species, and the cumulative percentage of average similarity contributed by the species in decreasing order of their contribution. To list the characteristic species of each vegetation type, a cut-off level of cumulative contribution of 90% was used. The clusters were then named by using one or two dominant species. The results for listing species' contribution to the dissimilarity included average dissimilarity between two groups compared, average abundance of species in each group, percent contribution to the dissimilarity made by each species, and the cumulative percentage of contribution by the species sorted in decreasing order of contribution. Since there are many pairs of sites, making up of the average similarity or dissimilarity contributed by each species, the ratio between average species contribution to within group similarity or between-groups dissimilarity and standard deviation (Similarity/SD or Dissimilarity/SD) was also listed in both sets of results to assess the consistency of species contribution.

Finally, we calculated the mean importance value of species for each of 46 clusters obtained by classifying sites in both main and outlier matrices. Later, we used primary clusters x species matrix in which species had mean importance value as abundance data, and performed cluster analysis to obtain final linkages among clusters.

ii) Ordination

Vegetation types identified by the cluster analysis were then superimposed on a non-metric multidimensional scaling (NMDS) ordination. In NMDS, sites are plotted as points in a space comprised of fixed number (usually 2 or 3) of dimensions, with distance between points in the ordination space representing underlying dissimilarity between those points (Clarke 1993).

2.5 Crosswalk with Rutchey's classification:

We compared the vegetation types identified in the present analysis with the vegetation types described in Rutchey et al. (2007). A vegetation type was considered in correspondence when they had a majority of species common. Only those species which were mentioned in the descriptions of a particular vegetation type in Rutchey et al. (2007) were considered for comparison. Since both classifications are hierarchical, the crosswalk was done at each level. Nonetheless, if a vegetation type was present in both classifications, but at different levels, they were also considered identical. Moreover, when a vegetation type was identified in the present classification, but was not found described in Rutchey's classification, the type of vegetation, its species composition and location in the field, were described in detail. Conversely, if a vegetation type described in the Ruthcy's classification was not identified in the present classification, potential regions where that vegetation may be found were described, and the regions were flagged 'important' for future sampling.

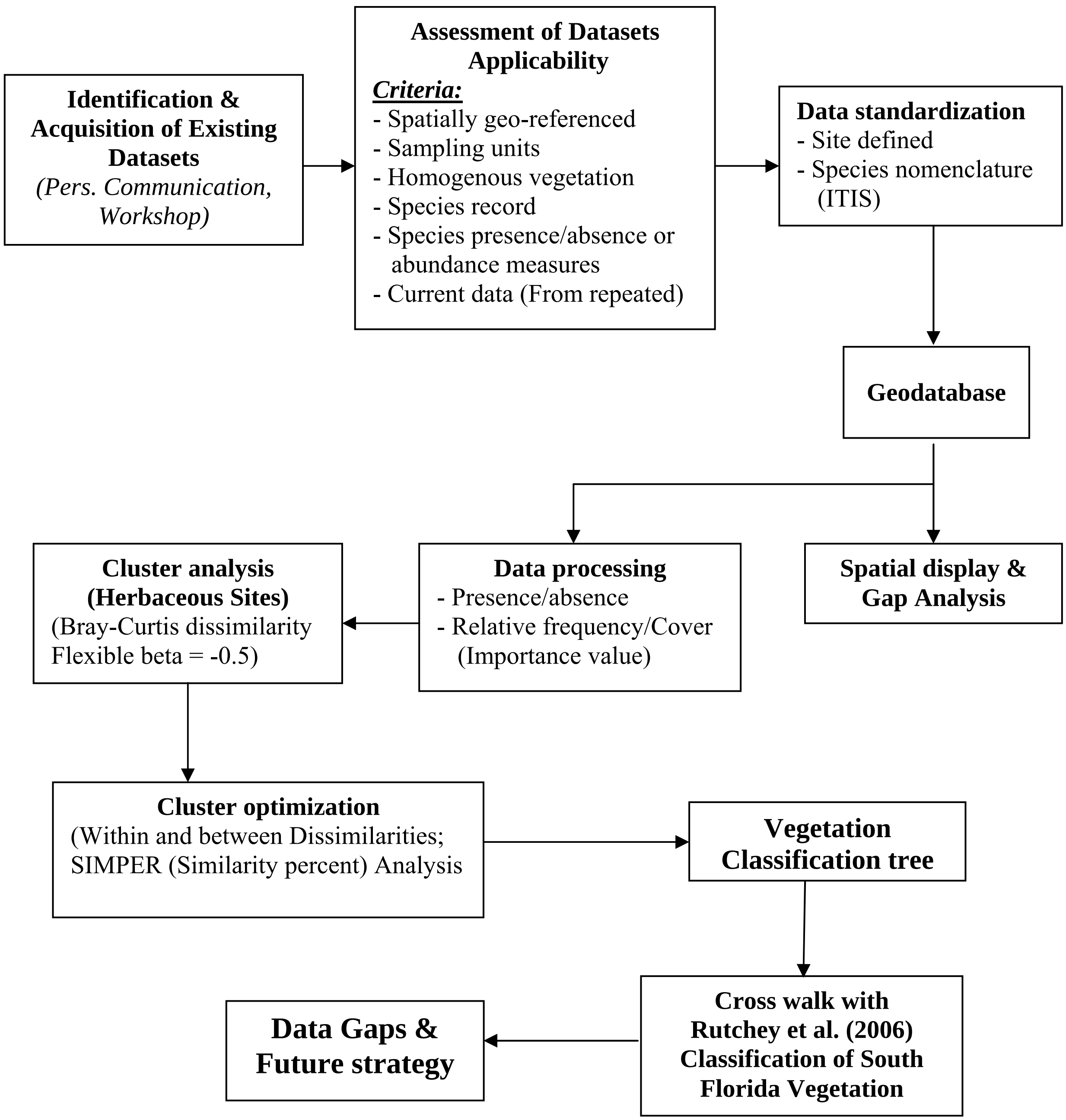

Figure 2: A flow chart showing the method steps followed for data acquisition, geodatabase development, and marsh vegetation classification.

3. Results

3.1 Vegetation Datasets

With the cooperation of multiple South Florida vegetation scientists, we successfully compiled 35 datasets containing plant community information. Their detailed descritption are in Appendix 1. Each dataset obtained from researchers or other sources (e.g. websites) was comprised of species occurrence (i.e. presence/absence) and/or abundance measures, collected in the field at multiple sites using a consistent sampling method. If a researcher used different sampling methods for different sub-sets of sites, each sub-set was treated as an individual dataset. The 35 datasets contained 8,246 sites with some form of plant community information, but each of them did not have detailed records of species composition and abundance. For instance, Rutchey_WCA3 did not have species data.

Twenty one datasets contained species data from communities representing single vegetation classes (Level 1 in Rutchey et al. 2006), while the other 11 datasets had species data from multiple vegetation classes. However in many cases, distinctions among different types of woody vegetation like forest, woodland, shrubland and scrub, were not made. Similarly, all sites with submerged aquatic, emergent and graminoid-dominated vegetation were simply listed as Marsh in the composite dataset. Vegetation class information for sites in three datasets (i.e. ENP_HID, IRC_Intercept & Rutchey_WCA), which together included 40% of total sites was not available with the species data received.

3.1.1 Vegetation sampling units

Types of sampling units used by researchers to collect the species data varied among datasets. Twenty seven datasets, encompassing 4,278 sites contained species data collected using plots of different sizes. Plot size ranged from 5 m^2 to 1 ha within marshes and prairies, and from 75 m^2 to 1 ha in wooded areas. In general, individual datasets had uniform plot sizes for all sites present within it. However, in some cases, particularly in the study of tree islands, plot size varied depending on the hammock sizes. Similarly, when transects were the sampling units used, they were of various lengths and were used either as individual sampling units or in the case of 11 studies, in combination with plots/subplots. In three studies, point intercepts along line transects were used to record the occurrence of a species.

In nineteen datasets, covering both forested and herbaceous communities, sub-plots were used to collect species data. The sub-plots were either nested within the plots or were used along transects. The number and size of sub-plots varied greatly (i.e. 2 to 84) from one dataset to the other, and occasionally within the same study. Before using the composite dataset for any purposeful classification, effects of different-sized plots and sampling intensity (i.e. the number of sub-plots) need to be well discussed.

3.1.2 Floral composition and species abundance

Datasets varied in their types of species abundance measurements, which were either recorded in the field or later calculated based on the measurements taken for quantifying the species data in the field. Obviously, the common denominator for using the maximum number of sites across the different datasets was the presence-absence data. However, one requirement of developing a field-data based vegetation classification is the completeness of the list of species that occurred within a sampling unit. In a plot method, when subplots are used to record the occurrence of species or the quantitative measures of their abundance, the species not present in the subplots but only in the full-sized plot should also be recorded. In two thirds of the datasets, such information was lacking, particularly for the understory vegetation in forests, and for herbaceous vegetation in marshes and prairies. So, the use of presence-absence data across different dataset was also not free from problems. Moreover, one major dataset, Rutchey_WCA, includes approximately 30% of all sites for which data were received, had the observations recorded at sites that could be extremely useful for the ground truthing, but may not be useful for developing data-driven vegetation classification.

One other basic requirement for collecting species data for vegetation classification is that the sampling unit needs to be placed, as far as possible, in a uniform community. A sampling unit covering the area across community types may blur the classification of that site. In the current composite dataset, though such information is not clearly stated for the majority of sites, sizes of most sampling units indicate that they were most likely uniform in all but one study. In IRC_Intercept, a 250 m line transect was used, which in a region with heterogeneous vegetation, could easily have crossed different plant communities. For this reason, the sites in IRC_Intercept were not included for developing the field data-based vegetation classification.

There is always a trade off when using a high volume of data that employ different types of quantitative measures, as opposed to not using them at all or using only a single type. In the current datasets, the 2nd most common measure for tree species is density, while for herbaceous species, both frequency and cover measures are usable. In 50% of the forest sites, basal area is also usable. The least emphasized measure of community structure, particularly in the forest/woody plots, is height, which is a major criterion to group the woody communities in forest, woodland, shrubland and scrub communities at even the first level of classification (Rutchey et al. 2006).

3.2 Geodatabase

A Geodatabase was developed following the guidelines used by NPS/SFCN to facilitate the long-term management of both the existing vegetation data contributed by researchers of various organizations and data that will be collected in future. The Geodatabase is relational and consists of feature datasets, feature classes, data tables, and relationship classes (**Table 4**). A feature dataset is exclusively for the natural area management units, and includes the following shape files: parks, preserves and water conservation areas present in South Florida. In the parent directory, feature classes include separate shape files for the geographic information of all sites, and details for herbaceous (marsh) sites only. Site geographic information includes both Lat-Long (degree decimals) and UTM coordinates in North American Datum 1983 (NAD83). The shape file with marsh site details includes their geographical locations and vegetation characteristics, including results from cluster analysis. Data files include individual tables with contact addresses for persons who contributed their vegetation data, the details of each dataset, site attributes, plant species data arranged by site, and lists of species (**Table 4**). Data tables are basically arranged in two sub-groups, each containing detailed information at dataset and site level. The tables with the site level details are of two types: i) species data and related information (i.e. lookup tables), for all sites, and ii) species data and vegetation classification results for herbaceous sites.

3.3 Vegetation Classification – Level 1

For the first level of classification, 5249 sites from 32 datasets were used. Sites in two clusters represented primarily the woody and herbaceous vegetation (**Figure 2**). Sites classified into the herbaceous category agreed with researchers' characterizations in >97% of cases, whereas 25% of sites in the woody category were originally characterized as herbaceous. Interestingly, most of the mis-categorized sites were in disturbed areas, such as the restored sites in the hole-in-donut within the Everglades National Park, and slough sites in Trexler_FISHMON dataset, in which several plant taxa were identified up to only genus level. We combined the cluster solutions and researchers' characterization of sites to pool the herbaceous sites for detailed classification.

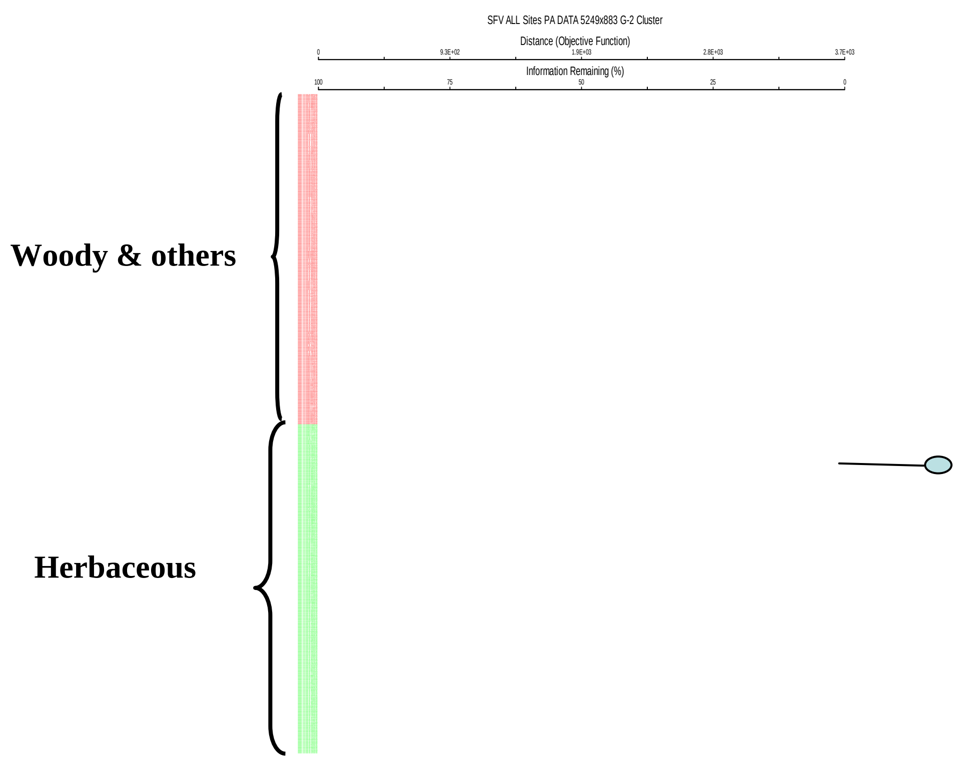

Figure 3: Dendrogram showing the sites clustered in two major groups, woody and herbaceous. A data matrix of 5249 sites x 883 species containing species presence-absence data were used for classification.

The sites were primarily grouped into two groups. One group primarily consisted of herbaceous sites, while sites in the other group were predominantly woody. However, many of the sites linked at the lower within the second group were herbaceous sites. A close examination of those sites revealed that they were either in disturbed areas and had some woody component, or were unique in their species compositions.

3.4 Herbaceous Vegetation Classification

Marshes and prairies dominated by herbaceous vegetation are the major habitat in south Florida, and cover most of the Everglades, extending from Lake Okeechobee to the coast. In the coastal areas, marsh vegetation consists of plant species that are tolerant to brackish environments. In the classification of sites with herbaceous vegetation, most coastal sites were separated as outliers, suggesting a distinct group, hereafter termed as 'salt marsh', at the very upper level of the hierarchical classification tree. In the cluster analysis of freshwater marshes, the grouping of sites was influenced by the disturbance levels at each site, and soil and hydrologic conditions. Sites from the disturbed areas, particularly those from hole-in-the-donut, where vegetation was once cleared, had vegetation consisting of mostly forb-dominated primary colonizers. In the classification of freshwater marshes, these sites together with few other disturbed sites scattered across the Everglades and BICY, formed a distinct group that separated out from rest of freshwater marsh. Most freshwater marsh sites clustered together depending on their species composition which was primarily concomitant with site hydrology. The groups were identified as seasonally flooded prairie, seasonally flooded marsh and semi-permanently flooded marsh. This level of grouping is not present in Rutchey et al. (2007). In the subsequent classification of these groups, clusters were first named based on life forms, and then diagnostic species of the groups, which were similar to level 4 and 5 in Rutchey et al. (2007), and alliances in ecological classification of terrestrial vegetation (NatureServe 2006). Clusters identified at various level of classification of marsh vegetation are described below.

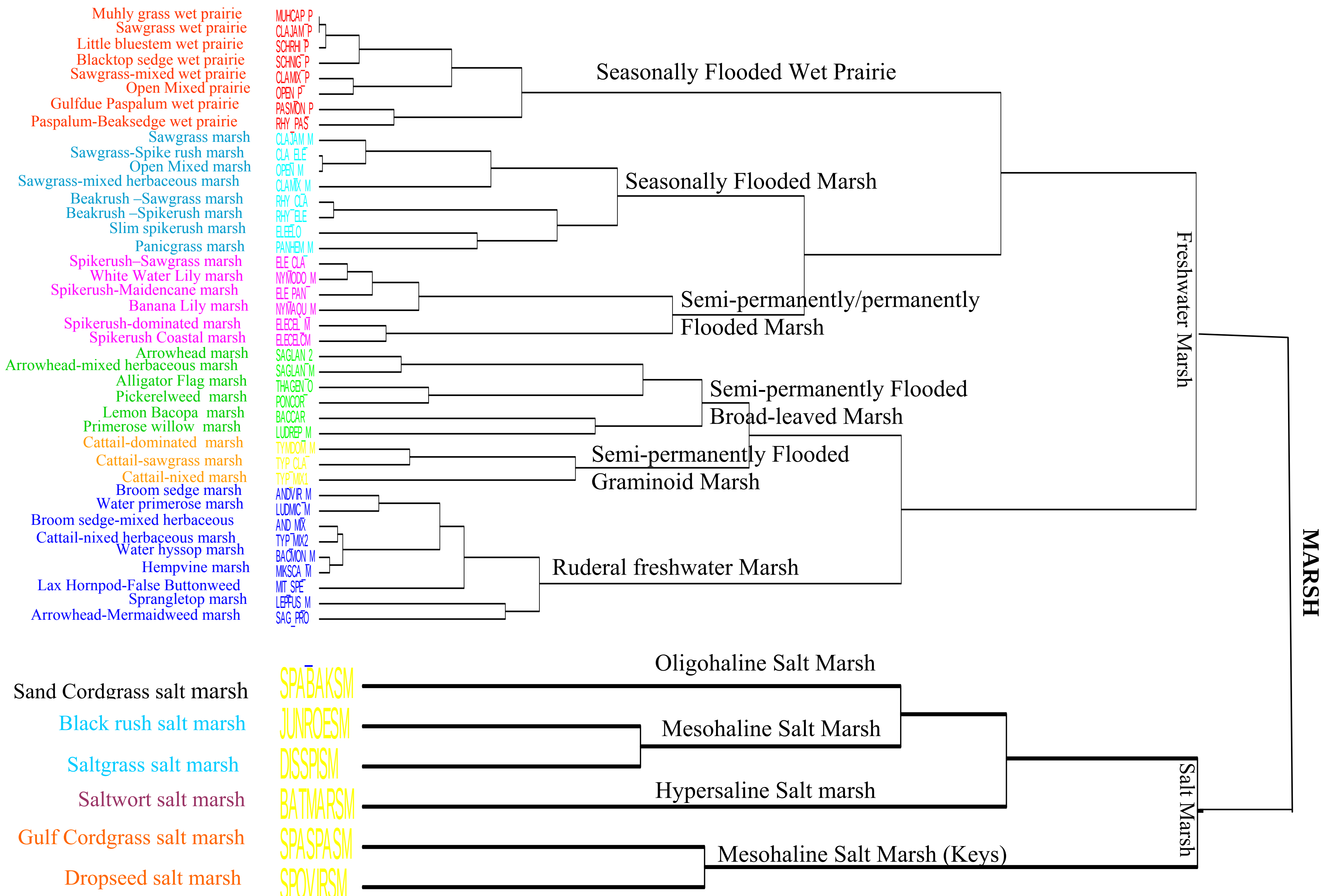

Figure 4: Schematic presentation of dedrogram re-constructed from the results of agglomerative hierarchical cluster analysis of herbaceous sites.

Description of Marsh vegetation types

5 Marsh (M)

5.1 Salt Marsh (MS)

Salt marsh consists of mostly salt-tolerant or halophytic species that have developed the mechanisms to adjust to a range in environmental conditions influenced by salinity gradients, and periodic inundation in the South Florida coastal regions. As the result, salt marsh vegetation differs in species composition depending on the elevation gradients in the intertidal zones that not only differ in frequency and duration of inundation but also in salinity. In the present analysis, six types of salt marsh vegetation, grouped in three classes, oligohaline, mesohaline, and hypersaline, were identified (**Figure 5**). Of these six vegetation types, two types were represented by only two or less sites in the dataset, and they were found in Florida Keys.

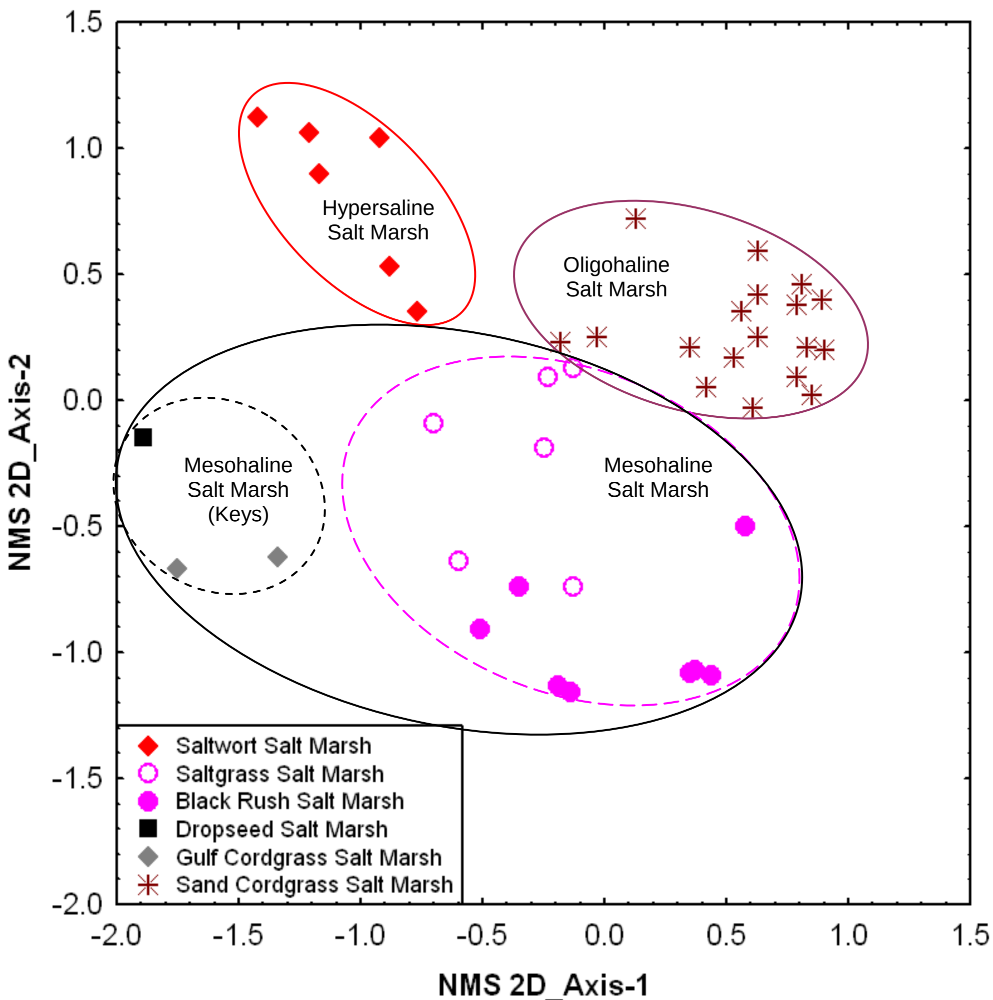

Figure 5: Non-metric multidimensional scaling (NMS) ordination based on importance values of species at 41 salt marsh sites

5.1.1 Oligohaline Salt Marsh (MSO)

This type of salt marsh is primarily dominated by low-salt (<5.0 ppt) tolerant species mixed with several freshwater species.

5.1.1.1 Oligohaline Graminoid Salt Marsh (MSOG):

Salt marsh is primarily dominated by low-salt tolerant graminoids, such as sand cordgrass (*Spartina bakeri*), that often can grow in freshwater environments too.

***5.1.1.1.1* Sand Cordgrass Salt Marsh *(Spartina bakeri* Salt Marsh) – MSOGs:** This type of salt marsh is present in coastal zones, such as Cape Sable and Stair-Step region in the Everglades National Park, Ten Thousand Islands National Wildlife Reserve, and Fakahatchee Strand Preserve State Park (**Figure 6**). The vegetation is primarily dominated by sand cordgrass (*Spartina bakeri*). At some sites, however, freshwater species, such as sawgrass (*Cladium mariscus* ssp. *jamaicense*) and/or spikerush (*Eleocharis cellulosa*) have high abundance percentage, depending on the local microtopographic variation. Other associated species in this vegetation type are a mix of freshwater as well as salt tolerant species, such as *Distichlis spicata*, *Sesuvium portulacastrum*, *Ruppia maritima*, *Rhynchospora tracyi*, *Phyla nodiflora*, and *Mikania scandens*, among others. Woody species such as *Baccharis angustifolia*, *Morella cerifera* and *Rhizophora mangle* are also common at some sites**.**

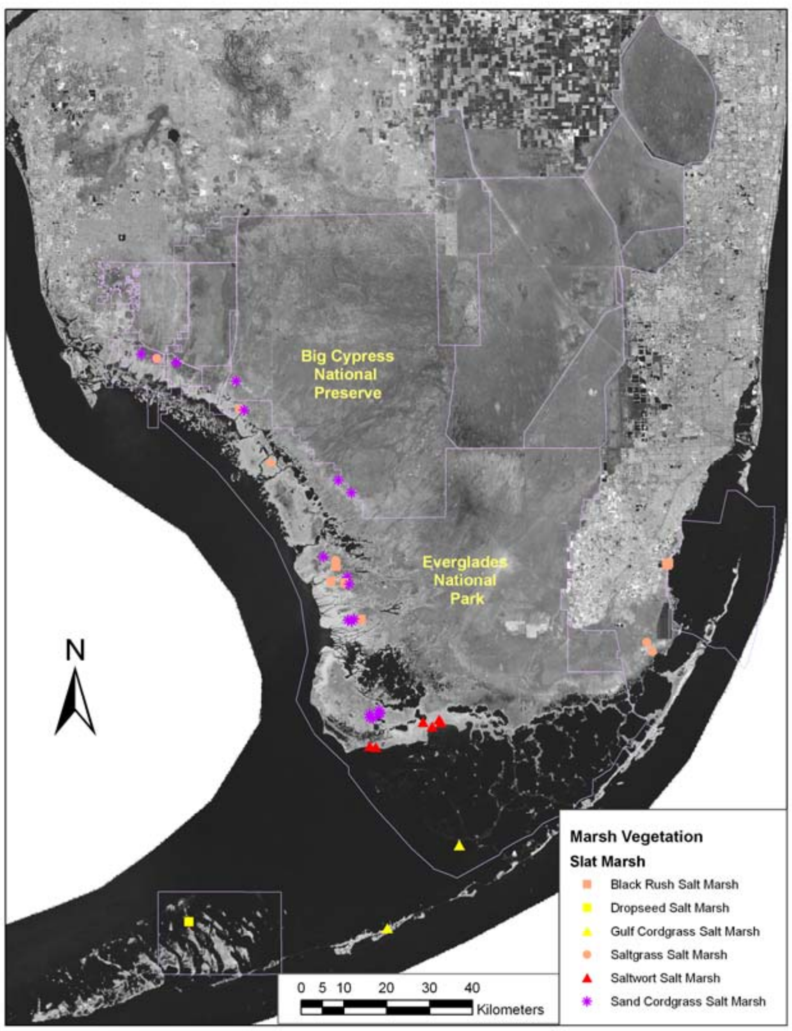

Figure 6: Location map showing salt marsh vegetation types.

5.1.2 Mesohaline Salt Marsh (MSM):

This type of salt marsh is primarily dominated by medium-salt (5-18 ppt) tolerant species.

5.1.2.1 Mesohaline Graminoid Salt Marsh (MSMG):

Salt marsh is primarily dominated by medium-salt tolerant graminoids, such as saltgrass (*Distichlis spicata),* black rush *(Juncus roemerianus*), gulf cordgrass (*Spartina spartinae*), dropseed (*Sporobolus virginicus*), among others.

***5.1.2.1.1* Saltgrass Salt Marsh *(Distichlis spicata* Salt Marsh) – MSMGd:** This type of salt marsh is present in upper tidal zones in Stair-Step region and C111 basin in Everglades National Park, and in Ten Thousand Islands National Wildlife Reserve (**Figure 6**). The vegetation is primarily dominated by saltgrass (*Distichlis spicata*). The characteristic species in this vegetation type include coastal graminoids (*Spartina bakeri, Juncus roemerianus, Sporobolus virginicus,*), and succulents (*Sesuvium portulacastrum, Batis maritima, Borrichia frutescens, Sarcocornia perennis, Salicornia bigelovii*). Woody species, mainly seedling and saplings of mangroves (*Laguncularia racemosa, Avicenia germinans,* and *Rhizophora mangle*) are frequently present at some sites.

***5.1.2.1.2* Black Rush Salt Marsh *(Juncus roemerianus* Salt Marsh) – MSMGj:** This type of vegetation is present in coastal marsh in south-western part of Everglades National Park. The vegetation is strongly dominated by black needle rush (*Juncus roemerianus*). At some sites, it forms monospecific stands with >90% relative cover. Associated species that are characteristics of this vegetation type include ferns (*Acrostichum danaeifolium* and *Blechnum serrulatum*), cordgrass (*Spartina bakeri*), saltgrass (*Distichlis spicata*), christmasberry (*Lycium carolinianum*), among others. Saplings of red mangrove are also very common.

***5.1.2.1.3* Gulf Cordgrass Salt Marsh *(Spartina spartinae* Salt Marsh) - MSMGs:** This type of vegetation is present in Florida Keys. The vegetation is strongly (>80% relative abundance) dominated by gulf cordgrass (*Spartina spartinae*). The characteristics species of this vegetation type include other salt-tolerant species such as saltgrass (*Distichlis spicata*), saltmeadow cordgrass (*Spartina patens*), and dropseed (*Sporobolus virginicus*).

***5.1.2.1.4* Dropseed Salt Marsh *(Sporobolus virginicus* Salt Marsh) – MSMGp:** This type of vegetation is present in Florida Keys. The vegetation is strongly dominated by dropseed (*Sporobolus virginicus*). In this vegetation, other commonly present salt-tolerant species include gulf cordgrass (*Spartina spartinae*), saltmeadow cordgrass (*Spartina patens*), shoregrass (*Monanthochloe littoralis*) and saltgrass (*Distichlis spicata*).

5.1.3 Hypersaline Salt Marsh (MSH):

This type of salt marsh is primarily dominated by high-salinity (18-30 ppt) tolerant species.

*5.1.3.*1 Hypersaline Succulant Salt Marsh (MSHS):

Salt marsh is primarily dominated by high-salt tolerant succulants, such as saltwort (*Batis maritima*), glasswort (*Sarcocornia* sp.*)*, and sea purslane *(Sesuvium* sp.*)*.

5.1.3.1.1 **Saltwort Salt Marsh (*Batis maritima* Salt Marsh) – MSHSb:** Saltwort (*Batis maritima*)-dominated vegetation type is present in tidal zones in Cape Sable and south of West Lake. At some sites, chickenclaws (*Sarcocornia perennis*) and saltgrass (*Distichlis spicata*) are co-dominant with turtle weed. Other characteristic species of this vegetation type are sea daisy (*Borrichia frutescens*), sea purslane (*Sesuvium portulacastrum*), among others. More information on other associate species of this vegetation type is needed.

5.2 Freshwater Marsh (MF):

Freshwater marsh communities are widespread in South Florida, and are primarily shaped by hydrology, nutrients and disturbances. Natural and disturbed communities are well separated, and cattail vegetation is present along a wide range of hydrology and disturbance (**Figure 7)**, depending on the abundance of other species present in ths community **(**Appendix 2).

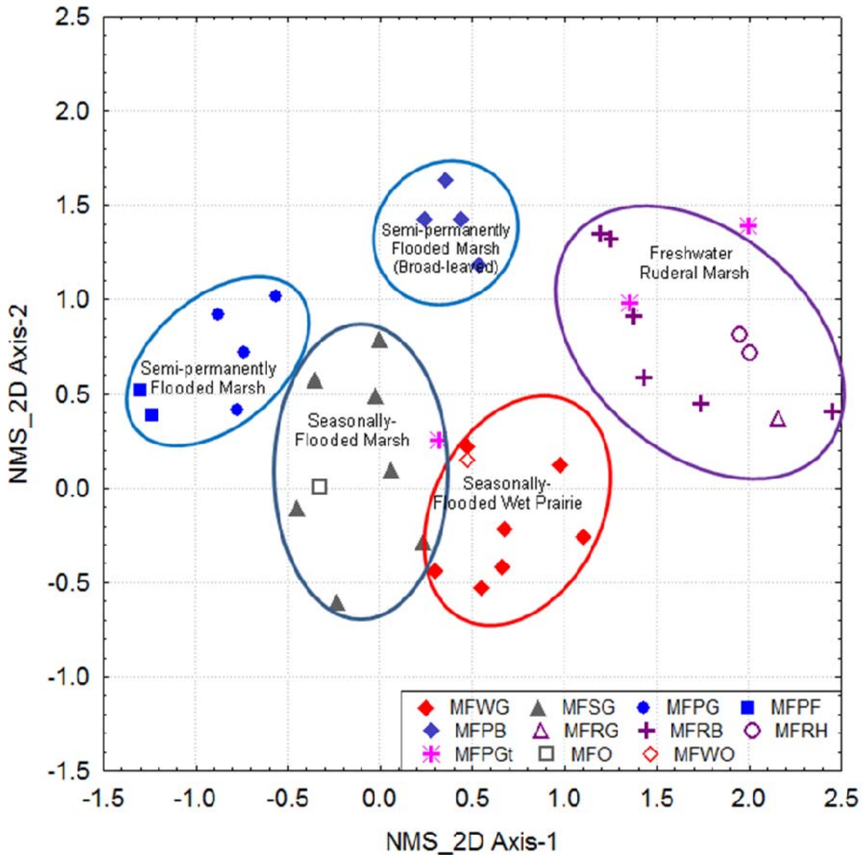

Figure 7: Non-metric multidimensional scaling (NMS) ordination based on importance values of species at 3,452 Freshwater Marsh sites. Points in ordination space represent centroids of site scores, averaged over vegetation type. (Outliers were not included in the ordination)

5.2.1 Seasonally Flooded Wet Prairie (MFW):

Seasonally flooded freshwater prairies are short-hydroperiod marsh and are found in the area that gets periodically flooded for 3-7 months a year.

5.2.1.1 Seasonally flooded Graminoid Wet Prairie (MFWG):

In short hydroperiod marl prairies, that are flooded for 3-7 months a year, marsh vegetation is characterized by a mix of graminoids that includes low-stature sawgrass (*Cladium mariscus* ssp. *jamaicense*), muhly grass (*Muhlenbergia capillaris* var. *filipes*), little bluestem (*Schizachyrium rhizomatum*), and black sedge (S*choenus nigricans*), among others. In most places, these species, particularly the first three, are found together in different proportions. Based on the dominance of one or the other species, four types of freshwater graminoid prairies; Muhly grass, Little Bluestem , Sawgrass, Black-top Sedge Wet Praries, are described (Ross et al. 2006; Rutchey et al. 2007). The first three types have many species in common, but are distinguishable based on the relative abundance of dominant species (Appendices 2 and 3).

***5.2.1.1.1* Muhly Grass Wet Prairie *(Muhlenbergia capillaris* var. *filipes* Wet Prairie) – MFWGm:** This vegetation type is generally found in the seasonally flooded marl prairies in the southern Everglades, at the both eastern and western flanks of the Shark Slough, and Taylor Slough basin, and prairies in Big Cypress National Preserve (**Figure 8**). Muhly grass (*Muhlenbergia capillaris* var *filipes*)-dominated vegetation has the hydroperiod of less than 6 months, and it is frequently burned. In this vegetation type, sawgrass (*Cladium mariscus* ssp. *jamaicense)* and blue stem (*Schizachyrium rhizomatum*) are the next two most abundant species. Their high abundance occasionally makes the vegetation difficult to be distinguished. Other characteristic species commonly found in this vegetation are *Panicum tenerum, Centella asiatica, Pluchea rosea*, *Rhynchospora microcarpa, Schoenus nigricans, Cassytha filiformis, Eragrostis elliottii, Andropogon virginicus,* and *Aristida purpurascens,* among others.

***5.2.1.1.2* Little Bluestem Wet Prairie *(Schizachyrium rhizomatum* Wet Prairie) – MFWGs:** The vegetation type is characterized by the dominance of little bluestem (*Schizachyrium rhizomatum*) vegetation. It is commonly found in the marl prairies in the Taylor Slough basin, to the west of the Shark Slough, south of Old Ingram highway, and south-western part of Big Cypress National Preserve (**Figure 8**). This vegetation has short hydroperiod (4-7 months), and is generally present in frequently burned areas. In this vegetation type, sawgrass (*Cladium mariscus* ssp. *jamaicense)* and muhly grass (*Muhlenbergia capillaris* var *filipes*) are the next two most abundant species. Other associated species are *Centella asiatica, Panicum tenerum, Rhynchospora microcarpa, Cassytha filiformis, Panicum virgatum, Rhynchospora tracyi, Pluchea rosea, Hymenocallis palmeri, Rhynchospora divergens, Eragrostis elliotti*, *Paspalum monostachyum,* and *Aristida purpurascens*, among others.

5.2.1.1.3 **Sawgrass Wet Prairie (*Cladium mariscus* ssp. *jamaicense* Wet Prairie) – MFWGc:** In the seasonally flooded marl soils, sawgrass (*Cladium mariscus* ssp. *jamaicense*) is mostly of short stature, and dominates the vegetation in most parts of marl prairies, including frequently burned coastal prairies. In marl prairies, sawgrass often is present in high abundance mixed with muhly grass (*Muhlenbergia capillaris var. filipes*) and little bluestem (*Schizachyrium rhizomatum*) (Appendix 3). However, in disturbed areas and rough rocky-glades, the vegetation is much more diverse. The other characteristic species of this vegetation are *Panicum tenerum, Centella asiatica, Cassytha filiformis, Rhynchospora tracyi, Pluchea rosea, Rhynchospora microcarpa, Phyla nodiflora*, and *Symphyotrichum bracei*, among others. In disturbed areas, particularly near canals and in rough rocky-glades, the vegetation is much more diverse. In such area, the relative abundance of sawgrass is lower than 20%, and the species, such as *Centella asiatica* and others are present as co-dominants, suggesting two different associations under this vegetation type. These are, (i) *5.2.1.1.3.1* Sawgrass-dominant Wet Prairie, and (ii) *5.2.1.1.3.2* Sawgrass-Mixed herbaceous Wet Prairie. The characteristic species of the later vegetation type include the mix of species representing a wide range of hydrologic conditions. The characteristic species are *Cladium mariscus* ssp. *jamaincense*, *Centella asiatica*, *Panicum tenerum, Eleocharis cellulosa, Rhynchospora tracyi, Schizachyrium rhizomatum, Pluchea rosea, Rhynchospora microcarpa, Muhlenbergia capillaries* var. *filipes, Bacopa caroliniana, Phyla nodiflora* and *Leersia hexandra* (Appendix 2).

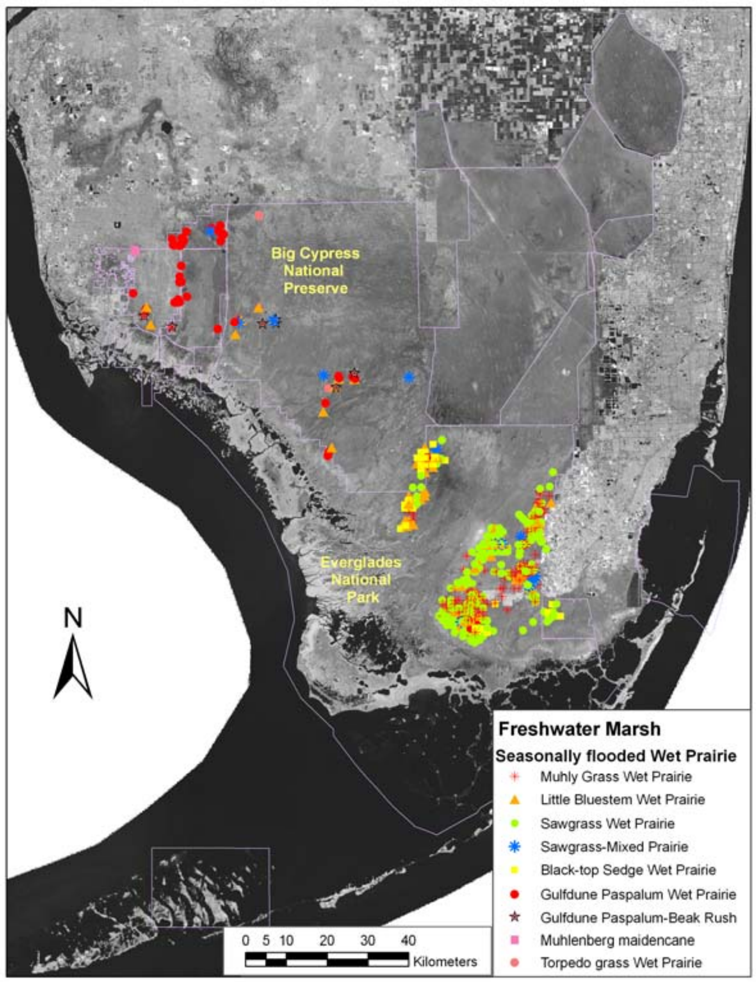

Figure 8: Location map showing the sites with seasonally flooded wet prairie vegetation types.

5.2.1.1.4 **Black-top Sedge Wet Prairie *(Schoenus nigricans* Wet Prairie) – MFWGh:** In Taylor Slough basin and in the marl prairies west of Shark River Slough and south of Old Ingraham highway (**Figure 8**), vegetation in localized areas is dominated by black-top sedge

(*Schoenus nigricans*) that grows in tussocks. In spaces between tussocks, the commonly found species are sawgrass (*Cladium mariscus* ssp. *jamaicense*), little bluestem (*Schizachyrium rhizomatum*), and muhly grass (*Muhlenbergia capillaris* var. *filipes*). These species are occasionally co-dominant with black-top sedge. The characteristic species of this vegetation type are *Cassytha filiformis, Centella asiatica, Panicum virgatum, Rhychospora microcarpa, Rhynchospora tracyi, Panicum tenerum, Paspalum monostchyum, Hymenocallis palmeri*, *Crinum americanum, Eragrostis elliottii, Symphyotrichum dumosum* var. *dumosum*, among others.

***5.2.1.1.5* Gulfdune Paspalum Wet Prairie *(Paspalum monostachyum* Wet Prairie) – MFWGp:** Gulfdune paspalum (*Paspalum monostachyum*) has substantial cover in the little bluestem (*Schizachyrium scoparium*) and/or muhly grass (*Muhlenbergia capillaris* var. *filipes*)-dominated wet prairies. However, this species is generally dominant in the transitional community between wet prairies and sawgrass marsh, particularly when the sawgrass (*Cladium mariscus* ssp. *jamaicense*) is sparse and of low stature. Because *Paspalum monostachym* is strongly associated with the representative species of wet prairies (short-hydroperiod) as well as marsh, *P. monostachyum* dominated vegetation has been moved between these two groups (Ross et al. 2004, 2006; Rutchey et al. 2006, 2007). In the present classification, however, it is treated as a member of wet prairies, as many more sites, particularly in western part of South Florida, have *Paspalum monostachyum* dominanted vegetation with the associated species that are representatives of short-hydroperiod wet prairies. The characteristic species of this vegetation are *Rhynchospora diversgens, Centella asiatica,Rhynchospora microcarpa, Ludwigia microcarpa*, *Elytraria caroliniensis* var. *angustifolia*, *Rhynchospora colorata*, *Dichanthelium dichotomum* var. *ensifolium*, *Hyptis alata, Proserpinaca pectinata, Panicum tenerum, Eragrostis elliotti*, *Pluchea rosea, Cassytha filiformis, Hymenocallis palmeri*, *Crinum americanum*, and *Dichanthelium aciculare*. At some sites west of Everglades, this vegetation type has scattered individuals of stunted pond cypress (*Taxodium ascendens*) with their seedlings well incorporated in the herb layer vegetation. At many of these sites within Big Cypress National Preserve, *Rhynchospora divergens* is co-dominant, and occasionally its relative abundance is much higher than that of *Paspalum monostachyum* suggesting two associations under this vegetation type: (i) *5.2.1.1.5.1 Paspalum monstatchum*-dominated Wet Prairie, and (ii) *5.2.1.1.5.2 Paspalum monostachyum-Rhynchospora divergens* Wet Prairie. In the latter group, the other characteristic species are sawgrass (*Cladium mariscus* ssp. *jamaicense*), *Schizachyrium rhizomatum, Panicum tenerum, Iva microcephala, Centella asiatica*, and *Eleocharis geniculata* (Appendix 2).

***5.2.1.1.6* Muhlenberg Maidencane Wet Prairie *(Amphicarpum muehlenbergianum* Wet Prairie) –MFWGa:** This vegetation type is very rare, and in the present analysis was found at only two sites, one each in Big Cypress National Preserve and Picayune Strand State Forest (**Figure 8**). In this vegetation, associated herbaceous or semi-woody species are *Rubus trivialis*, *Euthamia tenuifolia var tenuifolia*, *Spermacoce terminalis, Scoparia dulcis, Andropogon virginicus,* and *Cyperus haspan*, among others.

***5.2.1.1.7* Torpedo Grass Wet Prairie *(Panicum repens* Wet Prairie) –MFWGr:** This vegetation type is very rare, and in the present analysis was found at only two sites, both in

Big Cypress National Preserve (**Figure 8**). In this vegetation, associated herbaceous are *Iva microcarpa, Bacopa caroliniana, Ludwigia repens, Sabatia stellata,* among others.

5.2.2 Seasonally Flooded Marsh (MFS)

Seasonally flooded freshwater marsh is found in the area that gets periodically flooded for 5-11 months a year.

5.2.2.1 Seasonally Flooded Graminoid Marsh (MFSG)

Seasonally flooded graminoid marsh is primarily dominated by hydrophilic graminoids, such as sawgrass (*Cladium marisucs* ssp. *jamaicense*), beakrush (*Rhynchospora sp.*) and maidencane (*Panicum hemitomon*). These species may be present in monospecific stand or are co-dominant with other graminoids, such as spikerush (*Eleocharis* sp.).

***5.2.2.1.1* Sawgrass Marsh (*Cladium mariscus* ssp. *jamaicese* Marsh) – MFSGc:** Sawgrass (C*ladium. mariscus* ssp. *jamaicese*) is the single most common species present in the Everglades prairies and marsh. Sawgrass has wide amplitude with respect to hydrology, and so no wonder it is substantially present in association with species that are characteristics of both coastal and freshwater prairies and marshes. In sawgrass-dominated vegetation, cover of prairie species is much less in the wet areas, where the sawgrass basically has >90% cover forming the monotypic sawgrass marsh with the mean height exceeding 2m. Moreover, sawgrass marsh in most parts of the southern Everglades and Water Conservation Areas has the presence of the species that are indicators of much wetter conditions. Among them, the most common species are beakrush (*Rhynchospora* spp.) spikerush (*Eleocharis* spp.), bladderworts (*Utricularia* spp.), gulfdune paspalum (*Paspalum monostachyum*), panicum (*Panicum virgatum, P. hemitomon*).

> ***5.2.2.1.1.1* Sawgrass dominant Marsh (*Cladium marisucus* ssp. *jamaicense*-dominated Marsh) - MFSGcD:** In most of the Everglades, sawgrass (*Cladium mariscus* ssp. *jamaicense*) is found in mono stand, contributing >80% of relative cover**.** This type of community is present in Water Conservation Areas, and on ridges in Shark River Slough (**Figure 9**). Other herbaceous species which occur in these stands in low abundance (~1%) are *Bacopa caroliniana, Sagittaria lancifolia, Eleocharis cellulosa,* and *Rhynchospora tracyi.*
>
> ***5.2.2.1.1.2* Sawgrass-Spikerush Marsh (*Cladium marisucus* ssp. *jamaicense-Eleocharis cellulosa* Marsh) - MFSGcS:** This type of vegetation is present in Water Conservation Areas and in sloughs within Everglades National Park, where sawgrass (*Cladium mariscus* ssp. *jamaicense*)-dominated vegetation has often high cover of spikerush (*Eleocharis cellulosa*). However, in some areas where sawgrass has relatively low cover and sites are open, species of bladderworts (*Utricularia* spp.), particularly purple bladderwort (*U. purpurea*) have very high abundance. Other characteristic species of this vegetation are *Bacopa coroliniana, Panicum hemitomon, Rhynchospora tracyi, Sagittaria lancifolia, Peltandra virginica, Pontederia cordata*,

among others. In the areas where this vegetation type is present in relatively short hydroperiod, *Crinum americanum, Hymenocallis palmeri, Justicia angusta* and *Leersia hexandra* are commonly present. This vegetation type differs from Spikerush-Sawgrass Marsh, described under 'Semi-permanently Flooded Marsh', in having much lower abundance of bladderworts and spikerush (Appendix 3).

***5.2.2.1.1.3* Sawgrass Mixed herbaceous Marsh (*Cladium mariscus* ssp. *jamaicense* Mixed herbaceous Marsh) – MFSGcM:** At several sites in the Everglades sawgrass marsh, the vegetation is very heterogeneous. At those sites, the sawgrass (*Cladium mariscus* ssp. *jamaicense*) has usually the relative abundance of <30%, and it is associated with both herbaceous and woody species (usually <1 m height). This type of vegetation is present at the disturbed sites in Water Conservation Areas, in the marshes adjacent to the tail of tree islands, and restored sites in the hole-in-the donut regions in the Everglades National Park. In this vegetation type, commonly associated woody species are *Cephalanthus occidentalis* and *Baccharis glomeruliflora*, fern is *Blechnum serrulatum*, and herbaceous species are *Hyptis alata, Mikania scandens, Ipomoea sagittata, Ludwigia microcarpa, Sagittaria lancifolia, Rhynchospora colorata,* and *Lythrium alatum* var *lanceolatum*, among others.

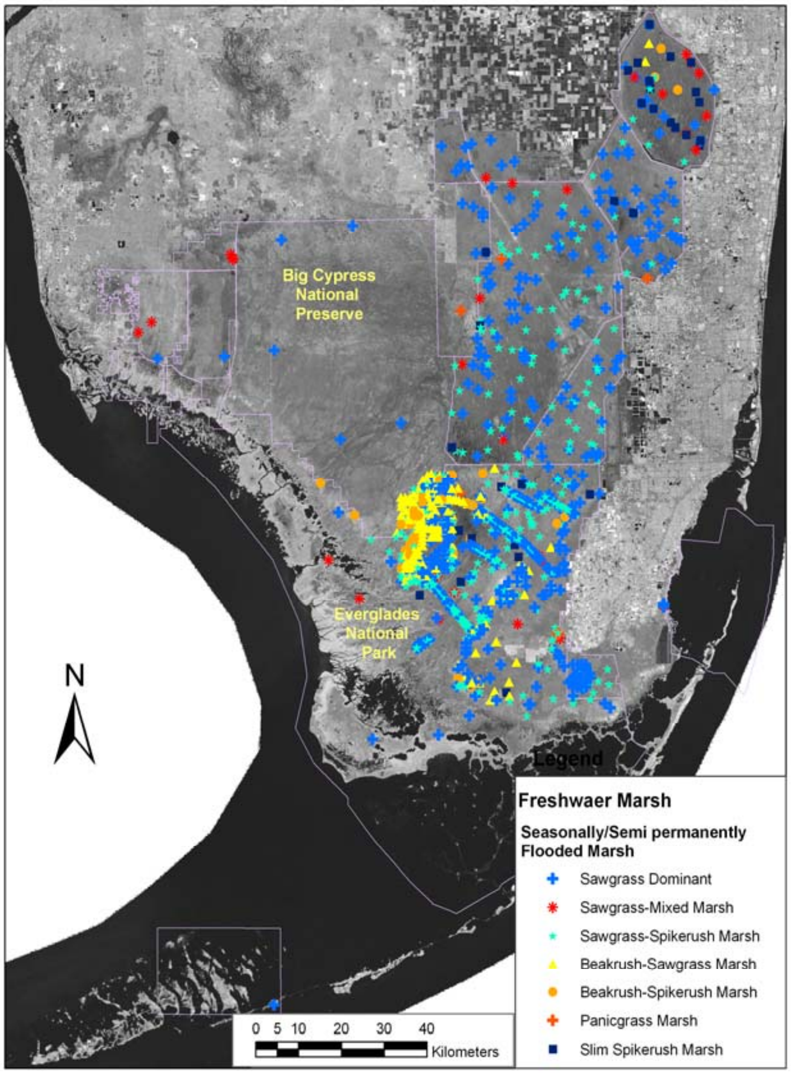

Figure 9: Location map showing the sites with seasonally flooded marsh vegetation types.

***5.2.2.1.2* Beakrush Marsh (*Rhynchospora* Marsh) – MFSGr:** Beakrush (*Rynchospora* spp.) Marsh is primarily dominated by Tracy's beak rush (*Rhynchospora tracyi*). Occasionally, the communities are dominated by southern beakrush (*Rhynchospora microcarpa*) or inundated beakrush (*Rhynchospora inundata*). This vegetation type is commonly found in seasonally flooded Everglades (**Figure 9**), where *Rhynchospora tracyi* is present in association with various species that are characteristics of a freshwater graminoid wet prairie or marsh. While in the wet prairies, beakrush is substantially present with little bluestem (*Schizachyrium scoparium*) and/or muhly grass (*Muhlenbergia capillaris* var.*filipes*), in the marsh, beakrush is usually associated with low stature sawgrass (*Cladium mariscus* ssp. *jamaicense*) and spikerush (*Eleocharis cellulosa*). Threfore this vegetation type is further splitted into two, though the dissimilarity between these two types was <60% (Appendix 3).

5.2.2.1.2.1 **Beakrush-Sawgrass Marsh *(Rhynchospora tracyi - Cladium marisucus* ssp. *jamaicense* Marsh) – MFSGrC:** The vegetation is dominated by Tracy's beakrush (*Rhynchospora tracyi*) with substantial (≤ 50% relative abundance) presence of sawgrass (*Cladium mariscus* ssp. *jamaicense*). The abundance of sawgrass in this vegetation type varies depending on the hydrologic conditions, and occasionally, its cover surpasses the beakrush cover depicting the vegetation type to be named as sawgrass-beakrush (*Cladium mariscus* ssp. *jamaicense-Rhynchospora tracyi*) Marsh (Ross et al. 2006). Other characteristic species commonly found in beakrush-sawgrass marsh are *Bacopa caroliniana, Eleocharis cellulosa, Panicum tenerum, Panicum hemitomon, Crinum americanum, Rhynchospora microcarpa, Panicum virgatum, Sagittaria lancifolia, Pluchea rosea,* and *Hymenocallis palmeri,* among others**.**

5.2.2.1.2.2 **Beakrush-Spikerush Marsh *(Rhynchospora tracyi – Eleocharis cellulosa* Marsh) – MFSGrS:** The vegetation is domiinated by Tracy's beakrush (*Rhynchospora tracyi*) with substantial (≤ 50% relative cover) presence of coastal spikerush (*Eleocharis cellulosa*). Spikerush cover in this vegetation type varies, and occasionally surpasses the beakrush cover resulting in the vegetation type to be named as spikerush-beakrush (*Eleocharis-Rhynchospora tracyi*) Marsh (Ross et al. 2006). Other characteristic species of this vegetation type are *Bacopa caroliniana, Cladium mariscus* ssp. *jamaicense, Panicum hemitomon, Sagittaria lancifolia, Rhynchospora inundata, Panicum virgatum, Crinum americanum,* and *Hymenocallis palmeri,* among others**.**

5.2.2.1.3 **Panicgrass Marsh (*Panicum hemitomon* Marsh) – MFSGa:** This type of graminoid marsh is found in Loxahatchee National Wildlife Refuge, Water Conservation Area 3A, Shark River Slough and Taylor Slough basins (**Figure 9**), and at the restoration sites in hole-in-the-donut region in the Everglades National Park. At some sites, sawgrass (*Cladium mariscus* ssp. *jamaicense*) is substantially (≤ 50% relative cover) present. In this vegetation type, the next most dominant species is arrowhead (*Sagittaria lancifolia*). Other characteristic species present in this vegetation are *Fuirena breviseta, Potamogeton illinoensis, Paspalidium geminatum, Bacopa monnieri, Utircularia foliosa, Paspalum blodgettii, Leerisa hexandra,* and *Eleocharis cellulosa*.

5.2.2.1.4 **Slim Spikerush Marsh (*Eleocharis elongata* Marsh) – MFSGe:** This type of vegetation is dominated by slim spikerush (*Eleocharis elongata)* and is common in Loxahatchee National Wildlife Refuge (**Figure 9**). It is also present at some slough sites in

Water Conservation Areas (WCA2A, WCA2B and WCA3A) and Shark Slough in the Everglades National Park. In this vegetation type, sawgrass (*Cladium mariscus* ssp. *jamaicense*) is the next most dominant species. Other characteristic species of this vegetation are *Panicum hemitomon, Bacopa carolianiana, Nymphaea odorata, Rhunchospora tracyi, Nymphoides aquatica, Utricularia purpurea, U. foliosa, Paspalidium geminatum,* and *Sagittaria lancifolia.*

5.2.3 Semi-Permanently Flooded Marsh (MFP):

In the parts of Everglades which remain flooded in most parts of a year, vegetation is dominated by emergent and floating species, including spikerush (*Eleocharis* spp.), water lily (*Nymphae odorata*), banana lily (*Nymphoides aquatica*), bladderwort (*Utricularia* spp.), among others. These species are present in different proportions, particularly responding to varying water depth. Depending on the dominance of one or the others of these taxa, following vegetation types were identified.

5.2.3.1 Semi-Permanently Flooded Broad-leaved Emergent Marsh (MFPB):

Semi-permanently flooded broad-leaved emergent freshwater marsh is primarily dominated by flood-tolerant broad-leaved emergents, such as pickerelweed (*Pontederia cordata*), arrowhead (*Sagittaria lancifolia*), alligator flag (*Thalia geniculata*), and lemon bacopa (*Bacopa caroliniana*).

***5.2.3.1.1* Pickerelweed Marsh (*Pontederia cordata* Marsh) – MFPBp:** This type of vegetation is characteristics of long-hydroperiod, and is found at the sites with shallow water. The vegetation is dominated by pickerelweed (*Pontederia cordata*). In this vegetation type, arrowhead (*Sagittaria lancifolia)* is the next most common species. The other common species found in this vegetation are *Bacopa caroliniana, Blechnum serrulatum, Crinum americanum, Eleocharis geniculata, Panicum repens, P. hemitomon, Rhynchospora inundata, Hydrolea corymbosa, Ludwigia repens,* and *Cladium mariscus* ssp. *jamaicense.*

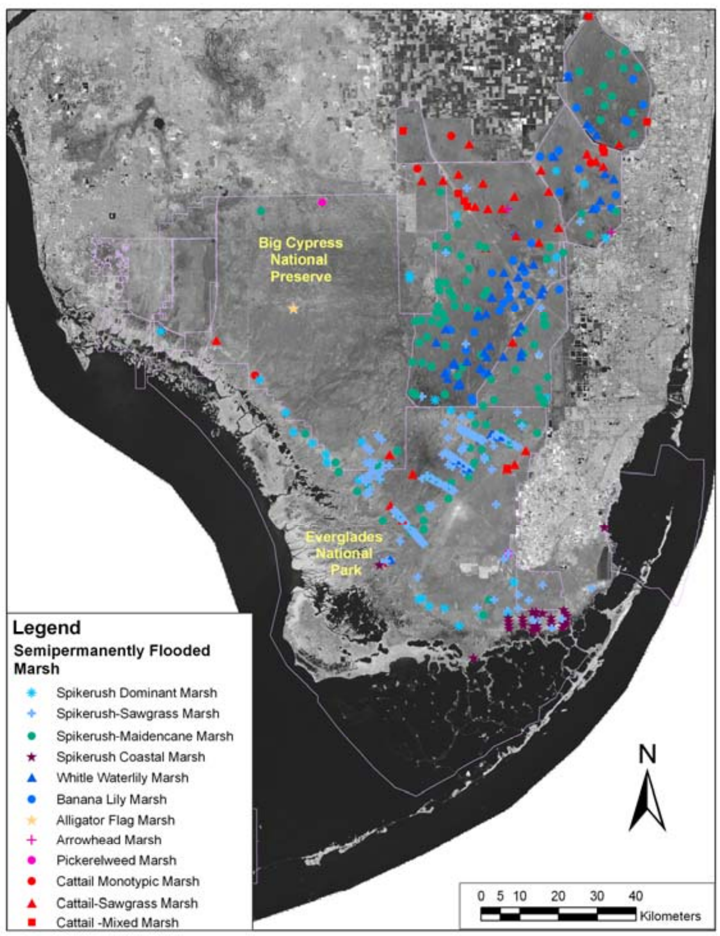

Figure 10: Location map showing the sites with semi-permanently flooded marsh vegetation types.

5.2.3.1.2* Arrowhead Marsh (*Sagittaria lancifolia* Marsh) – MFPBs**: The vegetation is dominated by the Bulltongue arrowhead (*Sagittaria lancifolia*). This type of vegetation is characteristics of long-hydroperiod, and it commonly occurs in sloughs, around alligator holes, and in sink-holes in prairies. However, in the present analysis, it was found at only few sites scattered in Water Conservation Area 3A, Taylor Slough basin, and restoration sites in hole-in-the-donut in Everglades National Park (**Figure 10**). In this vegetation, other species associated with *Sagittaria lancifolia* are *Panicum hemitomon*, *Leersia hexandra*, *Leptochloa fusca* ssp *fascicularis, Mikania sandens, Bacopa caroliniana, Paspalidium geminatum,* and *Elecoharis cellulosa,** among others**.**

***5.2.3.1.3* Alligator Flag Marsh (*Thalia geniculata* Marsh) – MFPBt:** The vegetation is dominated by the alligator flag (*Thalia geniculata*). However, this vegetation type is very rare in the Everglades. In the existing dataset, this was found in only one site in Big Cypress National Preserve.

***5.2.3.1.4* Lemon bacopa Marsh *(Bacopa caroliniana* Marsh*)* – MFRBa:** This type of vegetation is dominated by lemon bacopa (*Bacopa caroliniana*), and is found in wet areas. The vegetation type is very diverse in species composition. The characteristic species in this vegetation type are *Sagittaria lancifolia, Panicum rigidulum, Ludwigia repens, Crinum americanum, Panicum virgatum*, and *Rhynchospora inundata*, among others.

5.2.3.2 Semi-permanently Flooded Graminoid Marsh (MFPG)

Semi-permanently flooded graminoid freshwater marsh is primarily dominated by flood-tolerant graminoids, such as cattail (*Typha domingensis*) and spikerush (*Eleocharis cellulosa*). These species may be present in monospecific stand or are mixed with other graminoids. Most common of them are sawgrass (*Cladium mariscus* ssp. *jamaicense*) and maidencane (*Panicum hemitomon*).

***5.2.3.2.1* Cattail Marsh *(Typha domingensis* Marsh) – MFPGt:** In various parts of Everglades, vegetation is dominated by cattails, which are present either in pure stand or mixed with other species, primarily sawgrass (*Cladium mariscus* ssp. *jamaicense*). In addition, in areas like around alligator holes, near canals, restored sites, fringe of tree islands, cattails are mixed with other broad-leaved herbaceous species and/or woody shrubs, depending on the degree of disturbance, water depth, and available nutrients.

> ***5.2.3.2.1.1* Cattail-dominant Marsh (*Typha domingensis*-dominated Marsh) – MFPGtD:** In some parts of the Everglades, *Typha domingensis* is found in pure stand, contributing >90% of relative abundance**.** This type of community is present in Loxahatchee National Wildlife Refugee, Water Conservation Areas, and at some sites in hole-in-the-donut region of the Everglades National Park. Among herbaceous species which occur in these stands in very low abundance are *Satittaria lancifolia, Ludwigia* spp. *(Ludwigia repens* and *L. octovalvis), Cyperus haspan*, *Mikania scandens* and *Spermacoce floridana*.

***5.2.3.2.1.2* Cattail-Sawgrass Marsh (*Typha domingensis – Cladium mariscus* ssp. *jamaicense* Marsh) – MFPGtC:** In several parts of Water Conservation Areas (WCA2A and WCA3A), and some places in the Everglades National Park, cattails (*Typha domingensis*) and sawgrass (*Cladium mariscus* ssp. *jamaicense*) occur together. However, their relative proportions greatly vary between sites, depending on the altered hydrology, and also nutrients, mainly phosphorus. In this vegetation type, *Sagittaria lancifolia* and *Pontederia cordata* are very common. Other associates are *Polygonum hydropiperoides, Rhynchospora filifolia, Utricularia foliosa, Nymphoides aquatica, Utircularia gibba* and *Ludwigia repens,* among others.

***5.2.3.2.1.3* Cattail Mixed-Herbaceous Marsh (*Typha domingensis* Mixed-Herbaceous Marsh) – MFPGtM:** In the Everglades, mostly at the disturbed sites, where sawgrass (*Cladium mariscus* ssp. *jamaicense)* is almost absent and the relative cover of cattails is <50%, the vegetation is very heterogeneous. The cattails are associated with both herbaceous and woody species. This type of vegetation is present at the disturbed sites in Water Conservation Areas, in the marshes adjacent to Alligator holes and bayhead tree islands, and restored sites in the hole-in-the donut regions in the Everglades National Park. Woody species include *Salix caroliniana, Anona glabra* and *Baccharis glomeruliflora*, among others. In this vegetation type, other commonly associated species are *Mikania scandens, Ludwigia microcarpa, Ludwigia repens, Sagittaria lancifolia, Panicum hemitomon, Lythrum alatum* var. *lanceolatum*, *Bacopa monnieri, Ludwiga octovalis, Symphyotrichum subulatum*. In the hole-in-the-donut region, some sites have cattails co-dominant with *Andropogon virginicus* and *Ludwigia microcarpa*.

***5.2.3.2.2* Spikerush Marsh (*Eleocharis cellulosa* Marsh) – MFPGe:** The most common graminoids in the semi-permanently flooded area in South Florida are the species of *Eleocharis* (*E. cellulosa* and *E. elongata*). They are dominant in different parts of the Everglades. Species composition and the associated species present in spikerush marsh vegetation greatly vary depending on the hydrologic conditions.

***5.2.3.2.2.1* Spikerush dominant Marsh *(Eleocharis cellulosa*–dominated Marsh) – MFPGeD:** Spikerush (*Eleocharis cellulosa*)-dominated vegetation is present in southern part of Shark River Slough and in Water Conservation Areas (**Figure 10**). In this vegetation type, the relative abundance of coastal spikerush (*Eleocharis cellulsa*) is >60% and associated taxa comprised of a wide range of species adapted to various water depth. In this vegetation type, sawgrass (*Cladium mariscus* ssp. *jamaicense)* is present in very low abundance. The characteristic species of Spikerush-dominated Marsh are *Sagittaria lancifolia*, *Rhynchospora tracyi*, *Utricularia purpurea, Paspalidium geminatum, Utricularia foliosa, Nymphoides aquatica, Bacopa caroliniana, Eriocaulon compressum,* and *Panicum hemitomon*.

***5.2.3.2.2 2* Spikerush-Sawgrass Marsh (*Eleocharis cellulosa –Cladium mariscus* ssp. *jamaicense* Marsh) – MFPGeC:** In part of Everglades National Park and Water Conservation areas, coastal spikerush (*Elecharis cellulosa*) and sawgrass commonly occur together. However, sawgrass (*Cladium mariscus* ssp. *jamaicense*) abundance is relatively low. In this vegetation type, purple bladderwort (*Utricularia purpurea*) is strongly present, and occasionally has much higher relative cover than *Eleocharis cellulosa* and *Cladium mariscus* ssp. *jamaicense*. The relatively high abundance of baldder wortts and low abundance of sawgrass differentiates this vegetation type from Sawgras-Spikerush Marsh, described under 'Seasonally Flooded Marsh'. Other associated species are *Utricularia foliosa, Panicum hemitomon*, *Bacopa caroliniana, Rhynchospora tracyi,* and *Paspalidium geminaturm,* among others.

5.2.3.2.2.3 **Spikerush-Maidencane Marsh (*Eleocharis cellulosa –Panicum hemitomon* Marsh) – MFPGeP:** Coastal spikerush (*Elecharis cellulosa*) and maidencane (*Panicum hemitomon*) co-dominated vegetation is common in Water Conservation Areas, and in stair step region, Shark River Slough, Taylor Slough and C111 basin in the Everglades National Park. In semi-permanently flooded area, bladderworts (*Utricularia purpurea, U. gibba*) are also strongly associated spikerush and maidencane. In this vegetation, other characteristic species are *Bacopa caroliniana, Eleocharis elongata, Utricularia foliosa, Nymphoides aquatica, Paspalidium geminaturm, Nymphaea odorata, Sagittaria lancifolia*, and *Paspalum blodgettii* One important characteristic of this vegetation type is the presence of very low cover of sawgrass (*Cladium mariscus* ssp. *jamaicense*) and beakrush (*Rhynchospora tracyi*).

5.2.3.2.2.4 **Spikerush Coastal Marsh (*Eleocharis cellulosa* Coastal Marsh) MFPGeO –** Spikerush (*Eleocharis cellulosa*) marsh in the coastal area such as C111 basin, is invaded by the coastal elements, mainly seedling and saplings (<1m ht) of red mangrove (*Rhizophora mangle*). Though several freshwater species including sawgrass (*Cladium mariscus* ssp. *jamaicense*)*,* are strongly present in this community. A few saltmarsh species such as *Ruppia maritime*, *Distichilus spicata, Sprobolus virginicus, Juncus roemeranus* also were occasionally present**.**

5.2.3.3 **Semi-permanently Flooded Floating-Leaved Marsh (MFPF):**

In the semi-permanently flooded areas in sloughs and sink holes in the glades, the rooted floating plants are common. Very often vegetation is dominated by white water lily (*Nymphaea odorata*) or banana lily (*Nymphoides aquatica*). In both vegetation types, however, various species of bladderworts (*Utricularia* spp.) are common.

5.2.3.3.1 **White Water Lily Marsh (*Nymphaea odorata* Marsh) – MFPFy:** White **w**ater lily (*Nymphaea odorata*)-dominated marsh is present in semi-permanently flooded area in Shark River Slough and Water Conservation Areas (WCAs). In this vegetation type, bladderworts (*Untricularia purpurea, U. gibba, U. foliosa*) are common, and in many sites, eastern purple bladderwort (*Utricularia purpurea*) is co-dominant with white water lily. Other associated species of this vegetation type are *Eleocharis cellulosa, Cladium mariscus* ssp. *jamaicense, Panicum hemitomon*, *Eleocharis elongata*, and *Nymphoides aquatica*, among others.

5.2.3.3.2 **Banana Lily Marsh (*Nymphoides aquatica* Marsh) – MFPFa:** Banana lily or floating hearts (*Nymphoides aquatica*)-dominated marsh is commonly found in Water Conservation Areas (WCAs). Bladderworts (*Untricularia purpurea, U. gibba* and *U. foliosa*) are common in this vegetation type, and they together can have relative cover greater than banana lily. Other characteristic species of this vegetation are *Eleocharis cellulosa, Cladium mariscus* ssp. *jamaicense, Panicum hemitomon*, *Utricularia radiata*, *Paspalum blodgetti*, *Eleocharis elongtata*, *Nymphaea odorata*, and *Nuphar lutea* ssp. *advena*.

5.2.4 Ruderal Freshwater Marsh (MFR)

In the Everglades, distinct vegetation assemblages occupy the abandoned fields and the disturbed areas that once practically get denuded by natural and/or anthropogenic disturbances. In general, the vegetation in those areas remains very diverse and supports the co-dominance of two or more species, many of which are ruderal species, i.e. ability to colonize the disturbed wetlands. The species composition, however, depends on the local micro-habitat, and may change rapidly depending on the hydrologic alterations and time since disturbance. The vegetation types described in this group are mostly present at the sites in hole-in-the-donut restoration area within the Everglades National Park.

5.2.4.1 Ruderal Graminoid Freshwater Marsh (MFRG):

This type of ruderal marsh vegetation is primarily dominated by ruderal graminods, though several hydrophilic forbs also occur.

5.2.4.1.1 **Broom sedge Marsh *(Andropogon virginicus* Marsh) – MFRGa:** This type of vegetation is found in old abandoned field and disturbed areas where vegetation has been completely destroyed and hydrology altered. In this vegetation type, the relative dominance of broom sedge (*Andropogon virginicus)* greatly varies depending on hydrological alterations and time since disturbance.

> ***5.2.4.1.1.1*** **Broom sedge dominant Marsh *(Andropogon virginicus*-dominated Marsh) – MFRGaD:** In the hole-in-the-donut restoration area within the Everglades National Park, vegetation at several sites is dominated by broom sedge (*Andropogon virginicus*), though its relative cover in this area seldom exceeds 20%. The characteristic species of this vegetation are *Lythrum alatum* var. *lanceolatum, Ludwigia microcarpa, Mikania scandens, Conoclinium coelestinum Ludwigia octovalis, Schizachyrium scoparium, Spermacoce floridana, Eupatorium leptophyllum,* and *Cyperus ligularis*, among others.
>
> ***5.2.4.1.1.2*** **Broom sedge-Mixed herbaceous Marsh *(Andropogon virginicus* Mixed herbaceous Marsh) – MFRGaM:** In the disturbed sites, broom sedge (*Andropogon virginicus*) exists in co-dominance with many other species such as *Symphyotrichum subulatum, Lythrium alatum* var. *lanceolatum, Ludwigia octovalvis,* and *Mikania sandens.* The other associated species in this vegetation type are *Typha domingensis, Ludwigia microcarpa,* and *Schizachyrium scoparium*. This vegetation type is present

mainly at the restored sites in the hole-in-the-donut region within the Everglades National Park. The vegetation differs from the *Andropogon virginicus*-dominated vegetation due to presence of *Typha domingensis* and co-dominance of several herbaceous species.

5.2.4.2 Ruderal Herbaceous Freshwater Marsh (MFRH):

This type of ruderal marsh vegetation is co-dominated by ruderal forbs and/or herbaceous vines.

***5.2.4.2.1* Hempvine Mixed herbaceous marsh (*Mikania scandens* Mixed herbaceous Marsh) – MFRHm:** This type of vegetation is found in disturbed area. The vegetation is very diverse, and usually several species are co-dominant with hempvine (*Mikania scandes*). Among them, most frequently associated species are *Mitreola petiolata, Bacopa moninieri, Ludwigia microcarpa, Lythrum alatum* var. *lanceolatum, Eleocharis geniculata, Spermacoce floridana, Cyperus haspan, Andropogon virginicus,* and *Leptochloa fusca* ssp. *fascicularis.*

5.2.4.3 Ruderal Broad-leaved Emergent Freshwater Marsh (MFRB):

This type of ruderal marsh vegetation is dominated or co-dominated by broad leaved emergents.

***5.2.4.3.1* Water hyssop Marsh *(Bacopa monnieri* Mixed herbaceous Marsh) – MFRBb:** At some of restoration sites in the hole-in-the-donut area the vegetation is dominated by water hyssop (*Bacopa monnieri*). However, the type of vegetation is very diverse in species composition, and several species have moderately high cover. Among them, most common are *Panicum rigidulum*, water primerose (*Ludwigia microcarpa*) and sprangletop (*Leptochloa fusca* ssp. *fascicularis*). Other associated species in this vegetation type are *Mikania scadens, Symphyotrichum subulatum, Cyperus haspan, Fuirena breviseta, Mitreola petiole, Ludwigia octovalvis, Sagittaria lancifolia, Lythrium alatum* var. *lanceolatum,* and *Ludwigia repens*.

***5.2.4.3.2* Sprangletop Marsh (*Leptochloa fusca* ssp. *fascicularis* Marsh) – MFRBl:** This type of vegetation is common in disturbed area such as hole-in-the-donut region, where mostly early successional species are dominant. The vegetation type is dominated by sprangeltop (*Leptochloa fusca* ssp. *fascicularis*). The characteristic species of this vegetation type include *Mikania scandens, Symphyotrichum subulatum, Lythrum alatum* var *lanceolatum, Panicum hemitomon, Cyperus surinamensis, Andropogon virginicus,* and *Mitreola petiolata.*

***5.2.4.3.3* Water Primrose Marsh (*Ludwigia microcarpa* Marsh) – MFRBm:** This vegetation is dominated by water primrose (*Ludwigia microcarpa*), and is found mainly in restoration sites in hole-in-the-donut region in Everglades National Park. In this region, this type of vegetation is very close to *Anodropogon virginicus*-dominated vegetation type in species composition. Besides *Andropogon virgincus*, other characteristic species of this vegetation are *Schizachyrium scoparium, Rhynchospora colorata, Cyperus haspan, Fuirena breviseta, Centella asiatica, Rhynchospora microcarpa, Mikania scandens, Setaria parviflora, Juncus megacephalus, Ludwigia octovalvis, Symphyotrichum subulatum, Eragrostis atrovirens,* and *Mitreola petiolata*.

***5.2.4.3.4* Creeping Primrose Willow Marsh *(Ludwigia repens* Marsh) – MFRBr:** This vegetation type is primarily dominated by creeping primrose-willow (*Ludwigia repens*), and is mostly present at the disturbed sites in the hole-in-the-donut region in Everglades National Park and in Big Cypress National Preserve. The associated species in this vegetation are *Sagittaria lancifolia, Bacopa monnieri, Prosepinaca palustris, Leptochloa fusca* ssp. *fascicularis, Symphyotrichum subulatum, Panicum hemitomon,* and *Mikania scandens*, among others. Many of those species were characteristics of very wet conditions.

***5.2.4.3.5* Lax Hornpod-False Buttonweed Marsh (*Mitreola petiolata-Spermacoce floridana* Mixed herbaceous Marsh) – MFRBs:** This is also one of early successional vegetation, exclusively present in hole-in-the-donut area within Everglades National Park. This vegetation is co-dominated by lax hornpod (*Mitreola petiolata*), and false buttonweed (*Spermacoce floridana*). In this vegetation type, water primrose (*Ludwigia microcarpa*) is also commonly present, though together these three species have mean relative cover <25%, largely due to presence of several species with moderately high (>5%) cover. The characteristic species of this vegetation type are *Lythrum alatum* var. *lanceolatum, Cyperus polystachyos, Cyperus haspan, Ammannia latifolia,* and *Eleocharis geniculata, Ludwigia octovalvis, Rhynchospora colorata, Scoparia dulcis,* and *Bacopa monnieri*.

***5.2.4.3.6* Arrowhead-Mermaidweed Marsh *(Sagittaria lancifolia-Proserpinaca palustris* Marsh) – MFRBp:** This type of vegetation is present at restored sites in hole-in-the-donut in Everglades National Park. The vegetation type is primarily co-dominated by arrowhead (*Sagittaria lancifolia*) and mermaid-wee (*Proerpinaca palustris*). However, their sum relative cover is <25%, as many other associated species have also relatively high cover. Those species are *Rhynchospora microcarpa, Panicum rigidulum, Schizachyrium scoparium, Ludwigia microcarpa, Fuerena breviseta Mitreola petiolata, Eragraostis atrovirens, Cyperus haspan*, *Mikenia scandens,* and *Centella asiatica*, among others.

5.2.6 Open Freshwater Marsh (MFO):

Sparsely vegetated (<10% cover) open water freshwater marsh often with a mix of graminoids, herbaceous, and/or emergent freshwater vegetation, such as low stature sawgrass (*Cladium mariscus* ssp. *jamaicense*), spikerush (*Eleocharis* spp.), beakrush (*Rhynchospora tracyi*), panicgrass (*Panicum* spp.), xattail (*Typha domingensis*), arrowhead (*Sagittaria* spp.), Water primerose (*Ludwigia microcarpa*), pickerelweed (*Pontederia cordata*), water lily (*Nymphaea* spp.), among others.

5.2.7 Open Freshwater Prairie (MFWO):

Open ground or exposed rock with sparse vegetation (<10% cover) often with a mix of graminoids and/or forbs, such as low stature sawgrass (*Cladium mariscus* ssp. *jamaicense*), beakrushes (*Rhynchospora divergens*, *R. traceyi*), muhly grass (*Muhlenbergia capillaris* var. *filipes*), little bluestem *(Schizachyrium rhizomatum*), *Centella asiatica*, *Eragrostis elliottii, Crinum americanum*, among others.

3.5 Cross-walk with Rutchey's Classification

A crosswalk between the field data-based classification and Rutchey's classification of South Florida vegetation (Rutchey et al. 2007), showed correspondence in a majority of vegetation types at different levels (Appendix 4). Similar to Level-2 in Rutchey et al. (2007), the groupings in the present classification also resulted in Salt Marsh and Freshwater Water Marsh. However, since an additional level, primarily guided by concurrence between plant communities and its major environmental driver, which is hydrology in freshwater marsh and salinity in salt marsh, is suggested in this classification, Level 3, 4, and 5 in Rutchey et al. (2007) was comparable to Level 4, 5, and 6 in the present recommended classification. Life forms (graminoid, broadleaved, succulent) used for Level 3 in Ruthchey's classification is kept the same in this test classification, although graminoid cattail communities do not grouped with other graminoid, but instead were in different clusters depending on the dominance of cattail and percent abundance of associated species. The correspondence between Level 4 of Rutchey et al. (2007) and Level 5 of this classification was for 63% of vegetation types described in Rutchey's classification. Fourteen vegetation types described at Level-4 of Salt water and Freshwater Marshes in Rutchey et al. (2007) were not identified in the field data-based cluster analysis (Appendix 4).

In contrast, we identified a few associations that were previously not described by Rutchey et al. (2007). Four of them, including *Bacopa caroliniana, Bacopa monnieri, Ludwigia microcarpa* and *Ludwigia repens*, are in the Freshwater herbaceous marsh, one, *Andropogon virginicus*-dominated, is in the freshwater graminoid prairie.

4. Discussion

Development of a comprehensive vegetation classification is an iterative process that involves various quantitative and qualitative approaches, including collection of expert opinion, literature survey, interpretation of aerial photos, development of the classification system, collection of vegetation and important environmental data in the field, quantitative analysis of field data, verification of provisional vegetation types, and development of an ecologically meaningful vegetation classification. In these efforts, because collection of quantitative field data is an expensive and time consuming process, an endeavor was made to (1) gather existing field data collected by South Florida researchers, (2) assess their suitability for developing a vegetation classification, and (3) develop a test classification for a subset of the data, i.e., communities dominated by herbaceous plants. A vast amount of vegetation data has been collected from many South Florida sub-regions over the last two decades, and exists today in a wide assortment of formats. We gathered a large portion of those data, standardized their species nomenclature, and incorporated them into a geodatabase. While the existing vegetation data that can support a quantitative approach to vegetation classification covers most of terrestrial natural areas and vegetation associations present in South Florida, some areas are more extensively represented than others and some vegetation types described in Rutchey et al. (2007) and NatureServe (2006) are missing in the datasets. Moreover, classification of herbaceous sites using agglomerative cluster analysis suggests that plant communities in nature are strongly arranged along major environmental gradients, including hydrology and salinity, and levels of disturbance. To be most useful within the ecosystem restoration efforts currently underway in the region, a comprehensive classification system should incorporate those elements, so that tangible changes in community composition due to alterations in the environmental drivers can be easily assessed.

Sampling units and species data

The scale of spatial variation in vegetation composition has significant consequences on vegetation classification. However, sampling methods as well as the shape and size of sampling units may influence the expression of spatial variation (Chytrý and Otýpková 2003). As elsewhere, south Florida vegetation researchers have used sampling units that varied in shape and size. Since raw field data were not available for several datasets, no efforts were made to standardize the sampling units, though data collected in plots of fixed size are considered more useful for the development of classification systems (Jennings et al. 2006; 2009). The same authors suggest a two-pronged strategy for sampling in the vegetation classification process; plots for developing the classification (classification plots) and the others for providing supplemental information relevant to the existing vegetation types (occurrence plot). While data sets that record only dominant species and their abundance values can fulfill the requirements for occurrence plots, development of a field-data based vegetation classification requires the comprehensive list of species associated with classification plot sampling. If subplots are used within a plot, it is important that the species list includes taxa not recorded in the sub-plots, but present in the plot. In the south Florida vegetation data, several datasets, comprising of 42% of all usable data, either did not include species present only outside the sub-plots or did not have detailed information whether the species were included (Table 2; Appendix 1). When the number of sub-plots within a plot is adequate, the species present in the plot but not in sub-plots usually include uncommon species. These species are good indicators of environmental quality, despite being rare. They may not have significant impact on the classification, but can be helpful in management planning and for the determination of suitable management operations.

To minimize noise among the datasets used in the classification process, the species abundance measures were relativized by the site total. Two types of abundance measure, percent cover and frequency of species, were used. However, percent cover values are widely accepted abundance measures, as they are not only relatively rapid to field survey, but also are reliable for classification because they are subject to less noise due to variation in plot size (Jennings et al. 2006). In contrast, presence-absence based frequency data does not reflect accurately the inter-stand variation in species abundance, and is influenced by the size and number of sub-plots used within a plot or on a transect. Still, because our purpose was to use limited existing data to identify the vegetation types present over large geographical areas, rather than to categorize the individual sites, we based our analysis on species Importance Values derived from a combination of data sets that included percent frequency or percent cover only, or both measures together. Thus, the test classification developed for herbaceous sites in the present study needs to be cautiously used. We recommend that efforts to collect additional field data to fill gaps in the existing data should use plots as sampling units, and that the comprehensive and reliable classification be developed based on percent cover abundances.

Environmental drivers and plant community as continuum entity

One purpose for classifying sites that vary in vegetation composition is to extract the information on how plant communities are arranged along dominating environmental gradients. In South Florida, particularly in the Everglades, hydrology is considered to be the most important environmental factor in shaping the structure of freshwater plant communities at the local and regional scale (Gunderson 1989, 1994; Busch et al. 1998; Ross et al. 2003). In the coastal areas, however, vegetation communities are arranged along salinity gradients (Egler 1952; Ross et al. 2000). Therefore, it is no surprise that the grouping of sites in our classification of herbaceous communities express the hydrologic and salinity gradients in freshwater and coastal marshes, respectively. However, in several instances, breaks between clusters are very subtle, and significant compositional overlap exists between closely related groups. On the other hand, sites within a cluster sometimes vary considerably in species composition. Nevertheless, the sorts of within-cluster variation in species composition closely follow the influential environmental gradients. The results strongly support the continuum concept of community, i.e. communities are continuous rather than forming distinct, separate entities. In the classification of herbaceous sites, this was clearly observed in several clusters. For instance, *Cladium* Marsh which is dominated by sawgrass (*Cladium mariscus* ssp. *jamaicense*) varies greatly in species composition. Sawgrass is recognized as a species with tolerance to a wide range of hydrological conditions (Gunderson 1994, David 1996, Jordan et al. 1997), Within *Cladium* Marsh, it is obvious that the abundance of short- and long-hydroperiod adapted associates vary inversely with one another.

The data-based classification of herbaceous sites developed in this study differs from the Rutchey et al. (2007) classification at Level 3. At this level, Rutchey and co-authors used life forms as the major criteria for subgroups within both freshwater and salt marsh, with the primary objective of mapping vegetation from aerial photos. In the field-data based classification, however, such groupings were not distinct at this level. In contrast, freshwater communities grouped together based on their affinities with respect to hydrologic conditions and disturbances. For instance, the spikerush (*Eleocharis cellulosa*) – dominated "graminoid" marsh grouped with the water lily (*Nymphaea* and/or *Nymphoides*)-dominated "floating emergent" marsh, rather than with graminoid sawgrass (*Cladium mariscus* ssp. *jamaicense*) marsh, because of the habitat similarities of the first two groups, i.e., relatively long hydroperiod and high water level. However, the interaction between hydrology and disturbances (natural and anthropogenic) also is important in community differentiation. In this test classification, graminoid cattail communities do not grouped with other graminoid, but instead were in different clusters depending on the dominance of cattail and percent abundance of sawgrass and other herbaceous and semi-woody species. Salt marsh communities grouped together on the basis of position along the salinity gradient, though location within the region also influenced the grouping. For instance, in the present dataset Gulf cordgrass (*Spartina spartinae*) and dropseed (*Sporobolus virginicus*) salt marshes of the Florida Keys were separated from the rest of the salt marshes. Therefore, results of data-based classification suggest the use of ecological criteria to classify both freshwater and salt marsh vegetation at Level 3. For freshwater marsh, three groups are recognized along a gradient of increasing hydric condition, seasonally flooded wet prairie, seasonally flooded marsh, and semi-permanently flooded marsh. For salt marsh, three groups are recognized along a gradient of increasing salinity: oligohaline, mesohaline and hyepersaline marsh. These ecological groupings, particularly for freshwater marsh, are in concurrence with the criteria used in the Terrestrial Ecological Classification for Tropical Florida (NatureServe 2006), and also have important management implications. Ongoing restoration efforts under the Comprehensive Everglades Restoration Plan (CERP) are set to alter the existing management-induced hydrologic regimes, thereby affecting the relative species abundances of both inland and coastal plant communities. Changes in relative species abundance caused by modification in hydrologic regimes, particularly in the freshwater communities, will result in a gradual shift in community composition along the hydrologic gradient. In coastal areas, management-induced alteration in freshwater delivery may influence the salinity of the brackish water environments, though the effects will be strongly modified by sea level rise, which is noticeable in South Florida coastal zones. In general, even minor changes in salinity can significantly impact species composition in the coastal prairies. Therefore, recognition of vegetation alliances and associations arranged along hydrologic and salinity gradients can serve as a tool in monitoring the success of restoration efforts.

Disturbances and plant communities

Both natural and anthropogenic disturbances have been important players in plant community organization in South Florida, particularly in the Everglades. Disturbances influence vegetation composition by removing biomass, and modifying post-event colonization rates and successional trajectories. While fires and hurricanes are two major disturbances that influence vegetation patterns in South Florida (Egler 1952; Craighead and Gilbert 1962; Gunderson 1994), restoration and creation of wetlands on degraded lands and sites that have been prone to encroachment by invasive species are an integral part of wetland mitigation measures. Moreover, a change in water quality resulting from anthropogenic disturbance and the release of phosphorus from the Everglades Agricultural Area (EAA) has accelerated the growth of cattail and associated species. Furthermore, regular visits by people on tree islands, and adjoining marshes in north-east Shark Slough and in Water Conservation Areas have also impacted the vegetation composition there. From the above instances, it is obvious that, plant communities in some localities in South Florida are largely reflections of different types and levels of disturbance. A comprehensive vegetation classification that includes the vegetation associations formed in response to disturbances would help to effectively plan and monitor ecosystem restoration activities.

Existing vegetation datasets and data gaps

Vegetation data included in the geodatabase cover most of the natural area management entities in South Florida. Sample coverage is excellent in some areas, particularly the wet prairies and marshes in Everglades National Parks and Water Conservation Areas, while communities present in Big Cypress National Preserve either are not sampled or if sampled, the data in their current form are not adequate for vegetation classification.

Freshwater Marsh vegetation present in Water Conservation Areas and sloughs in Everglades National Park are well covered under EPA's REMAP sampling scheme, but the quantitative species data includes percent frequency rather than percent cover, and lacks a comprehensive list of all species present in the plot; these data characteristics are considered essential for developing a comprehensive vegetation classification (Jennings et al. 2006, 2009). Moreover, despite the presence of ample data points in freshwater marsh **(Table 5)**, mostly as random samples in REMAP data, and transect sampling in Ross_MAP data, several freshwater communities described in Rutchey et al. (2007) are still not represented in the existing datasets (Appendix 4), suggesting the need for either an increase in sampling intensity of random points or incorporation of some form of systematic sampling to represent those plant communities. Additional sampling is also needed to cover the range of salt marshes present in South Florida, as half of the salt marsh types listed in Rutchey et al. (2007) classification, are not present in the current dataset.

Woody vegetation data cannot be considered complete. The existing data covers tree islands in Shark Slough, the C111 basin, southern WCA 3A and 3B, pinelands in Raccoon Point (BICY), and Long Pine Key (EVER), a few sites in Cypress vegetation in BICY, Cypress and pine flatwood vegetation in PSSF and FPNWR. However, not all kinds of tree islands are represented in the dataset, and data from a large area of woody vegetation in BICY are not available. Similarly, sufficient data on mangrove and other coastal vegetation, particularly in Taylor Slough basin and along the west coast of South Florida are also missing. A well-coordinated sampling scheme at a number of recommended sites (**Table 5)** is needed to gather vegetation data from these areas.

Classification of woody vegetation is primarily based on cover and height (Rutchey et al. 2007). However, most of vegetation datasets representing woody vegetation include relative abundance, basal area, and/or density of trees. Cover estimates are available from only five datasets, covering 433 data points, including 117 in Florida Keys; height estimates are not available from even these data. Sampling efforts aimed at gathering woody vegetation data should include estimation of species cover and height by strata.

5. Conclusions

The existing vegetation datasets received from a number of distinguished researchers covers most of terrestrial natural areas and vegetation associations present in South Florida. However, in the datasets, some areas are more extensively represented than others and some vegetation types, in both woody and herbaceous groups, described in existing classification systems are missing. Moreover, classification of herbaceous sites using hierarchical agglomerative cluster analysis suggests that freshwater and salt marsh communities are arranged along hydrology and salinity gradients, respectively. In addition, plant communities in some localities are largely reflections of different types and levels of disturbance. To be most useful within the ecosystem restoration efforts currently underway in the Greater Everglades, a comprehensive and reliable classification system should incorporate those elements, so that tangible changes in community composition due to alterations in the environmental drivers can be easily assessed.

6. References

Armentano, T. V., Sah, J. P., Ross, M. S., Jones, D. T., Cooley, H. C. and Smith, C. S. 2006. Rapid responses of vegetation to hydrological changes in Taylor Slough, Everglades National Park, Florida, USA. *Hydrobiologia* 569: 293-309.

Barry, M. 2006. Vegetation sampling from 1996 to 2006 at Florida Panther National Wildlife Refuge (With comparisons to data collected at Picayune Strand State Forest and Fakahatchee Strand Preserve Sate Park). Draft Report. Submitted to US Fish and Wildlife Service, Florida Panther National Wildlife Reserve, Naples, FL.

Bradley, K. A. and Woodmansee, S. W. 2006. South Florida National Parks Vegetation Map Accuracy Assessment. Final Report – Cooperative Agreement # H51200040010. Submitted to National Park Service - South Florida/Caribbean Network, Palmetto Bay, FL. June 6, 2000.

Busch D.E., Loftus W.F. and Bass O.L. Jr 1998. Long-term hydrologic effects on marsh plant community structure in the southern Everglades. *Wetlands* 18: 230–24.

Chytrý M. and Otýpková, Z. 2003. Plot sizes used for phytosociological sampling of European vegetation. *Journal of Vegetation Science* 14: 563-570.

Clarke, K.R. 1993. Non-parametric multivariate analyses of changes in community structure. *Australian Journal of Ecology* 18: 117-143.

Clarke, K. R. and Gorley, R. N. 2001. PRIMER v5: User manual/Tutorial. Primer-E. Plymouth, 91p.

Clarke, K. R. and Warwick, R. M. 2001. Change in Marine Communities: An Approach to Statistical Analysis and Interpretation. 2nd Edition., PRIMER-E Ltd, Plymouth Marine Laboratory, Plymouth, UK. 144p.

David, P. G. 1996. Changes in plant communities relative to hydrologic conditions in the Florida Everglades. *Wetlands* 16:15-23.

Egler F. E. 1952. Southeast saline Everglades vegetation, Florida, and its management. *Vegetatio* **3**: 213–65.

Gann, T. T. and Childers, D. L. 2006. Relationships between hydrology and soils describe vegetation patterns in seasonally flooded tree islands of the southern Everglades, Florida. *Plant and Soil* 279: 271-286.

Gauch, H. G. Jr. 1982. Multivariate Analysis in Community Ecology. Cambridge Studies in Ecology, Canbridge University Presess, New York, NY.

Gunderson L. H. 1989. Historical hydropatterns in wetland com munities in Everglades National Park. In: Sharitz R.R. and Gibbons J.W. (eds), Freshwater Wetlands and Wildlife. CONF- 8603101, DOE Symposium Series No. 61., pp. 1099–1111.

Gunderson, L. H. 1994. Vegetation of the Everglades: Determinants of community composition. In: S. M. Davis and J. C. Ogden, (Eds.) Everglades, the Ecosystem and its Restoration. Pages 323-340. St. Lucie Press, Delray Beach, FL.

Hanan, E. 2008. Multi-Scaled Patterning of Plant-Soil-Water Interactions across Tree Islands and Marshes within the Prairie and Slough Landscapes of Everglades National Park. MS Thesis. Department of Environmental Studies, Florida International University, Miami, FL.

Heisler, L., Towle, D. T., Brandt, L. A. and Pace, R. T. 2002. Tree island vegetation and water management in the central Everglades. In: Sklar, F. H. and van der Valk, A. (Eds) *Tree Islands of the Everglades*. pp. 283-310. Kluwer Academic Publishers, Boston, MA.

Jennings, M. D., Faber-Langendoen, D., Peet, R.K., Loucks, O.L., Glenn-Lewin, D. C., Damman, A., Barbour, M. G., Pfister, R., Grossman, D.H., Roberts, D., Tart, D., Walker, M., Talbot, S.S., Walker, J., Hartshorn, G.S., Waggoner, G., Abras, M.D., Hill, A., Rejmanek, M. 2006. Description, Documentation, and Evaluation of Associations and Alliances within the US National Vegetation Classification. Manuscript version 4.5, June 2006.

Jennings, M. D., Faber-Langendoen, D., Loucks, O.L., Peet, R.K., and Roberts, D. 2009. Standards for associations and alliances of the US National Vegetation Classification. *Ecological Monographs* 79 (2): 173-199.

Jordan, F., Jelks, H. L. and Kitchens, W. M. 1997. Habitat structure and plant community composition in a northern everglades wetland landscape. *Wetlands* 17:275-283.

Kline, M., Ross, M. S., Ruiz, P. L., Shamblin, B., Sah, J. P., Hanan, E. J. and Stoffella, S. 2007. Marl Prairie/Slough Gradients; patterns and trends in Shark Slough and adjacent marl prairies (CERP monitoring activity 3.1.3.5). Annual Report.

Lance, G. N. and Williams, W. T. 1967. A general theory of classification sorting strategies I. Hierarchical systems. *The computer journal* 9: 373-380.

Legendre, P. and Legendre, L. 1998. *Numerical Ecology*. 2nd English Edition. Elsevier Science B. V., Amsterdam.

Milligan, G. W. 1989. A study of the Beta-Flexible Clustering Method. *Multivariate Behavioral Research, 24*, 163-176.

Milligan, G.W. and M.C. Cooper. 1988. A Study of Standardization of Variables in Cluster Analysis. *Journal of Classification* 5:181-204.

NatureServe. 2006. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 23 October 2006.

Ross, M. S., Meeder, J. F., Telesnicki, G. J., Ruiz, P. L. Ruiz and Sah, J. P. 1996. Vegetation Analysis in the C-111/Taylor Slough Basin (Final Report). November, 1996. Southeast Environmental Research Center. Contract – 4244.

Ross, M. S., O'Brien, J. and Flynn, L. 1992. Ecological site classification of Florida Keys terrestrial habitats. *Biotropica* 24:488-502.

Ross, M. S. and Ruiz, P. L. 1996. A Study of the Distribution of Several South Florida Endemic Plants in the Florida Keys. Report to the U. S. Fish and Wildlife Service. March 15, 1996.

Ross, M. S., Meeder, J. F., Sah, J. P., Ruiz, P. L. and Telesnicki, G. J. 2000. The Southeast Saline Everglades revisited: a half-century of coastal vegetation change. *Journal of Vegetation Science* 11:101-112.

Ross, M. S. Sah, J. P., Snyder, J. R., Ruiz, P. L., Jones, D. T., Cooley, H. C., Travieso, R., and Hagyari, D. 2006. Effect of Hydrology Restoration on the Habitat of the Cape Sable Seaside Sparrow. Third Annual Report to Everglades National Park. March, 2006. pp 50.

Ross. M. S., Sah, J. P., Ruiz, P. L., Jones, D.T., Cooley, H.C., Travieso, R., Snyder, J.R. and Robinson, S. 2004. Effect of Hydrology Restoration on the Habitat of the Cape Sable Seaside Sparrow. Report to Everglades National Park. November 30, 2004.

Ross, M. S., Reed, D. L., Sah, J. P., Ruiz, P. L. and Lewin, M. T. 2003. Vegetation: environment relationships and water management in Shark Slough, Everglades National Park. *Wetlands Ecology and Management* 11: 291-303.

Ruiz, P. L., Ross, M. S. Walters, J, Hwang, B. Gaiser, E. E. and Tobias. F. 2002. Vegetation of the Coastal Wetlands in Biscayne National Park: Blocks 6-8. Report to the South Florida Water Management District (SFWMD contract C-12409).

Rutchey, K., Schall, T.N., Doren, R.F., Atkinson, A., Ross, M. S., Jones, D.T., Madden, M., Vilchek, L., Bradley, K. A., Snyder, J.,R., Burch, J.,N., Pernas, T., Witcher, B., Pyne, M. ,White, R., Smith III, T.J., Sadle, J., Smith, C. S., Patterson, M. E., and Gann, G. D. 2006, Vegetation Classification for South Florida Natural Areas: Saint Petersburg, Fl, United States Geological Survey, Open-File Report 2006-1240. 142 p.

Rutchey, K., Schall, T.N., Doren, R.F., Atkinson, A., Ross, M. S., Jones, D.T., Madden, M., Vilchek, L., Bradley, K. A., Snyder, J.,R., Burch, J.,N., Pernas, T., Witcher, B., Pyne,

M. ,White, R., Smith III, T.J., Sadle, J., Smith, C. S., Patterson, M. E., and Gann, G. D. 2007. Vegetation Classification System for South Florida Natural Areas. Version 5.22.07.

Scheibler, D. and Schneider, W. 1985. Monte Carlo Tests of the Accuracy of Cluster Analysis Algorithms: A Comparison of Hierarchical and Nonhierarchical Methods. *Multivariate Behavioral Research*, 20: 283-304

Snyder, J. R. and Belles, H. A. 2000. Long-term study of fire season and frequency in pine forest and associated cypress wetlands, Big Cypress National Preserve: Project Description and Preliminary data. A Report. US Geological Survey, Ochopee, FL 34141.

Snyder, J. R., Ross, M. S., Koptur, S. and Sah, J. P. 2005. Developing Ecological Criteria for Prescribed Fire in South Florida Pine Rockland Ecosystems. USGS Open File Report OF: 2006-1062.

Westfall, R. H., Theron, G. K. and Rooyen, N. 1997. Objective classification and analysis of vegetation data. *Plant Ecology* 132: 137-154.

Table 1: List of datasets received.

SNO	Dataset_ID	Dataset_Name	Dataset_Source	VegClass	Dataset_Region
1	Armentano_HH	EVER Hammocks	Tom Armentano	Forest	EVER
2	Barry_VEGMON	SW Florida Vegetation Monitoring	Mike Barry	Forest, Woodland, Shrubland, Scrub, Marsh	FPNWR, FSPSP, PSSF, TTINWR
3	Burch_BICY	BICY-PSSF Prairie Vegetation	Jim Burch	Marsh	BICY, PSSF
4	Coronado_TI	WCA3 Tree Islands	Carlos Coronado	Forest	WCA3
5	ENP_HID	Hole-In-Donut Vegetation Monitoring	ENP Website (Nancy O'Hare)	Shrubland, Scrub, Marsh	EVER
6	ENP_PIEL	ENP Fire Monitoring	Hillary Cooley	Woodland	EVER
7	ENP_PRAIRIE	ENP Fire Monitoring	Hillary Cooley	Marsh	EVER
8	Hanan_TIRES	Resource Islands	Erin Hanan	Woodland	EVER
9	Heisler_TI	WCA Tree Islands	Lorraine Heisler	Forest	WCA3A & 3B
10	IRC_AA	Accuracy Assessment	Keith Bradley	Forest, Woodland, Shrubland, Scrub, Marsh	EVER, BISC
11	IRC_INTERCEPT	Intercept	Keith Bradley	Forest, Woodland, Shrubland, Scrub, Marsh	EVER, BISC, BICY
12	Possley_MDCPINE	Miami Dade County Pinelands	Jennifer Possley	Woodland	MDC
13	Richards_REMAP05	REMAP-2005 Vegetation Monitoring	Jennifer Richards	Marsh, Submerged Aquatic	EVER, WCAs
14	Richards_REMAP99	REMAP-1999 Vegetation Monitoring	Jennifer Richards	Marsh, Submerged Aquatic	EVER, WCAs
15	Rivera_MANGROVE	FCE-LTER Mangroves	Victor River-Monroy	Forest, Scrub	EVER
16	Ross_BBCW	Biscayne Bay Coastal Wetlands	Mike Ross	Forest, Woodland, Shrubland, Scrub, Marsh	BISC
17	Ross_BPK	Big Pine Key Fire Ecology	Mike Ross	Forest, Woodland	NKDR
18	Ross_C111MP	C-111 Marsh and Prairies	Mike Ross	Marsh	EVER
19	Ross_C111TI	C-111 Tree Islands	Mike Ross	Forest	EVER
20	Ross_CSSS	CSSS Habitat Vegetation	Mike Ross	Marsh	EVER, BICY
21	Ross_ENDEMIC	Keys Endemics	Mike Ross	Forest, Marsh	Florida Keys
22	Ross_KEYS	Keys Vegetation	Mike Ross	Forest, Marsh	Florida Keys

SNO	Dataset_ID	Dataset_Name	Dataset_Source	VegClass	Dataset_Region
23	Ross_MAP	MAP Transects	Mike Ross	Marsh	EVER
24	Ross_RS	Ridge and Slough Vegetation	Mike Ross	Marsh	EVER
25	Ross_SS	Shark Slough Vegetation	Mike Ross	Woodland, Marsh	EVER
26	Ross_TIEXT	Extensive Tree Islands	Mike Ross	Forest	EVER, WCA3A & 3B
27	Ross_TIINT	Intensive Tree Islands	Mike Ross	Forest	EVER
28	Ross_TS	Taylor Slough	Mike Ross	Marsh	EVER
29	Rutchey_WCA2	Vegetation Mapping WCA2	Ken Rutchey	Forest, Woodland, Shrubland, Scrub, Marsh, Submerged Aquatic	WCA2
30	Rutchey_WCA3	Vegetation Mapping WCA3	Ken Rutchey	Forest, Woodland, Shrubland, Scrub, Marsh, Submerged Aquatic	WCA3s
31	Shamblin_HH	Biscayne Island Hammocks	Brooke Shamblin	Forest	BISC
32	Smith_TI	ENP Tree Islands	Craig Smith	Forest	EVER
33	Snyder_RP	Raccoon Point Fire Monitoring	Jim Snyder	Forest	BICY
34	Trexler_FISHMON	FISHMON Vegetation	Joel Trexler	Marsh, Submerged Aquatic	EVER, WCAs
35	Troxler_C111TI	C111 Bayheads	Tiffany Troxler	Forest	EVER

Table 2: Datasets with types of sampling units used in the field to collect vegetation data, and their usefulness for developing field data-based classification. Y = yes, N = No; NA = information not available.

S. No.	Dataset_ID	Point	Transect		Plot		Nested plots	Subplots			No. of Sites	Comprehensive species list in plot	Usefulness in Classification
			Line	Belt	Y/N	Size		Y/N	Size	Number			
1	Armentano_HH			Y							41	NA	Medium-High
2	Barry_VEGMON		Y	Y	Y	5 x 50 m^2	Y	Y	0.5 x 1 m^2	5-10	308	NA	High
3	Burch_BICY		Y		Y	10 x 10 m^2		Y	1 x 1 m^2	12-48	52	NA	High
4	Coronado_TI				Y	10 x 10 m^2					49	Y	High
5	ENP_HID				Y	10 x 10 m^2					500	Y	Low-Medium
6	ENP_PIEL	Y	Y	Y	Y	50 x 20 m^2	Y	Y	10 x 25 m^2	4	27	N	Medium-High
7	ENP_PRAIRIE	Y	Y	Y	Y	50 x 20 m^2					57	N	Medium-High
8	Hanan_TIRES				Y	Variable					8	Y	High
9	Heisler_TI		Y					Y	2-m radius	10	31	NA	High
10	IRC_AA		Y		Y	(4) 40x20 m^2					257	N	High
11	IRC_INTERCEPT	Y	Y								600	NA	Minimal
12	Possley_MDCPINE				Y	20 x 40 m^2	Y	Y	5 x 5 m^2 & 1 x 1m^2	3 & 9	20	Y	High
13	Richards_REMAP05				Y	10 x 2 m^2	Y	Y	1 x 1 m^2 & 0.5 x 0.5 m^2	5 & 20	344	N	Medium-High
14	Richards_REMAP99				Y	10 x 2 m^2	Y	Y	1 x 1 m^2 & 0.5 x 0.5 m^2	5 & 20	418	N	Medium-High
15	Rivera_MANGROVE				Y	20 x 20 m^2	Y	Y	10 x 10 m^2	4	7	Y	High
16	Ross_BBCW			Y	Y	10 x 10 m^2	Y	Y	1 x 1 m^2	5	299	NA	High
17	Ross_BPK				Y	100 x 100 m^2	Y	Y	50 m^2 & 1 m^2	20 & 80	18	Y	High
18	Ross_C111MP				Y	50 m radius	Y	Y	1 x 1 m^2	30	57	Y	High
19	Ross_C111TI				Y	Variable					56	Y	Medium-High
20	Ross_CSSS				Y	60 x 1 m^2	Y	Y	0.5 x 0.5 m^2	10	906	Y	High
21	Ross_ENDEMIC				Y	5 m radius					232	N	Medium
22	Ross_KEYS				Y	5 x 5 m^2					127	Y	High
23	Ross_MAP				Y	5 x 5 m^2	Y	Y	1 x 1 m^2	5	285	Y	High

S. No.	Dataset_ID	Point	Transect		Plot		Nested plots	Subplots			No. of Sites	Comprehensive species list in plot	Usefulness in Classification
			Line	Belt	Y/N	Size		Y/N	Size	Number			
24	Ross_RS				Y	5 x 5 m^2	Y	Y	1 x 1 m^2	5	84	Y	High
25	Ross_SS				Y	10 x 10 m^2	Y	Y	5 x 5 m^2 & 1 x 1m^2	1 & 3	668	Y	High
26	Ross_TIEXT				Y	Variable	Y	Y	1-m, 2-m & 3-m radius	3 to 6	72	N	Medium-High
27	Ross_TIINT				Y	Variable	Y		5 x 5 m^2 & 1-m radius	12-15	16	Y	High
28	Ross_TS				Y	5 x 1 m^2	Y	Y	0.5 x 0.5 m^2	20	100	Y	High
29	Rutchey_WCA2										532	NA	Minimal
30	Rutchey_WCA3										2402	NA	Minimal
31	Shamblin_HH				Y	20x20 m^2	Y	Y	5 x 5 m^2 & 1 x 1 m^2	2 & 4	32	Y	High
32	Smith_TI				Y	Variable					72	NA	Minimal
33	Snyder_RP				Y	100 x 100 m^2	Y	Y	20 x 50 m^2 & 1 x 1m^2	1 & 20	90	Y	High
34	Trexler_FISHMON				Y	100 x 100 m^2	Y	Y	1 x 1 m^2	5 to 7	70	N	Medium
35	Troxler_C111TI		Y					Y	2 x 3 m^2	11 to 14	9	NA	Medium-high

Table 3: Datasets with different measures of species abundance

Dataset_ID	Stratum	Record of species	P/A	Rank Abund.	Relative Abund.	Freq.	Density	Basal Area	Cover Category	Cover Value	Height Category	Height	Biomass
Armentano_HH	Tree	C	Y	Y									
Barry_VEGMON	Tree	C	Y				Y	Y					
	Sapling/Shrub	C	Y				Y						
	Herb		Y			Y			Y	Y			
Burch_BICY	NA	C	Y							Y			
Coronado_TI	Tree	C	Y				Y						
ENP_HID	NA	C	Y							Y	Y		
ENP_PIEL	Tree	I	Y				Y	Y					
	Shrub	I	Y				Y						
	Herb	I	Y			Y*				Y			
ENP_PRAIRIE	Shrub	I	Y				Y			Y			
	Herb	I	Y			Y*							
Hanan_TIRES	Tree	C	Y						Y	Y			
Heisler_TI	Tree		Y			Y				Y			
	Sapling/Shrub		Y			Y				Y			
IRC_AA	Tree		Y						Y**	Y**			
	Shrub		Y						Y**	Y**			
	Herb	I	Y						Y**	Y**			
IRC_INTERCEPT	NA		Y			Y*							
Possley_MDCPINE	Tree	C	Y							Y			
	Shrub		Y			Y				Y			
	Herb		Y			Y				Y			
Richards_REMAP05	Herb		Y			Y							
Richards_REMAP99	Herb		Y			Y							
Rivera_MANGROVE	Tree	C	Y					Y					
Ross_BBCW	Tree	C	Y				Y		Y	Y			
	Sapling/Shrub		Y						Y	Y			
	Herb		Y			Y			Y	Y			
Ross_BPK	Tree	C	Y				Y	Y		Y			
	Sapling/Shrub		Y			Y							Y

Dataset_ID	Stratum	Record of species	P/A	Rank Abund.	Relative Abund.	Freq.	Density	Basal Area	Cover Category	Cover Value	Height Category	Height	Biomass
	Herb		Y			Y				Y			
Ross_C111MP	Herb	I	Y	Y		Y							
Ross_C111TI	Tree	C	Y	Y									
Ross_CSSS	Herb	C	Y			Y				Y			
	Woody		Y				Y						
Ross_ENDEMIC	Tree	C	Y				Y						
	Sapling/Shrub		Y				Y						
	Herb		Y							Y			
Ross_KEYS	NA		Y							Y			
Ross_MAP	Herb	C	Y			Y			Y				
	Woody		Y				Y						
Ross_RS	Herb	C	Y			Y			Y	Y			
	Woody		Y				Y						
Ross_SS	Herb		Y			Y			Y	Y			
	Woody		Y				Y						
Ross_TIEXT	Tree	C	Y	Y			Y	Y					
	Herb		Y	Y									
Ross_TIINT	Tree	C	Y				Y	Y				Y	
	Sapling/Shrub		Y			Y			Y	Y			
	Herb		Y			Y			Y	Y			
Ross_TS	Herb		Y			Y			Y	Y			
Rutchey_WCA													
Shamblin_HH	Tree	C	Y				Y	Y					
	Sapling		Y			Y	Y						
Smith_TI	Tree		Y		Y								
Snyder_RP	Tree	C	Y				Y	Y					
	Sapling/Shrub		Y						Y	Y			
	Herb		Y			Y			Y	Y			
Trexler_FISHMON	Herb		Y			Y	Y						
Troxler_C111TI	Tree		Y			Y	Y	Y					

NA = Not distinct; Record of species - C = Complete, I = Incomplete, Blank = Information not available. * Frequency & Cover same, as those values are calculated as percent of intercepts at a fixed number of intercept points along line transect. ** Only for dominant (with cover >5%) species.

Table 4: The descriptions of contents of files (Tables/Feature Class layers) included in the SFV_Geodatabase

SNO	File Name	Table/ Feature Class	Contents
1	SFV_Dataset_Contacts	Table	The list of 35 vegetation datasets that were received for developing field-data based classification of South Florida plant communities, and contact address of the researchers who contributed their vegetation data.
2	SFV_Dataset_Details	Table	The sampling details of 35 datasets that were received from researchers.
3	SFV_Site_Locations	Point features	The list of vegetation data sites and their geographical coordinates.
4	SFV_Site_Attributes	Table	The table lists vegetation data sites, and their attributes. Together with geographical location, the attributes included the type, size and number of vegetation sampling units used at each site, vegetation characters, elevation, soil depth, water depth, type of disturbances and time since disturbances. However, not all sites have data for each attributes, as the kind of information varied among datasets received from researchers.
5	SFV_Dataset_Species	Table	Scientific name and codes of plant taxa present in vegetation datasets In this data file, both researcher's version and updated version of scientific name and codes for plant taxa are given.
6	SFV_Species_List	Table	The list of plant taxa present in South Florida vegetation datasets
7	SFV_Dataset_Vegdata_ALL	Table	Vegetation data received from several researchers. Vegetation data are nearly in the same form as they were received from researchers.
8	SFV_Species_Data	Table	The data file consists of species presence/absence and abundance data. For vegetation datasets that were received from researchers, species abundance data are summarized for each species by vegetation stratum and site.
9	SFV_Lookup_AgeClass	Table	The lookup table consists of definition of codes used by researchers to record species abundance by age class.
10	SFV_Lookup_CoverCode	Table	The lookup table consists of definition of cover codes used by researchers to record species cover within a vegetation sampling unit.
11	SFV_Lookup_EventID	Table	The lookup table consists of definition of codes used by researchers to represent the sampling event when the same permanent sites have been sampled repeatedly.
12	SFV_Lookup_HeightClass	Table	The lookup table consists of definition of codes used by researchers to record species abundance by height class.
13	SFV_Lookup_MgtEntity	Table	The lookup table consists of definition of codes used for management entities that are represented by the sites with vegetation data included in the

SNO	File Name	Table/ Feature Class	Contents
			datasets.
14	SFV_Lookup_RankAbundance	Table	The lookup table consists of definition of codes used by researchers to rank species based on their abundance within a vegetation sampling unit.
15	SFV_Lookup_SamplingUnit	Table	The lookup table consists of definition of codes for type of sampling units used by researchers to record species abundance.
16	SFV_Lookup_VegLayer	Table	The lookup table consists of definition of vegetation layer (stratum) used by researchers to record species abundance within a vegetation sampling unit.
17	SFV_H_Sites_Species_IV_Data	Table	Species importance value (IV) data for only marsh and prairie sites.
18	SFV_H_Sites_Vegtypes	Table	The table lists herbaceous sites, their geographical coordinates and results of test vegetation classification.
19	SFV_H_Sites_vegtype_Loc	Point features	The feature class has herbaceous sites, their geographical coordinates and results of test vegetation classification.
19	SFV_H_Sites_Vegtypes_Desc	Table	The table describes the field-data based vegetation classification of herbaceous sites (Level 1: Marsh) for which vegetation data were received from several researchers, and results of crosswalk with south Florida vegetation classification described in Rutchey et al. (2006).
20	IRC_Intercept_Points	Table	A list of points used for the quantitative plant inventory of the BICY conducted by Institute for Regional Conservation (IRC) between 2003-2004 for accuracy assessment
21	IRC_Intercept_Species_Data	Table	Quantitative plant inventory of the BICY conducted by Institute for Regional Conservation (IRC) for accuracy assessment.
22	Rutchey_WCA2_Vegdata	Table	The file contains the information on vegetation collected at sites visited during the WCA2 vegetation mapping effort.
23	Rutchey_WCA3_Vegdata	Table	The file contains the information on vegetation collected at 2402 checksites visited during the WCA3 vegetation mapping effort. Field visits took place from 1996 to 2003 via airboat or helicopter.
24	Rutchey_WCA3_abbreviatios	Table	The file contains the information on abbreviations used to describe vegetation at 2402 checksites visited during the WCA3 vegetation mapping effort.
25	Management_Areas	Polygon features	BICY, BISC, EVER, FPNWR, FSPSP, GWHNWR, NKDR, PSSF, RWMA, SFWMD, SGWEA, TTNWR, WCA
Relational classes			
1	SFV_Site_Loc_Attributes		Relation between Site_Locations and Site_Attributes

SNO	File Name	Table/ Feature Class	Contents
2	H_Sites_Veg_Site_Attribute		Relation between Herb_Vegtype_Locations and Site_Attributes
4	H_Sites_Veg_Loc_Des		Relation between Herb_Vegtype_Locations and H_Sites_Vegtype_Description
3	H_Sites_Veg_Spp_IV		. Relation between Herb_Vegtype_Locations and H_Sites_Species_IV_Data

Table 5: Major vegetation categories with number of useful sites in the existing datasets, and minimum number of recommended additional field sites needed.

General category or area/region			# potentially usable sites in datasets	Minimum # additional sites needed	Comments
Level (Rutchey et al. 2007)	**General Vegetation Category**	**Region**			
1 & 2	Hammock and Swamp forests/woodlands	BICY	36	64	In IRC_AA dataset, forest and woodland data are usable to the limited extent as the data were cover of only dominant species (>5% cover). Additional 20 forest sites and 44 woodland sites are recommended.
1 & 2	Tree islands (Hammocks & Bayheads/forests and woodlands)	EVER	203	55	Hardwood hammocks on the tree islands are well represented, but bayheads and prairie islands are underrepresented. Also, the data include mostly P/A and/or basal area. Tree height is available for only 16 plots. Additional plot data at least in 25 bayheads and 30 prairie islands are recommended.
		WCAs	94	66	Species abundance data include (density, basal area, or frequency & cover), but no height. So they have only limited use. Additional sites with species cover and height are needed.
1 & 2	Hardwood forests and woodlands (Florida Bay keys and islands)	EVER & Keys	58	32	Ross_Keys sites well represent the forests in woodlands in the Florida keys. Sites to characterize vegetation in the Florida bay islands are needed.
1 & 2	Coastal Hardwood Hammocks (Biscayne	BISC	32	28	Shamblin_HH sites represent the hammocks in the region to some extent.

General category or area/region			# potentially usable sites in datasets	Minimum # additional sites needed	Comments
Level (Rutchey et al. 2007)	General Vegetation Category	Region			
	Bay Keys & Islands)				Considering that this vegetation covers 22.7% area (Ruiz et al. 2008), additional plots that are randomly located in mainland and islands of the region.
1 & 2	Pinelands	Keys, EVER, Miami-Dade, BICY	167	0	Sufficient sites for analysis to proceed Height data not available. Developing a relationship between DBH & Height is recommended.
1, 2, 3 & 4	Pine Flatwoods	PSSF, FPNWR	139	0	Sufficient sites in PSSF and FPNWR for analysis. For additional data in other regions of South Florida, researchers working in those regions need to be contacted.
1, 2, 3 & 4	Mangrove forests/woodlands/ shrublands	Florida Keys & Biscayne Bay Coastland	243	0	Sufficient sites for analysis to proceed Height data not available. Therefore, classification into different categories of woody vegetation will need information on height.
		EVER	51	69	Most of sites are concentrated in C111 and Taylor Slough basin. Data for additional sites in Ten Thousand Island NWR and other regions in EVER are strongly recommended, as the mangroves are likely to be impacted by sea level rise. +
3	Shrubland	EVER, BICY, FPNWR	45	60	Dwarf cypress in both EVER and BICY are well represented. Some of Shrublands adjacent to tree islands in

General category or area/region			# potentially usable sites in datasets	Minimum # additional sites needed	Comments
Level (Rutchey et al. 2007)	General Vegetation Category	Region			
					EVER are represented. At least additional 15 more sites in EVER are needed. Shrubby vegetation is common on tree islands in WCAs. At least 45 sites in these areas are recommended.
4	Scrubland	EVER, BICY, FNPWR, PSSF	46	74	More than half of scrub vegetation data are from FNPWR and PSSF. Data for few sites are from EVER, and very few sites from BICY. At least, additional 30 sites in BICY, 15 in EVER, and 30 in WCAs are needed.
5	Freshwater marsh	EVER, BICY, BISC, WCAs, Keys, FNPWR, PSSF, PSPSP, TTINWR	3515	145	Analysis complete, but 12 Rutchey et al (2007) categories (Appendix 2) did not have any plots supporting them and three categories had only 1-2 plots. Additional 8-10 plots in each of those categories are needed.
5	Salt marsh and coastal prairies	EVER, Keys	44	32	Analysis was done, but a few Rutchey et al (2007) categories, such as Keysgrass, Glasswort, Sea Purslane, Herbaceous salt marsh, and Open Salt marsh did not have any plots supporting them. Two categories were represented by only 1 or 2 sites. Additional 3 to 5 plots in each of such categories are needed.
	Disturbed areas/gradients	EVER, BICY, BISC, Keys, FNPWR, PSSF,	1013	90-120	In the database, only 12% of sites had disturbance information. They represented scrapped ground in HID

General category or area/region			# potentially usable sites in datasets	Minimum # additional sites needed	Comments
Level (Rutchey et al. 2007)	**General Vegetation Category**	**Region**			
		PSPSP, TTINWR			(500), burned (within 5 years after fire; 484) and hurricane impacted (29) sites. Additional 90-120 sites representing other disturbances, such as air-boat path ways, nutrient enrichment and exotic invasion, are recommended.

APPENDICES

Appendix 1: Descriptions of vegetation datasets in South Florida vegetation database.

1. **Dataset_ID:** Armentano_HH
   Contact Person: Tom Armentano, 3310 Lake Padgett Dr., Land O' Lakes, FL 34639.
   Email: omvarment@msn.com
   Data Sites: Long Pine Key (EVER)

Summary/Description: The dataset consists of vegetation data collected only once from 41 hammocks, mostly (63.4%) in the Long Pine Key area, EVER. Other hammocks were in tree islands in the Shark Slough landscape and marl prairies in the eastern and southern Everglades. Data were collected in context of characterizing vegetation composition in the hammocks and of assessing changes in species composition since late 1950s when Craighead had surveyed some of the Long Pine Key hammocks. All sites in the dataset are geo-referenced, and they have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of species rank abundance (semi-quantitative) using two belt-transects. The dataset has the comprehensive list of plant species that were found within the belt transects.

Vegetation type* (Physiognomy)*: Hammock forest.

Sampling unit: Belt transects of variable length and width. Sampling techniques included use of two transects per site. Each transect started and ended at 2 m inside of bole of tree whose canopy over hanged the hammock edge. Length of the transects varied with size of the tree islands, and width varied from one to several meters along the same transect depending on the visibility within the island.

Species composition: Species list includes all species, including trees, shrubs, herbs, ferns, orchids and lianas that were found within the belts. Species records do not any reference to stratum.

Species abundance: Quantitative data in the dataset includes the record of species rank abundance, ranging from 1 to 3: 1-Rare for species with <3 individuals, 2-infrequent or uncommon (qualitative), and 3-frequent or common (qualitative). Suggested rankings (by the dataset author) for rare, infrequent and frequent categories are 1, 4 and 10, respectively.

Usefulness in classification: Medium-high

2. **Dataset_ID:** Barry_VEGMON
   Contact Person: Mike Barry, Institute for Regional Conservation
   Email: barry@regionalconservation.org
   Data Sites: FPNWR, FSSP, PSSF, TINWR

Summary/Description: The dataset consists of vegetation data collected at 308 sites in different habitats within four protected areas, Florida Panther National Wildlife Reserve (FPNWR), Fakahatchee Strand State Preserve (FSSP), Picayune Strand State Forest (PSSF), and Ten Thousand Island National Wildlife Reserve (TTINWR). Data were collected in context of characterizing the vegetation structure and composition and understanding the effects of fire, hydrology, invasion of exotic species, and human disturbances on species composition and abundance (**Barry 2006**). For many of these sites, vegetation data are available from multiple sampling events which would enable researchers to assess vegetation change over time, particularly in response to various disturbances. In the dataset, 288 sites are geo-referenced, and they have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes density and basal area of trees (>2.5 cm dbh) derived from the field data (the number of individuals and dbh) that were recorded in 5 x 50 m plot (belt transect), percent cover of palms and shrubs recorded using line intercept method on a 50 m line transect, and percent cover of species in herb layer estimated in 5, 6 or 10 0.5-m^2 sub-plots. The dataset has the comprehensive list of plant species.

Vegetation type* (Physiognomy)*: Forest, Woodlands, Scrub and Herbaceous

Sampling unit: Plots and line transects. Sampling method included the use of a 5 x 50 m plot (Belt Transect) for recording abundance of both overstory (>10 cm dbh) and understory (2.5 to 10 cm dbh) trees, a 50 m line transect for recording percent cover of palms and shrubs, and five to ten 0.5 x 1 m subplots nested within the tree plot for percent cover of herb layer species.

Species composition: The dataset has the comprehensive list of plant species that were found within the sampling plots (trees), on the line transect (palms and shrubs), and in the sub-plots (herb layer species). The information on the species that were not found on line transect (shrubs) or subplots (herb layer species), but were present elsewhere within the tree plot is not mentioned.

Species abundance: Quantitative vegetation data in the dataset includes density, basal area and height of tree species present in both understory and overstory, and percent cover of palms, shrubs and herb layer species.

Usefulness in classification: High

3. **Dataset_ID:** Burch_BICY
   Contact Person: Jim Burch, Big Cypress National Preserve,
   Email: jim_burch@nps.gov
   Data Sites: Prairies (BICY and PSSF)

Summary/Description: The dataset consists of vegetation data collected at 52 sites - 13 in Picayune Strand State Forest (PSSF), and 39 in Big Cypress National Preserve (BICY). Among 39 sites within the preserve, 9 sites were in disturbed areas, Concho Billy Trail, which had recently been restored. Sites were generally homogenous and did not include more than one community (Jim Burch, *personnel communication*). In the dataset, all sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Data were collected in context of characterizing vegetation composition and monitoring effects of disturbances in the prairies. Vegetation data includes percent cover of each species collected using line intercept method on 4 transects within 10 x 10 m plots. In the disturbed sites, however, the data were collected in a series of subplots along transects of variable length. The dataset has the species cover data summarized by site and the comprehensive list of species intercepted on the transects or found in subplots.

Vegetation type* (Physiognomy)*: Prairies.

Sampling unit: Plot (10 x 10 m^2) or transects (variable length). At 43 sites, 13 in PSSF and 30 in BICY, sampling method included use of line intercept technique on four 10-m long transects within 10 x 10 m plot. At 9 sites in BICY, the method included use of 12 to 84 1-m^2 sub-plots on 1 to 4 transects of varying lengths.

Species composition: The dataset has the list of species intercepted by lines within the plot (43 sites) or the species present in sub-plots on transects (9 sites).

Species abundance: Quantitative data in the dataset includes percent cover of each species summarized from the line intercept data and from the species cover in the subplots.

Usefulness in classification: High

4. **Dataset_ID:** Coronado_TI
   Contact Person: Carlos Coronado-Molina, South Florida Water Management District.
   Email: ccoron@sfwmd.gov
   Data Sites: WCA 3A & 3B

Summary/Description: The dataset consists of vegetation data collected on 25 tree islands in the Water Conservation Areas (WCA) 3A & 3B. Data were collected in context of characterizing vegetation structure, composition and growth in the tree islands. All the sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. The dataset has quantitative (density), vegetation data collected using four 10 x 10 m plots in each island, and summarized separately for head and tail regions that were homogeneous (Carlos Coronado-Molina, *personal communication*). Species list is not comprehensive and includes only the tree (>2.5 cm dbh) species present within the plots.

Vegetation type* (Physiognomy)*: Hammock forest and Swamp forest.

Sampling unit: Plots (10 x 10 m). Sampling method included use of four 10x10 m plots per island. All but one island had two plots in head and two plots in near tail region. One island had the plots only in its tail region. Though both head and tail regions were different from each other in species, two plots either in head or tail region were in homogeneous vegetation.

Species composition: The dataset has the record of species that were present in the tree stratum (> 2.5 cm dbh) within the plots. It does not include any record of understory or ground layer species.

Species abundance: Quantitative data in the dataset includes the record of number of individuals (density) of tree species present within the plots summarized by site (separate sites for head and tail).

Usefulness in classification: High

5. **Dataset_ID:** ENP_HID
   Contact Person: Craig Smith, Everglades National Park
   Email: Craig_S_Smith@nps.gov
   Data Sites: Hole-in-the-Donut Restoration Sites (EVER)

Summary/Description: The dataset consists of vegetation data collected at 500 sites in the Hole-in-Donut restoration area in the Everglades National Park. Data were collected in context of monitoring vegetation establishment and vegetation change over time in the restoration area. Data were downloaded from the website, and the sites do not have coordinates. Vegetation data are quantitative and includes species cover by different height categories.

Vegetation type* (Physiognomy)*: Marsh and Shrubs

Sampling unit: Plots (10 x 10 m)

Species composition: Species list is comprehensive and includes all species present in the plots.

Species abundance: Vegetation sampling included the record of percent cover of each species in five height classes. The use of height class 1 was for sub-merged, 2 for vines, and 3 to 5 for all other species. Sampling included the multiple estimates of cover of the same species if that occurred in more than one height class within a plot, resulting in >100% of cover for even some individual species.

Usefulness in classification: Low-medium

6. **Dataset_ID:** ENP_PIEL
   Contact Person: Hillary Cooley, Everglades National Park
   Email: Hillary_Cooley@nps.gov
   Data Sites: Long Pine Key (EVER)

Summary/Description: The dataset consists of vegetation data collected at 27 sites in the Long Pine Key and surrounding pinelands in the Everglades National Park. Data were collected in context of monitoring the impact of prescribed fire on tree mortality, pine regeneration, and change in structure and composition of shrub and ground layer vegetation. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative, and include the record of species in tree, shrub and herb layers. However, the dataset has the record of only slash pine (*Pinus elliottii*) in the tree stratum, but not any hardwood species that might be present in the same stratum. The vegetation data include density and basal area of pine trees (>2.5 cm dbh), density of shrubs (re-sprouted, immature and mature), and percent cover of herb layer species. Species list in the dataset includes only slash pine (*Pinus elliottii*) in the tree stratum, woody species present in shrub stratum collected in a 0.5 x 30 m belt transect, and record of herb layer species encountered at any of 100 points on a 30 m long line transect.

Vegetation type* (Physiognomy)*: Pine woodlands

Sampling unit: Plots (50 x 20 m). Sampling method included the use of 50 x 20 m plot to record number and dbh of overstory (dbh >15 cm) trees and 25 x 10 m (1/4th) plot nested within the larger plot for understory (2.5 to 15 cm dbh) trees. The method also included the use of 0.5 x 30 m belt transect and 30 m line transect to record shrub density and herb layer species cover, respectively.

Species composition: The dataset does not have comprehensive list of species. It includes only the record of slash pine (*Pinus elliottii*) in the tree stratum, woody species present shrub stratum in belt transect, and herb layer species encountered at any of 100 points on the line transect. The dataset does not include any hardwood species that might be present in tree stratum and the shrub and herb layer species that were not found on the belt and line transects, respectively, but that could be present within the plot.

Species abundance: Quantitative data in the dataset includes density and basal area of slash pine in the tree stratum, density of shrubs, and percent cover of herb layer species. Density and basal area of overstory (>15 cm dbh) and understory (2.5 to 15 cm dbh) trees are based on the record of number of trees present and dbh of individual trees in 50 x 20 m and 25 x 10 m plots, respectively. Density of shrub is based on the number of stems of each species recorded in three categories; resprouted, immature and mature. The cover of herb layer species is the number (percent) of points at which a species occurred when 100 points were sampled on a 30 m long line transect in each plot.

Usefulness in classification: Medium-high

7. **Dataset_ID:** ENP_Prairie
   Contact Person: Hillary Cooley, Everglades National Park
   Email: Hillary_Cooley@nps.gov
   Data Sites: Marsh and Prairies in eastern Everglades, Coastal Prairies in western Everglades (EVER)

Summary/Description: The dataset consists of vegetation data collected at 57 sites in freshwater marsh and prairies in the southeastern Everglades and costal prairies in the western Everglades within the Everglades National Park. Data were collected in context of monitoring the impact of prescribed fire on woody encroachment and change in species composition. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative, and they include density of shrubs (re-sprouted, immature and mature), and percent cover of herb layer species. Species list in the dataset includes woody species present in the shrub stratum in a 0.5 x 30 m belt transect, and herb layer species encountered at any of 100 points on a 30 m long line transect.

Vegetation type* (Physiognomy)*: Marsh and Prairies

Sampling unit: Plots (50 x 20 m^2). Shrub density and herb layer species cover was recorded using 0.5 x 30 m belt and 30 m long line transects, respectively.

Species composition: The dataset does not have comprehensive list of species. It includes only those shrub species present within the belt transects, and herb layer species found at any of 100 sampling points on a 30 m long line transect. It does not include the shrub and herb layer species that were not found on respective transects, but could be present within the plot.

Species abundance: Density of shrub is based on the number of stems of each species recorded in three categories; resprouted, immature and mature. The cover of herb layer species is the number (percent) of points at which a species occurred when 100 points were sampled on a 30 m long line transect in each plot.

Usefulness in classification: Medium-high

8. **Dataset_ID:** Hanan_TIRES
   Contact Person: Erin Hanan, Florida International University
   Email: ehana001@fiu.edu
   Data Sites: Shark River Slough, and marl prairie landscape in the eastern Everglades (EVER)

Summary/Description: The dataset consists of vegetation data collected on 8 tree islands, four in the Shark Slough and the other four in the marl prairie landscape of the eastern Everglades within the Everglades National Park. Data were collected in context of characterizing vegetation composition in relation to distribution of soil nutrients in and around tree islands (**Hanan 2008**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. The dataset has the species cover data that were estimated for each tree species found in the whole island.

Vegetation type* (Physiognomy)*: Bayhead and Bayhead Swamp forest

Sampling unit: Plots of variable size. Since sampling method included the visual estimate of each species found on each island, the sampling unit (plot size) varied with the island areas.

Species composition: The dataset includes all tree species found on the islands.

Species abundance: Quantitative data in the dataset include the cover value estimated for each tree species on the islands.

Usefulness in classification: High

9. Dataset_ID: Heisler_TI
Contact Person: Loraine Heisler, United States Fish and Wildlife Service
Email: lorraine_heisler@fws.gov
Data Sites: Tree islands (WCA 3A and 3B)

Summary/Description: The dataset consists of vegetation data collected on 31 tree islands in the Water Conservation Areas (WCA) 3A & 3B. Data were collected in context of characterizing vegetation structure and composition in the tree islands (**Heisler et al. 2002**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes the record of cover values, estimated for tree species in two height classes (1-3m & >3m) in 10 2-m radius (12.57 m^2) plots on each island. Species list includes the record of species (>1 m height) found in the sampling plots.

Vegetation type* (Physiognomy)*: Hammock forest and Swamp forest.

Sampling unit: Plots. Sampling method included the use of 10 2-m-radius (12.57 m^2) plots established on two transects perpendicular to each other on each island.

Species composition: The dataset has the record of species in two height categories: 1-3m and >3m. It does not include any ground layer species (<1 m height).

Species abundance: Quantitative data in the dataset includes percent cover of each species present in tree (height >3m) and sapling (height 1-3m) layers. Species abundance (cover value) data are summarized by both plots and sites. However, total cover values of species that had >3m height, are summarized by only sites, represented by each island.

Usefulness in classification: High

10. Dataset_ID: IRC_AA
Contact Person: Keith Bradley, Institute for Regional Conservation
Email: bradley@regionalconservation.org
Data Sites: BICY and EVER

Summary/Description: The dataset consists of vegetation data collected at 253 sites scattered throughout the Big Cypress National Preserve (BICY) and Everglades National Park (EVER). Data were collected in context of conducting accuracy assessment of the vegetation map developed by University of Georgia for BICY and EVER (**Bradley and Woodmansee 2006**). All sites but four are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Four sites have vegetation data but they do not have coordinates. Vegetation sampling included the record of overall plant cover in eight physiognomic strata (Emergent, Canopy, Subcanopy, Shrubs, Dwarf shrubs/Herbaceous, Non-vascular, Vine/Liana, and Epiphyte), and cover of the plant species contributing an estimated cover of ≥5% in each stratum in which the species is present. In addition, for each plot, the overall height class of the stratum was also recorded, and if a stratum was present, but no species had a cover of ≥5%, the height and cover of most dominant species in the stratum were recorded. The species list includes the species which had ≥5% cover in the stratum in which they were present. The species that had <5% cover in the stratum are not included.

Vegetation type* (Physiognomy)*: Forest, Woodland, Shrubland and Marsh

Sampling unit: Belt transect/Plots. Sampling method included the record of vegetation data within 10 m of either side of four 40 m long transects extending from a point in four cardinal directions, resulting in the use of two 20 x 80 m plots that perpendicularly crossed each other at the center. A 20 x 20 m intersection in the middle was common in both plots and sampled twice.

Species composition: The species list in the dataset includes all species which had ≥5% cover in any of eight strata (Emergent, Canopy, Subcanopy, Shrubs, Dwarf shrubs/Herbaceous, Non-vascular, Vine/Liana, and Epiphyte) present in the four belt transects. The species that had <5% cover in the stratum were not included, unless the species had the highest cover in the stratum.

Species abundance: The quantitative species data in the dataset includes the cover of the plant species contributing an estimated cover of ≥5% in each stratum the species is present. It also includes the cover of most dominant species in the stratum, when a stratum was present, but no species in that stratum had a cover of ≥5%.

Usefulness in classification: High

11. Dataset_ID: IRC_INTERCEPT
Contact Person: Keith Bradley, Institute for Regional Conservation
Email: bradley@regionalconservation.org
Data Sites: IRC_Intercept

Summary/Description: The dataset consists of species data collected at 59,308 intercepts (points) throughout the Big Cypress National Preserve (BICY). Data were collected in context of conducting accuracy assessment of the vegetation map developed by University of Georgia for BICY (**Bradley and Woodmansee 2006**). All intercept points are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of species present at the intercept points, arranged along 600 250-m long transects, 2 transects originating from a site and running in two randomly chosen cardinal directions. The dataset does not have quantitative data, but includes only the record of species present at each of 59,308 intercepts. Since transects usually crossed more than one habitat type (**Bradley and Woodmansee 2006**), data could not be summarized at the transect level. The species list includes all species encountered at the intercepts.

Vegetation type* (Physiognomy)*: Forest, Woodland, Shrubland and Marsh

Sampling unit: Points. Vegetation sampling included the use of points. The points were chosen along 600 250-m long transects, which were usually not established within the uniform habitat, and thus the transects could not be considered as the sampling units.

Species composition: The species list consists of all species that were encountered at the intercepts.

Species abundance: The dataset does not have the quantitative data, but only presence-absence at each intercept.

Usefulness in classification: Minimal.

12. Dataset_ID: Possley_MDCPINE
Contact Person: Jennifer Possley, Fairchild Botanical Garden
Email: jpossley@fairchildgarden.org
Data Sites: Miami-Dade County Pinelands (MDCEEL)

Summary/Description: The dataset consists of vegetation data collected at 20 sites in the Miami Dade County pinelands. Data were collected in context of characterizing the community composition of pine woodlands, understanding of ecology of rare plants, and monitoring the impact of prescribed fire on community structure and composition. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of species cover, using eight cover classes: 0%, <1%, 1-5%, 5-15%, 15-30%, 30-50%, 50-80%, and >80% in 20 x 40 m tree plot, three 5 x 5 m shrub plots nested within tree plot, and three 1 x 1 m subplots (for all species <0.5 m high) nested within each shrub plot. Species list is comprehensive and includes all species in different strata found in respective sampling plot/sub-plots.

Vegetation type* (Physiognomy)*: Pine woodlands

Sampling unit: Plots. Sampling method included the use of nested design – one 20 x 40 m tree plot, three 5 x 5 m shrub plots nested within the tree plot, and three 1 x 1 m subplots (for all species <0.5 m high) nested within each shrub plot.

Species composition: The dataset has the comprehensive list of species that includes all species in tree, sapling/shrub and herb strata found in respective sampling plot/sub-plots.

Species abundance: Quantitative data in the dataset includes percent cover of species summarized by subplot and plots.

Usefulness in classification: High

13. Dataset_ID: Richards_REMAP05
Contact Person: Jennifer Richards, Florida International University
Email: richards@fiu.edu
Data Sites: Water Conservation Areas (WCA1, WCA2, WCA3A & 3B) and EVER

Summary/Description: The dataset consists of vegetation data collected in 2005 at 344 sites scattered throughout freshwater marshes in the Everglades. Data were collected in context of characterizing South Florida Mash Vegetation using a Landscape Scale Random Sample as part of the US EPA Region 4 REMAP sampling across the Everglades National Park. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the presence/absence record of species present in five 1-m^2 quadrats nested within a 2 x 10 m plot, and the data are summarized as frequency of species. The species list is comprehensive and includes all species found in the quadrats within the plots.

Vegetation type* (Physiognomy)*: Marsh and Prairies

Sampling unit: Plots (10 x 2 m^2). Presence of all herb layer species was recorded in each of four 0.25 m^2 quadrats in five 1-m^2 sub-plots spaced every other meter and on alternating sides along a central transect of 10 x 2 m plot.

Species composition: The dataset has the comprehensive list of species present in the 20 0.25 m^2 quadrats in each plot. However, the dataset does not include the species not found in the quadrats but could be present within the plot.

Species abundance: Frequency of a species is based on the number quadrats in which the species is present.

Usefulness in classification: Medium-high

14. Dataset_ID: Richards_REMAP99
Contact Person: Jennifer Richards, Florida International University
Email: richards@fiu.edu
Data Sites: Water Conservation Areas (WCA1, WCA2, WCA3A & 3B) and EVER

Summary/Description: The dataset consists of vegetation data collected in 1999 at 418 sites scattered throughout freshwater marshes in the Everglades. Data were collected in context of characterizing South Florida Mash Vegetation using a Landscape Scale Random Sample as part of the US EPA Region 4 REMAP sampling across the Everglades National Park. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the presence/absence record of species present in five 1-m^2 quadrats nested within a 2 x 10 m plot, and the data are summarized as frequency of species. The species list is comprehensive and includes all species found in the quadrats within the plots.

Vegetation type* (Physiognomy)*: Marsh and Prairies

Sampling unit: Plots (10 x 2 m^2). Presence of all herb layer species was recorded in each of four 0.25 m^2 quadrats in five 1-m^2 sub-plots spaced every other meter and on alternating sides along a central transect of 10 x 2 m plot.

Species composition: The dataset has the comprehensive list of species present in the 20 0.25 m^2 quadrats in each plot. However, the dataset does not include the species not found in the quadrats but could be present within the plot.

Species abundance: Frequency of a species is based on the number quadrats in which the species is present.

Usefulness in classification: Medium-high

15. Author: Robert R. Twilley, Victor H. Rivera-Monroy, Edward Castaneda
Contact Person: Victor H. Rivera-Monroy, Louisiana State University
Email: vhrivera@lsu.edu
Data Sites: Mangroves (EVER)

Summary/Description: The dataset consists of vegetation data collected at 6 sites on the FCE-LTER transects. Shark River and Taylor Slough each has three sites. Data were collected in context of studying productivity along salinity gradients in the Southern Everglades coastal ecosystems. All sites are geo-referenced and have both Lat/Long and UTM coordinates. Vegetation data are quantitative (the basal area of each species), and they were collected using 20 x 20 m plots. Vegetation types at the majority of sites are mangrove forest, dominated by one or more of four mangrove species found in South Florida. Species list includes only mangrove species.

Vegetation type* (Physiognomy)*: Mangrove forest.

Sampling unit: Plots (20 x 20 m).

Species composition: Species list includes the record all four mangrove species present in the plots.

Species abundance: Quantitative data in the dataset includes total basal area (m^2/ha) of each species summarized at the plot level.

Usefulness in classification: High

16. Dataset_ID: Ross_BBCW
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Biscayne National Park (BISC)

Summary/Description: The dataset consists of vegetation data collected at 299 sites in the Biscayne Bay coastal wetlands within Biscayne National Park (BICY). Data were collected to characterize vegetation structure and composition in the Biscayne Bay coastal wetlands (**Ruiz et al. 2002**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes species cover estimated in nested plots. At each sampling site, 5 1-m^2 shrub/herb plots are nested in a 10 x 10 m tree plot. Species list includes the record of species in different strata (tree, sapling/shrub, herb) found in respective sampling units.

Vegetation type* (Physiognomy)*: Mangrove forests and woodlands, Herbaceous (Marsh)

Sampling unit: Plots. Sampling design included the use of one 4 x 10 m and one 2 x 10 m plots for recording individual trees of 10-25 cm and <10 cm dbh, respectively, nested in a 10 x 10 m plot (for >25 cm dbh). Shrub/Sapling (0.6 - 2 m ht) density was recorded in 5 1-m^2 sub-plots. For species cover, one 4 x 10 plot nested in the 10 x 10 m tree plot was used.

Species composition: Species list includes the record of species of different strata (tree, sapling/shrub, and herb) present in respective sampling units.

Species abundance: Quantitative data in the dataset includes tree and sapling/shrub density (individuals/ha), and percent cover of all species recorded in 4 x 10 m plot.

Usefulness in classification: High

17. Dataset_ID: Ross_BPK
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Big Pine Key (NKDR)

Summary/Description: The dataset consists of vegetation data collected at 18 sites present in the Big Pine Key pine rocklands within the National Key Deer Refugee (NKDR). Data were collected in context of monitoring the impact of experimental fires on tree mortality, pine regeneration, and structure and composition of shrub and ground layer vegetation (**Snyder et al. 2005**) All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of tree density and basal area within 18 1-ha plots, shrub cover in 20 4-m radius subplots nested in the tree plot, and herb cover in 80 1-m^2 quadrats nested in shrub sub-plots. Species list includes the record of species in different strata (tree, shrub, and herb) present in respective sampling units.

Vegetation type* (Physiognomy)*: Pine Woodlands

Sampling unit: Plots (1 ha). At each site, sampling plots included one 100 x 100 m tree plot, and 20 4-m radius (50-m^2) sapling/shrub sub-plots nested within the tree plot, and 80 1-m^2 herb quadrats nested in the 20 shrub sub-plots.

Species composition: The dataset has comprehensive list of species in different strata (tree, shrub, and herb) present in the respective sampling units.

Species abundance: Quantitative data in the dataset are the density and basal area of species present in tree stratum, percent cover of species present in shrub and herb strata, and biomass in all three strata.

Usefulness in classification: High

18. Dataset_ID: Ross_C111MP
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Southeast Saline Everglades in C111 Basin (EVER)

Summary/Description: The dataset consists of vegetation data from 57 sites in Southeast Saline Everglades (SESE). Vegetation data were collected to characterize recent vegetation composition and to assess the changes in the coastal wetland vegetation in 50 years (**Ross et al. 2000**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes species rank abundance estimated using 30 1-m^2 circular plots per site. Species list is comprehensive and includes all species present within the plots and in the surrounding marsh.

Vegetation type* (Physiognomy)*: Herbaceous

Sampling unit: Plot (~50m radius). Thirty 1-m^2 circular plots within a ~1 ha plot at each sampling site.

Species composition: A comprehensive list of species included all species present within the plots.

Species abundance: Quantitative data in the dataset includes species rank abundance and frequency of each species. Frequency of species was calculated as the percent of subplots in which the species was present. Rank abundance of a species at a site was the total abundance of that species in 30 plots as a percent of total abundance of all species at that site, where the species ranked first, second and third was assigned an abundance of 10, 5, and 2, respectively. A species ranked as fourth or higher or absent in any of subplots but present in the plot was assigned an abundance of 1.

Usefulness in classification: High

19. Dataset_ID: Ross_C111TI
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: C111/ Taylor Slough basin (EVER)

Summary/Description: The dataset consists of vegetation data from 54 sites in tree islands in the C111/Taylor Slough basin. Vegetation data were collected to characterize vegetation composition in the hammocks (**Ross et al. 1996; Ross et al. 2000**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes species rank abundance of tree species estimated in each hammock. Species list includes tree species present in the hammocks.

Vegetation type **(Physiognomy)*:*** Hammocks

Sampling unit: Islands (hammocks) that varied in size.

Species composition: The species list is not comprehensive, and it includes only the tree species. The dataset does not have record of understory and herb layer species.

Species abundance: Quantitative data include the rank abundance of tree species. Based on tree coverage, the species were ranked. Later, an abundance value 10 was assigned to the species ranked 1 through 4, 5 to the species ranked 5 through 8, 2 to the species ranked 9 through 12, and 1 to those ranked 13 or more.

Usefulness in classification: Medium-high

20. Dataset_ID: Ross_CSSS
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Marl prairies (EVER)

Summary/Description: The dataset consists of vegetation data collected at 906 sites scattered within the recent Cape Sable seaside sparrow habitat in the southern Everglades marl prairies. Six sites are exception to this, as they are located in the Cape Sable area which was once the sparrow habitat and now no longer has seaside sparrow. The sampling sites included 293 sites located at 100 or 200 m intervals on 6 transects, and 613 sites placed at the 1 km grids used for sparrow census since 1981. Vegetation data were collected to characterize vegetation structure and composition within past and recent sparrow habitat (**Ross et al. 2006**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of species cover estimated using 10 0.25 m^2 sub-plots spaced at 6 m intervals within a 60 x 1 plot, and of structural measures (vegetation height, total cover and portion of green cover) in 30 0.25 m2 sub-plots within the same plot . Species list is comprehensive and includes all species present within the plots.

Vegetation type* (Physiognomy)*: Herbaceous

Sampling unit: Plots (60 x1 m). Sampling method included use of 10 0.25 m^2 subplots spaced at every 6 m within a 60 x 1 m plot at each site.

Species composition: A comprehensive list of species included all species present within the 60 x 1 m plot. Herb species that were not found in the sub-plots but were present in the plot were also listed.

Species abundance: Species abundance data include percent cover of each species, and frequency of herb species present in 0.25 m^2 subplots. Frequency of species was calculated as the percent of subplots in which the species was present and the cover values were averaged over 10 sub-plots. Herb species present in the plot but not found in any of the subplots were assigned a mean cover of 0.01%.

Usefulness in classification: High

21. Dataset_ID: Ross_ENDEMIC
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Florida Keys

Summary/Description: The dataset consists of vegetation data collected at 233 sites scattered on five islands (Big Pine, No Name, Little Pine, Cudjoe, and Sugarloaf Keys) in the Lower Florida Keys. Data were collected in context of studying the distribution and status five taxa (*Indigofera keyensis*, *Chamecrista lineata* var. *keyensis*, *Chamaesyce deltoidea* subsp. *serpyllum*, *Melanthera parvifolia*, and *Linum arenicola)* that are endemic to Florida Keys (**Ross and Ruiz 1996**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of dbh of tree (>2.5 cm dbh) individuals, estimate of understory species cover by functional groups (shrubs, graminoids and palms), and count of individuals of endemic species in 5-m radius circular plots. Quantitative data include basal area of tree species, percent cover of understory species by functional groups, and density of endemic species. The species list is not comprehensive, and only tree layer species is complete.

Vegetation type* (Physiognomy)*: Forest

Sampling unit: Plots (5-m radius). Sampling method included the use of 5-m radius plots at 50-100 m distance along transects.

Species composition: Species list is not comprehensive, and includes only the tree species. Understory vegetation is represented by functional groups.

Species abundance: Quantitative vegetation data include basal area per ha for tree species, percent cover of understory vegetation represented by functional groups, and density of five endemic species.

Usefulness in classification: Medium

22. Dataset_ID: Ross_KEYS
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Florida Keys

Summary/Description: The dataset consists of vegetation data collected at 127 sites scattered on 25 islands in the Florida Keys. Data were collected to develop an ecological site classification of Florida Keys terrestrial habitats (**Ross et al. 1992**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes tree density, basal area and crown area estimated using point (plotless) method, and species cover of sapling/shrub and herb layer vegetation estimated in 5 x 5 m plots. The dataset has the comprehensive list of all species found in the plots.

Vegetation type* (Physiognomy)*: Forest, Woodland, Scrub, and Herbaceous

Sampling unit: Both plotless and plots. Plotless technique included the use of 10- and 5-factor prism for trees (>2.5 cm dbh), and the plots were of 5 x 5 m size for recording the abundance of tree sapling (<2 cm dbh), shrub and herb layer species.

Species composition: The dataset has the comprehensive list of species that includes all tree species found within the range of 10- and 5-factor prism, and shrub and herb layer species found in 5 x 5 m plot at each site.

Species abundance: Quantitative data in the dataset includes density, basal area and crown cover of tree species, and cover of shrub and herb layer species.

Usefulness in classification: High

23. Dataset_ID: Ross_MAP
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Marsh and Prairies (EVER)

Summary/Description: The dataset consists of vegetation data collected at 285 sites at 200, 300 or 500 m intervals on 5 transects in the Everglades National Park. Data were collected to characterize vegetation structure and composition along marl prairie-slough gradient and for monitoring temporal changes in vegetation. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data includes species cover estimated in nested plots. At each sampling site, five herb plots are nested in a 5 x 5 m shrub plot which is nested in a 10 x 10 m tree plot. Species list is comprehensive and includes all plant species present in the plots.

Vegetation type* (Physiognomy)*: Herbaceous and Bayhead Swamp

Sampling unit: Plot (10 x 10 m). Nested plot design included one 10 x 10 m tree (>5cm dbh) plot, one 5 x 5 m shrub (>100 cm height and <5 cm dbh) plot nested within the tree plot, and five $1m^2$ herb plots within the shrub plot.

Species composition: A comprehensive list of species included all tree species present within the 10x10 m plot, and shrub and herb species present in the 5 x 5 m plot. Herb species that were not found in any of the five herb plots but were present in the 5 x 5 m plot were also listed.

Species abundance: Species abundance data include percent cover of each species, and frequency of herb species present in 1-m^2 subplots. Frequency of herb species was calculated as the percent of subplots in which the species was present and the cover values were averaged over five sub-plots. Herb species present in the plot but not found in any of the subplots were assigned a mean cover of 0.01%.

Usefulness in classification: High

24. Dataset_ID: Ross_RS
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: EVER (Shark Slough), WCA3A and WCA3B

Summary/Description: Dataset consists of vegetation data collected at 84 sampling sites located within 1 km radius of 14 stage recorders in WCA3A, WCA3B and EVER. Data were collected to characterize vegetation structure and composition in adjacent ridge and slough. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included estimation of species cover in five 1-m^2 quadrats at the corners and center of a 5 x 5 meter plot.

Vegetation type* (Physiognomy)*: Herbaceous

Sampling unit: Plot (5 x 5 m). Five 1-m^2 subplots at the corners and center of a 5 x 5 meter plot.

Species composition: The dataset has the comprehensive list of species recorded in 5 x 5 meter plot at each sampling site.

Species abundance: Quantitative data include frequency and mean percent cover of each species present in a 5 x 5 m plot. Frequency was calculated as the percent of subplots in which a species was present. Cover value a species was averaged over five sub-plots, and species present in the plot but not found in any of the subplots were assigned a mean cover of 0.01%.

Usefulness in classification: High

25. Dataset_ID: Ross_SS
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Shark Slough (EVER)

Summary/Description: The dataset consists of vegetation data collected at 668 sites at 20 to 100 m intervals on 6 transects in Shark Slough within Everglades National Park. Data were collected to characterize slough vegetation in relation to hydrology and soil characteristics (**Ross et al. 2003**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative (cover) that were collected using nested plots at each sampling site. Species list includes all species present in 10x10 m plot at each site.

Vegetation type* (Physiognomy)*: Herbaceous and Bayhead Swamp

Sampling unit: Plots (10 x 10 m). Nested plot design was used to collect species abundance. At each sampling site, tree (>5cm dbh) data were collected using one 10 x 10 m plot, shrub (>100 cm height and <5 cm dbh) and vine cover in one 5 x 5 m plot nested within the tree plot, and herb layer data in three 1-m^2 plots nested within the 5 x 5 m shrub plot.

Species composition: A comprehensive list of species exists. All species present within 10 x 10 m plot at each sampling site were recorded. Species present in the plot but not found in any of the subplots were also listed and were assigned a mean cover of 0.01%.

Species abundance: Quantitative data includes cover value of each species. Tree cover was calculated from crown dimensions (length and width) measured for each individual tree, and percent cover value of shrub and herb species were summarized for 10 x 10 m plot at each sampling site. Cover values are the sum of live and dead cover, and thus may exceeds 100%.

Usefulness in classification: High

26. Dataset_ID: Ross_TEXT
Contact Person: Mike Ross, Florida International University

Email: rossm@fiu.edu
Data Sites: WCA3B and EVER (Shark Slough and Marl Prairies)

Summary/Description: The dataset consists of vegetation data collected on 69 tree islands, of which 14 and 55 islands are in WCA3B and Everglades National Park, respectively. Data were collected in context of characterizing vegetation structure and composition in the tree island hammocks over three years 2005-2008. These tree islands are designated as "extensive islands', as the vegetation data on those islands were recorded only one time. All the islands are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative, and they were collected using nested plot design with variable plot sizes. Species present in tree (>5 cm dbh), sapling (1-5 cm dbh), shrub (>100 cm height and <1cm dbh) and herb (<100 cm height) layer were recorded.

Vegetation type **(Physiognomy)*:*** Hammocks

Sampling unit: Transect and Plots. Species abundance data were collected using nested plots. Depending on the size of hammocks, there were 1-6 sets plots on each island. Tree data were collected using 3 m (28.26 m^2) and 2 m (12. 57 m^2) radius plots for large (>25 cm dbh) and small (5-25 cm dbh) trees, respectively. Measurements on sapling (1-3 cm dbh) and shrubs (>100 cm height and <1 cm dbh) were taken in 1 m (3.14 m^2) radius plot nested within the tree plot, while herb cover was recorded in 0.57cm (1 m^2) radius plot nested within the shrub plot.

Species composition: The dataset has the comprehensive list of tree and herb layer species present in the hammocks, and shrub species present in the sampling plots.

Species abundance: Quantitative data includes density and basal area ha^{-1} of each tree species, and percent cover of shrub and herb species. In addition, rank abundance data, recorded visually throughout the hammock, are also included in the dataset.

Usefulness in classification: High

27. Dataset_ID: Ross_TINT
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: WCA3B and EVER (Shark Slough and Marl Prairies)

Summary/Description: The dataset consists of vegetation data collected on 16 tree islands of which 10 islands are in Shark Slough and 6 islands are in marl prairies within the Everglades National Park. Data were collected in context of characterizing vegetation structure, composition and growth in the tree island hammocks and monitoring their response to hydrologic changes. In the ongoing study, those islands are designated as "intensive islands', as the data on various aspects of community structure and functions are collected periodically, more intensively than on the extensive islands. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative, and they were collected using nested plot design with variable plot sizes for three different strata, tree, shrub and herb. Species list includes the record of species in tree (>5 cm dbh), sapling (1-5 cm dbh), shrub (>100 cm height and <1cm dbh) and herb (<100 cm height) layer present in the respective sampling units.

Vegetation type* (Physiognomy)*: Hammocks

Sampling unit: Plots (variable in size). Data were collected in a permanent plot established on each island. The plot size varied between 225 m^2 and 625 m^2, and each plot was gridded in 5m x 5m cells. Tree data were collected in whole plot, irrespective of its size. Measurements on sapling and shrubs were taken in 1 m (3.14 m^2) radius plots, while herb cover and tree seedling density were recorded in 0.57cm (1 m^2) radius plots located at the center of each 5 x 5 m cell.

Species composition: The dataset has the record of all tree species that were present in the permanent plot, and of all shrub and herb species present in the respective subplots within the plot.

Species abundance: Quantitative data includes density and basal area of each species in tree layer, density of species in sapling layer, and percent cover of shrub and herb layer species.

Usefulness in classification: High

28. Dataset_ID: Ross_TS
Contact Person: Mike Ross, Florida International University
Email: rossm@fiu.edu
Data Sites: Taylor Slough (EVER)

Summary/Description: The dataset consists of vegetation data collected at 100 sites on 5 transects located in the Taylor Slough basin within the Everglades National Park. Data were collected periodically since 1979 to monitor the effects of hydrologic changes on Taylor Slough vegetation (**Armentano et al. 2006**). The dataset used for classification purpose, however, consists of vegetation data collected on all five transects only in 2003. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation data are quantitative (cover), and include the record of species cover collected using five 1-m^2 contiguous plots at each sampling site. All species present in 5 x 1 m plot were recorded.

Vegetation type* (Physiognomy)*: Herbaceous vegetation

Sampling unit: Plots (5 x 1 m). Sampling method included the use of 5 1-m^2 contiguous plots each of which was sub-divided into four 0.25 m^2) quarters. Absolute cover of each species present in each quarter (0.25 m^2 sub-plot) of 1 m^2 plot was recorded.

Species composition: The dataset has the record of all species that were present in 5 x 1 m plot at each site.

Species abundance: Quantitative data in the dataset include frequency and cover of each species summarized at the site level. Frequency of a species at a site is the percentage of quads (0.25 m^2) in which a species was present. Cover of a species is the mean of absolute cover values recorded for such species in 20 quads at each site.

Usefulness in classification: High

29. Dataset_ID: Rutchey_WCA2
Contact Person: Ken Rutchey, South Florida Water Management District
Email: krutchey@sfwmd.gov
Data Sites: WCA-2

Summary/Description: The dataset consists of vegetation data collected at 532 sites in context of ground truthing for vegetation mapping in Water Conservation Area -2 (WCA-2). All sites are geo-referenced and have UTM coordinates. Vegetation data is in form of a list of 1-7 dominant species at each site. At several sites, only major vegetation type is mentioned.

Vegetation type* (Physiognomy)*: Various kinds of plant communities.

Sampling unit: Only site observation without any systematic sampling.

Species composition: Dataset includes a list of 1-7 dominant species recorded at each site. At several sites, only major vegetation type is mentioned.

Species abundance: Not recorded. When there are more than one dominant species recorded at any site, it is not mentioned whether those species were recorded in a descending or ascending order of their dominance.

Usefulness in classification: Minimal.

30. Dataset_ID: Rutchey_WCA3
Contact Person: Ken Rutchey, South Florida Water Management District
Email: krutchey@sfwmd.gov
Data Sites: WCA-3A & 3B

Summary/Description: The dataset consists of vegetation data collected at 2402 sites in Water Conservation Area 3A & 3B (WCA-3A & 3B). Vegetation data were collected in context of ground truthing for vegetation mapping. All sites are geo-referenced and have UTM coordinates. Vegetation data is in form of a brief description of the vegetation type at and surrounding each site. The type of vegetation at majority of sites is described with reference to 1-5 dominant species, and the suffix sparse, dense, tall etc. have been used as qualifiers for special features.

Vegetation type* (Physiognomy)*: Various kinds of plant communities.

Sampling unit: Only site observation without any systematic sampling.

Species composition: Dataset includes only rapid appraisal or visual (observational) expression of dominance of 1-5 species. Any kind of regular sampling of species composition (presence/absence) or abundance was not accomplished.

Species abundance: Not recorded. When there are more than one dominant species recorded at any site, it is not mentioned whether those species were recorded in a descending or ascending order of their dominance.

Usefulness in classification: Minimal.

31. Dataset_ID: Shamblin_HH
Contact Person: Brooke Shamblin
Email: rshamb66@hotmail.com
Data Sites: Biscayne National Park (BISC)

Summary/Description: The dataset consists of vegetation data collected at 32 sites in the hammocks of four islands (Elliott, Old Rhodes, Sands and Totten) in the Biscayne National Park. Data were collected in context of characterizing vegetation structure and composition, and monitoring tree mortality and seedling dynamics. All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the measure of dbh of individual trees in 20 x 20 plots, and sapling/shrub density in two 5 x 5 m sub-plots nested in the tree plot. Species list includes all tree species present in the tree plots and shrub/sapling species present in sapling plots.

Vegetation type* (Physiognomy)*: Hammock forest

Sampling unit: Plots (20 x 20 m). At each site, sampling unit included one 20 x 20 m tree plot and two 5 x 5 m shrub plots nested within the tree plot. Two 1-m^2 seedling plots also were nested within each shrub plot.

Species composition: The dataset has the record of species that were present in tree (>2.5 cm dbh) and sapling/shrub (<2.5 cm dbh) strata.

Species abundance: Quantitative data in the dataset includes tree density and basal area, and sapling/shrub density.

Usefulness in classification: High

32. Dataset_ID: Smith_TI
Contact Person: Craig Smith, Everglades National Park
Email: Craig_S_Smith@nps.gov

Data Sites: Hammock forest and Swamp forest

Summary/Description: The dataset consists of vegetation data collected at 72 sites in tree islands in the Everglades National Park. Data were collected in context of characterizing vegetation composition of the tree islands. None of the sites has geographical coordinates. Vegetation data in 16 islands include the relative abundance of species, while that in rest 56 islands include only presence/absence of species. The sampling method is not included with the dataset, and it is uncertain whether species list is comprehensive or not.

Vegetation type* (Physiognomy)*: Hammocks, Bayhead and Bayhead swamps.

Sampling unit: Tree islands

Species composition: Species list includes trees, shrubs, ferns and lianas present on the islands.

Species abundance: Quantitative data in the dataset includes relative abundance of species for only 16 islands. For the rest 56 islands, vegetation data include only presence/absence of species

Usefulness in classification: Minimal

33. Dataset_ID: Snyder_RP
Contact Person: Jim Snyder, US Geological Survey, Big Cypress National Preserve
Email: jim_snyder@usgs.gov
Data Sites: BICY

Summary/Description: The dataset consists of vegetation data collected at 54 sties scattered in Raccoon Point pinelands in the Big Cypress National Preserve. Data were gathered in context of monitoring the impact of experimental fires on tree mortality, pine regeneration, and change in structure and composition of understory vegetation (**Snyder and Belles 2000**). All sites are geo-referenced and have both Lat/Long and UTM (NAD 1983) coordinates. Vegetation sampling included the record of dbh of all individual trees present in 100 x 100 m plot, and cover of understory herbaceous and woody species present in sub-plots using cover class (1 = <1%, 2 = 1-5%, 3 = 5-10%, 4 = 10-25%, 5 = 25-50%, 6 = 50-75%, and 7 = 75-100%). Quantitative vegetation data include the tree density and basal area, and shrub and herb frequency and percent cover. Species list includes the tree species present in 1-ha plots and shrub and herb layer species present in subplots nested within the tree plot.

Vegetation type* (Physiognomy)*: Pine woodlands

Sampling unit: Plots (100 x 100 m). At each site, sampling plots included one 100 x 100 m tree plot, and 20 2 x 5 m sapling/shrub plots and 20 1-m^2 herb plots nested in a 20 x 50 m plot that was centrally located within the tree plot.

Species composition: The dataset has comprehensive list of species of different strata (tree, shrub, and herb) present in the respective sampling plots and sub-plots.

Species abundance: Quantitative data in the dataset are the density and basal area of species present in tree stratum, and frequency and mean percent cover of shrub and herb layer species. Frequency of shrub and herb is the percent of 20 subplots in which a shrub or herb species present, and cover of a species is also averaged over 20 subplots.

Usefulness in classification: High

34. Dataset_ID: Trexler_Fishmon
Contact Person: Joel Trexler, Florida International University
Email: trexlerj@fiu.edu
Data Sites: WCA, EVER

Summary/Description: The dataset consists of vegetation data collected at 70 sites in the Shark and Taylor Slough basins in the Everglades National Park, and in the Water Conservation Area 3A and 3B. At those sites vegetation data have been gathered 5 times a year for multiple years in context of monitoring aquatic communities as part of the Modified Water Deliveries Program and the Comprehensive Everglades Restoration Plan (CERP). However, the present dataset includes vegetation data from June 2005 to April 2006 (Cum samples 48 to 52), for classification purpose only one time data (Cum Sample number 50) gathered in November-December 2005 were used. All sites, except 6 in the Shark River Slough, are geo-referenced and have both Lat/Long and UTM coordinates. Vegetation sampling includes record of live stem counts for all species except those belonging to 4 genera (*Bacopa*, *Chara*, *Ludwigia* and *Utricularia*) in 5 or 7 1- m^2 throw-traps (sub-plots) per site. Quantitative data have frequency and abundance measures (stem density or mean cover-volume). Species list includes all species found in the throw traps.

Vegetation type* (Physiognomy)*: Marsh

Sampling unit: Plots (100 x 100 m). Sampling method includes the use of 5 or 7 1-m^2 throw traps (sub-plots) nested within a 100 x 100 m plot at each site.

Species composition: The dataset includes the species that were found within the throw traps. The dataset has no mention of the species that were not present in the throw traps but could be present in the100 x 100 m plot.

Species abundance: Quantitative data in the dataset include frequency and stem density/m^2 or percent cover representing the percent of floating mat volume. Frequency is the percent of throw traps in which a particular species occurred at the site. The species belonging to 4 genera (*Bacopa*, *Chara*, *Ludwigia* and *Utricularia*) have percent cover while all other species have the stem density.

Usefulness in classification: Medium high

35. Author: Tiffany Troxler Gann
Contact Person: Tiffany Troxler Gann, Florida International University
Email: troxlert@fiu.edu
Data Sites: C111 Basin, EVER

Summary/Description: The dataset consists of vegetation data collected on 9 tree islands, particularly Bayheads, in C111 basin in the Everglades National Park. Data were collected in context of studying vegetation composition in relation to hydrology and soil characteristics (**Gann and Childers 2006**). All sites are geo-referenced and have both Lat/Long and UTM coordinates. Vegetation sampling included record of vegetation data in both lower (<1.3 m ht) and upper (>1.3 m ht) strata using line transect of 40 m long and 11 to 14 plots of 3 x 2 m. The dataset, however, includes frequency, density, and basal area of plant species only in upper stratum (>1.3 m). Species list includes all species of upper stratum found in the plots.

Vegetation type* (Physiognomy)*: Forest/Woodland (Bayheads)

Sampling unit: Transect and Plots. Sampling technique includes use of 11 to 14 2 x 3 m plots placed on two 40 m long transects on each island.

Species composition: Species list is comprehensive and includes all species present in the plots.

Species abundance: Quantitative data in the dataset includes frequency, density, and basal area together of tree species in upper stratum (>1.3 m).

Usefulness in classification: High

Appendix 2: Results from SIMPER (Similairty percentage) analysis of plant species importance value data from 3600 sites, listing the major characterizing species of each vegetation type identified in cluster analysis.

SIMPER
Similarity Percentages - species contributions

Data worksheet
Name: H_Sites_ Vegroups_IVI_Data
Data type: Abundance

Parameters
Resemblance: Bray Curtis similarity
Cut off for low contributions: 90.00%

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Salt Marsh					
Group MSOGs (5.1.1.1.1 Sand Cordgrass Salt Marsh)					
Average similarity: 47.52					
Spartina bakeri	60.30	44.07	2.12	92.74	92.74
Group MSMGd (5.1.2.1.1 Saltgrass Salt Marsh)					
Average similarity: 40.74					
Distichlis spicata	54.00	35.28	1.74	86.60	86.60
Sesuvium portulacastrum	9.80	2.18	0.33	5.36	91.96
Group MSMGj (5.1.2.1.2 Black Rush Salt Marsh)					
Average similarity: 40.51					
Juncus roemerianus	50.82	28.56	1.00	70.51	70.51
Rhizophora mangle	22.33	8.52	0.51	21.04	91.55
Group MSMGs (5.1.2.1.3 Gulf Cordgrass Salt Marsh)					
Average similarity: 81.83					
Spartina spartinae	81.86	81.83		100.00	100.00
Group MSMGp (5.1.2.1.4 Dropseed Salt Marsh)					
Less than 2 samples in group					
Group MSHSb (5.1.3.1.1 Saltwort Salt Marsh)					
Average similarity: 68.72					
Batis maritima	72.61	57.38	2.68	83.50	83.50
Sarcocornia perennis	20.75	10.89	0.92	15.84	99.34

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Freshwater Marsh					
Group MFWGm (5.2.1.1.1 Muhly Grass Wet Prairie)					
Average similarity: 54.39					
Muhlenbergia capillaris	28.55	21.95	2.70	40.35	40.35
Cladium mariscus ssp. jamaicense	24.55	19.21	2.52	35.32	75.67
Schizachyrium rhizomatum	8.28	3.43	0.61	6.31	81.98
Centella asiatica	3.64	1.95	0.96	3.58	85.56
Panicum tenerum	2.13	1.04	0.84	1.91	87.47
Pluchea rosea	1.78	0.73	0.69	1.34	88.81
Aristida purpurascens	1.75	0.73	0.69	1.34	90.15
Group MFWGs (5.2.1.1.2 Little Bluestem Wet Prairie)					
Average similarity: 57.54					
Schizachyrium rhizomatum	31.36	26.63	4.58	46.28	46.28
Cladium mariscus ssp. jamaicense	20.01	15.36	2.09	26.70	72.98
Muhlenbergia capillaris	7.89	4.14	0.91	7.19	80.17
Centella asiatica	3.39	1.69	0.87	2.94	83.11
Panicum tenerum	2.46	1.25	0.95	2.17	85.28
Rhynchospora microcarpa	2.43	1.19	0.87	2.07	87.35
Cassytha filiformis	2.57	1.00	0.58	1.73	89.08
Rhynchospora tracyi	2.36	0.86	0.57	1.49	90.57
Group MFWGcD (5.2.1.1.3.1 Sawgrass Wet Prairie)					
Average similarity: 50.44					
Cladium mariscus ssp. *jamaicense*	36.17	29.15	2.67	57.79	57.79
Muhlenbergia capillaris	11.50	6.94	1.26	13.76	71.54
Schizachyrium rhizomatum	8.47	3.81	0.67	7.55	79.09
Panicum tenerum	3.45	1.65	0.89	3.28	82.37
Centella asiatica	3.65	1.35	0.61	2.68	85.05
Cassytha filiformis	2.76	0.90	0.48	1.78	86.83
Rhynchospora tracyi	2.82	0.86	0.48	1.71	88.54
Pluchea rosea	2.25	0.85	0.61	1.69	90.24
Group MFWGcM (5.2..1.13.2 Sawgrass Mixed-herbaceous Wet Prairie)					
Average similarity: 34.72					
Cladium mariscus ssp. jamaicense	14.32	9.91	1.71	28.55	28.55
Centella asiatica	13.25	5.82	0.71	16.77	45.32
Panicum tenerum	6.85	4.55	1.46	13.12	58.44
Eleocharis cellulosa	7.49	3.00	0.60	8.65	67.09
Rhynchospora tracyi	3.72	1.60	0.70	4.62	71.71
Schizachyrium rhizomatum	3.79	1.04	0.39	2.98	74.69
Pluchea rosea	2.06	1.03	0.93	2.96	77.66
Rhynchospora microcarpa	2.96	0.90	0.53	2.61	80.26

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Panicum hemitomon	3.11	0.80	0.41	2.29	82.55
Muhlenbergia capillaris	2.21	0.76	0.54	2.20	84.75
Bacopa caroliniana	2.73	0.73	0.51	2.10	86.84
Phyla nodiflora	2.75	0.59	0.30	1.69	88.54
Leersia hexandra	2.16	0.53	0.40	1.53	90.07
Group MFWGh (5.2.1.1.4 Black-top Sedge Wet Prairie)					
Average similarity: 45.39					
Schoenus nigricans	17.20	13.25	2.61	29.19	29.19
Cladium mariscus ssp. jamaicense	15.58	5.83	0.52	12.86	42.05
Paspalum monostachyum	10.85	5.12	0.71	11.28	53.33
Schizachyrium rhizomatum	9.17	3.83	0.65	8.45	61.78
Cassytha filiformis	4.34	2.73	1.26	6.02	67.79
Centella asiatica	4.63	2.41	0.96	5.32	73.11
Panicum virgatum	4.96	2.31	0.83	5.09	78.20
Rhynchospora microcarpa	4.52	1.99	0.84	4.38	82.58
Rhynchospora tracyi	3.12	1.42	0.82	3.13	85.70
Panicum tenerum	2.97	1.39	0.86	3.06	88.76
Hymenocallis palmeri	1.59	0.74	0.79	1.63	90.40
Group MFWGpD (5.2.1.1.5.1 Gulfdune Paspalum Wet Prairie)					
Average similarity: 36.28					
Paspalum monostachyum	16.72	10.60	1.64	29.23	29.23
Cladium mariscus ssp. jamaicense	8.72	5.22	1.23	14.40	43.63
Schizachyrium rhizomatum	7.39	3.64	0.86	10.03	53.66
Muhlenbergia capillaris	8.09	3.43	0.70	9.45	63.11
Rhynchospora divergens	4.34	1.69	0.60	4.65	67.76
Centella asiatica	2.65	1.24	0.81	3.43	71.19
Rhynchospora microcarpa	2.36	1.12	0.77	3.10	74.29
Ludwigia microcarpa	2.31	1.00	0.67	2.75	77.04
Pluchea rosea	1.97	0.72	0.58	1.98	79.02
Elytraria caroliniensis	1.72	0.66	0.56	1.82	80.84
Rhynchospora colorata	1.50	0.60	0.61	1.64	82.48
Dichanthelium dichotomum var. ensifolium	1.52	0.50	0.50	1.38	83.86
Hyptis alata	1.41	0.48	0.55	1.32	85.18
Proserpinaca pectinata	1.92	0.47	0.35	1.28	86.46
Panicum tenerum	1.50	0.39	0.40	1.08	87.54
Eragrostis elliottii	1.19	0.39	0.51	1.07	88.61
Ipomoea sagittata	1.28	0.32	0.44	0.89	89.50
Mikania scandens	1.16	0.30	0.41	0.83	90.33

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Group MFWGpM (5.2.1.1.5.2 Gulfdune Paspalum-Spreading Beakrush Wet Prairie)					
Average similarity: 37.83					
Rhynchospora divergens	26.75	14.92	1.55	39.46	39.46
Paspalum monostachyum	11.94	6.56	1.02	17.34	56.80
Cladium mariscus ssp. jamaicense	9.33	6.29	2.70	16.63	73.43
Schizachyrium rhizomatum	5.31	2.80	1.30	7.40	80.83
Panicum tenerum	3.74	1.27	0.50	3.35	84.18
Iva microcephala	2.80	1.24	0.80	3.28	87.46
Centella asiatica	2.32	0.78	0.51	2.06	89.52
Eleocharis geniculata	3.34	0.60	0.26	1.59	91.11
Group MFWGa (5.2.1.1.6 Muhlenberg Maidencane Wet Prairie)					
Average similarity: 27.93					
Amphicarpum muehlenbergianum	38.06	16.90		60.51	60.51
Sabal palmetto	4.22	4.00		14.32	74.83
Rubus trivialis	9.79	3.92		14.03	88.86
Euthamia tenuifolia var. tenuifolia	4.32	2.00		7.16	96.02
Group MFWGr (5.2.1.1.7 Tolpedo Grass Wet Prairie)					
Average similarity: 41.92					
Panicum repens	51.85	41.92		100.00	100.00
Group MFSGcD (5.2.2.1.1.1 Sawgrass dominant Marsh)					
Average similarity: 60.95					
Cladium mariscus ssp. jamaicense	70.24	58.80	3.59	96.49	96.49
Group MFSGcS (5.2.2.1.1.2 Sawgrass-Spikerush Marsh)					
Average similarity: 53.47					
Cladium mariscus ssp. jamaicense	43.37	34.41	2.72	64.34	64.34
Utricularia purpurea	18.84	8.91	0.75	16.66	81.00
Eleocharis cellulosa	14.28	7.31	0.86	13.67	94.67
Group MFSGcM (5.2.2.1.1.3 Sawgrass Mixed-herbaceous Marsh)					
Average similarity: 30.23					
Cladium mariscus ssp. jamaicense	26.39	20.13	2.06	66.58	66.58
Hyptis alata	3.03	1.23	0.65	4.07	70.66
Pluchea rosea	2.94	1.09	0.62	3.62	74.27
Mikania scandens	2.35	0.81	0.57	2.67	76.94
Blechnum serrulatum	3.65	0.68	0.26	2.25	79.19
Ipomoea sagittata	1.99	0.67	0.51	2.22	81.41
Ludwigia microcarpa	2.43	0.60	0.41	1.98	83.38
Dichanthelium dichotomum var. ensifolium	1.66	0.48	0.43	1.57	84.96
Cephalanthus occidentalis	3.30	0.47	0.19	1.54	86.50

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Baccharis glomeruliflora	2.44	0.33	0.21	1.10	87.59
Rhynchospora microcarpa	1.67	0.29	0.26	0.95	88.55
Proserpinaca palustris	1.30	0.29	0.30	0.95	89.49
Muhlenbergia capillaris	1.94	0.28	0.22	0.93	90.43
Group MFSGrC (5.2.2.1.2.1 Beakrush-Sawgrass Marsh)					
Average similarity: 53.55					
Cladium mariscus ssp. jamaicense	28.16	22.31	2.61	41.66	41.66
Rhynchospora tracyi	17.92	13.15	2.06	24.55	66.21
Bacopa caroliniana	9.15	5.69	1.26	10.63	76.84
Eleocharis cellulosa	6.79	3.08	0.71	5.76	82.60
Panicum tenerum	4.85	2.16	0.78	4.04	86.64
Panicum hemitomon	3.76	1.31	0.52	2.44	89.08
Crinum americanum	3.24	1.17	0.49	2.18	91.26
Group MFSGrS (5.2.2.1.2.2 Beakrush-Spikerush Marsh)					
Average similarity: 54.08					
Rhynchospora tracyi	33.15	25.94	3.10	47.96	47.96
Eleocharis cellulosa	13.26	8.79	1.42	16.26	64.22
Bacopa caroliniana	10.90	6.53	1.11	12.08	76.30
Cladium mariscus ssp. jamaicense	9.14	5.67	1.16	10.49	86.79
Panicum hemitomon	4.15	1.56	0.59	2.89	89.68
Sagittaria lancifolia	3.71	1.44	0.60	2.66	92.34
Group MFSGa (5.2.2.1.3 Panicgrass Marsh)					
Average similarity: 38.31					
Panicum hemitomon	35.40	26.57	2.28	69.35	69.35
Cladium mariscus ssp. jamaicense	16.03	6.71	0.63	17.52	86.87
Sagittaria lancifolia	5.59	1.78	0.53	4.65	91.52
Group MFSGe (5.2.2.1.4 Slim Spikerush Marsh)					
Average similarity: 41.29					
Eleocharis elongata	31.17	25.38	3.41	61.49	61.49
Cladium mariscus ssp. jamaicense	19.01	7.40	0.57	17.93	79.41
Panicum hemitomon	4.68	1.53	0.50	3.70	83.11
Bacopa caroliniana	5.94	1.47	0.30	3.55	86.66
Nymphaea odorata	5.95	1.33	0.31	3.23	89.89
Rhynchospora tracyi	5.73	1.31	0.33	3.17	93.06
Group MFPBp (5.2.3.1.1 Pickerelweed Marsh)					
Average similarity: 42.75					
Pontederia cordata	46.47	32.96	6.71	77.09	77.09
Sagittaria lancifolia	14.82	6.80	1.47	15.90	92.99

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Group MFPBs (5.2.3.1.2 Arrowhead Marsh)					
Average similarity: 32.44					
Sagittaria lancifolia	42.04	27.62	1.91	85.15	85.15
Panicum hemitomon	5.69	1.49	0.48	4.60	89.75
Leptochloa fusca ssp. fascicularis	5.90	1.24	0.35	3.84	93.58
Group MFPBt (5.2.3.1.3 Alligator Flag Marsh)					
Less than 2 samples in group					
Group MFRBa (5.2.3.1.4 Lemon bacopa Marsh)					
Average similarity: 41.66					
Bacopa caroliniana	41.32	24.77	1.71	59.46	59.46
Sagittaria lancifolia	5.52	4.15	2.63	9.96	69.42
Panicum rigidulum	3.89	2.28	1.66	5.47	74.89
Ludwigia repens	3.44	2.07	2.63	4.98	79.86
Crinum americanum	7.94	1.90	0.52	4.56	84.43
Panicum virgatum	2.73	1.62	0.91	3.89	88.32
Rhynchospora inundata	3.33	0.77	0.41	1.85	90.16
Group MFPGtD (5.2.3.2.1.1 Cattail-dominant Marsh)					
Average similarity: 85.51					
Typha domingensis	90.02	85.00	8.12	99.41	99.41
Group MFPGtC (5.2.3.2.1.2 Cattail-Sawgrass Marsh)					
Average similarity: 41.74					
Typha domingensis	40.73	25.29	1.26	60.60	60.60
Cladium mariscus ssp. jamaicense	21.41	11.69	0.92	28.00	88.60
Sagittaria lancifolia	6.59	2.00	0.46	4.79	93.39
Group MFPGtM (5.2.3.2.1.3 Cattail Mixed-Herbaceous Marsh)					
Average similarity: 30.94					
Typha domingensis	16.06	8.14	0.97	26.30	26.30
Mikania scandens	3.35	1.97	1.53	6.38	32.68
Andropogon virginicus	4.11	1.69	0.69	5.47	38.15
Lythrum alatum var. lanceolatum	2.31	1.24	0.89	4.02	42.16
Ludwigia microcarpa	2.83	1.11	0.71	3.60	45.76
Ludwigia octovalvis	2.30	0.96	0.66	3.11	48.87
Bacopa monnieri	2.34	0.91	0.70	2.94	51.81
Mitreola petiolata	1.78	0.89	0.81	2.89	54.70
Symphyotrichum subulatum	2.09	0.85	0.61	2.73	57.44
Fuirena breviseta	1.56	0.70	0.66	2.25	59.68
Sagittaria lancifolia	2.32	0.68	0.47	2.20	61.88
Panicum hemitomon	2.25	0.68	0.48	2.19	64.07

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Setaria parviflora	1.45	0.59	0.60	1.90	65.97
Leptochloa fusca ssp. fascicularis	1.70	0.56	0.49	1.80	67.77
Cyperus haspan	1.31	0.51	0.56	1.65	69.41
Ludwigia repens	2.57	0.50	0.31	1.60	71.02
Conoclinium coelestinum	1.17	0.45	0.51	1.44	72.46
Juncus megacephalus	1.19	0.44	0.51	1.42	73.88
Baccharis glomeruliflora	1.20	0.42	0.49	1.36	75.24
Diospyros virginiana	1.40	0.41	0.47	1.32	76.56
Spermacoce floridana	1.22	0.40	0.45	1.29	77.84
Eleocharis geniculata	1.28	0.38	0.45	1.23	79.07
Pluchea rosea	1.06	0.38	0.46	1.22	80.29
Cyperus surinamensis	1.16	0.36	0.44	1.17	81.46
Rhynchospora colorata	0.98	0.34	0.46	1.11	82.57
Cyperus polystachyos	1.03	0.34	0.44	1.09	83.67
Ammannia latifolia	1.14	0.33	0.43	1.07	84.74
Sesbania herbacea	1.17	0.31	0.36	1.01	85.75
Panicum rigidulum	1.19	0.30	0.35	0.98	86.72
Eupatorium capillifolium	0.94	0.27	0.37	0.89	87.61
Symphyotrichum bracei	1.11	0.25	0.30	0.82	88.43
Schizachyrium scoparium	1.13	0.25	0.34	0.80	89.24
Cladium mariscus ssp. jamaicense	1.60	0.23	0.22	0.74	89.98
Phyla nodiflora	0.95	0.20	0.33	0.65	90.63
Group MFPGeD (5.2.3.2.2.1 Spikerush dominant Marsh)					
Average similarity: 56.53					
Eleocharis cellulosa	61.81	51.49	3.94	91.08	91.08
Group MFPGeC (5.2.3.2.2 2 Spikerush-Sawgrass Marsh					
Average similarity: 63.97					
Utricularia purpurea	46.59	37.00	1.73	57.83	57.83
Eleocharis cellulosa	20.01	15.20	2.98	23.76	81.60
Cladium mariscus ssp. *jamaicense*	12.68	7.87	1.08	12.31	93.91
Group MFPGeP (5.2.3.2.2.3 Spikerush-Maidencane Marsh)					
Average similarity: 43.22					
Eleocharis cellulosa	18.38	11.75	1.25	27.18	27.18
Utricularia purpurea	18.14	11.11	1.14	25.71	52.89
Panicum hemitomon	12.35	7.43	1.21	17.20	70.09
Utricularia gibba	8.46	2.93	0.46	6.79	76.88
Bacopa caroliniana	8.05	2.92	0.55	6.75	83.63
Eleocharis elongata	6.86	1.85	0.33	4.28	87.91
Utricularia foliosa	3.33	1.11	0.48	2.57	90.48
Group MFPGeO (5.2.3.2.2.4 Spikerush Coastal Marsh)					

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Average similarity: 55.51					
Eleocharis cellulosa	37.93	28.21	2.28	50.82	50.82
Rhizophora mangle	26.59	19.20	2.39	34.58	85.41
Cladium mariscus ssp. jamaicense	12.60	4.14	0.48	7.46	92.87
Group MFPFy (5.2.3.3.1 White Water Lily Marsh)					
Average similarity: 51.60					
Nymphaea odorata	31.89	25.22	2.96	48.87	48.87
Utricularia purpurea	29.37	18.67	1.14	36.18	85.05
Eleocharis cellulosa	6.77	2.15	0.49	4.17	89.22
Utricularia foliosa	6.51	2.08	0.48	4.03	93.26
Group MFPFa (5.2.3.3.2 Banana Lily Marsh)					
Average similarity: 50.85					
Nymphoides aquatica	32.58	24.39	2.72	47.98	47.98
Utricularia purpurea	18.13	10.63	0.91	20.91	68.89
Utricularia gibba	14.52	7.08	0.69	13.92	82.81
Utricularia foliosa	10.90	5.20	0.83	10.22	93.04
Group MFRGaD (5.2.4.1.1.1 Broom sedge dominant Marsh)					
Average similarity: 32.90					
Andropogon virginicus	19.31	12.90	1.48	39.22	39.22
Lythrum alatum var. lanceolatum	3.61	1.99	1.09	6.06	45.28
Ludwigia microcarpa	4.90	1.75	0.64	5.32	50.59
Baccharis glomeruliflora	2.61	1.32	0.87	4.02	54.62
Mikania scandens	2.47	1.18	0.80	3.59	58.21
Conoclinium coelestinum	2.28	1.16	0.83	3.52	61.73
Ludwigia octovalvis	2.86	1.10	0.61	3.33	65.06
Schizachyrium scoparium	3.03	1.06	0.55	3.23	68.29
Spermacoce floridana	2.50	0.96	0.65	2.93	71.22
Eupatorium leptophyllum	2.41	0.95	0.61	2.88	74.10
Cyperus polystachyos	2.28	0.88	0.67	2.67	76.77
Symphyotrichum subulatum	2.21	0.85	0.58	2.58	79.35
Phyla nodiflora	1.32	0.47	0.48	1.42	80.77
Mecardonia acuminata var. peninsularis	2.08	0.44	0.40	1.35	82.12
Setaria parviflora	1.34	0.36	0.35	1.09	83.21
Rhynchospora colorata	1.10	0.36	0.44	1.09	84.31
Cyperus ligularis	3.98	0.34	0.19	1.05	85.35
Mitreola petiolata	1.18	0.34	0.39	1.04	86.39
Fimbristylis cymosa	2.30	0.32	0.27	0.96	87.35
Salix caroliniana	1.06	0.30	0.39	0.90	88.25
Polypremum procumbens	1.56	0.30	0.32	0.90	89.15
Agalinis linifolia	1.24	0.24	0.27	0.74	89.89

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Fuirena breviseta	1.00	0.22	0.27	0.68	90.57
Group MFRGaM (5.2.4.1.1.2 Broom sedge-Mixed herbaceous Marsh)					
Average similarity: 46.17					
Mikania scandens	6.67	4.88	5.89	10.56	10.56
Symphyotrichum subulatum	5.74	4.26	1.79	9.24	19.80
Andropogon virginicus	5.50	4.22	1.27	9.14	28.93
Lythrum alatum var. lanceolatum	4.99	3.72	1.57	8.06	37.00
Ludwigia octovalvis	5.57	3.64	1.33	7.88	44.88
Ludwigia microcarpa	4.58	3.45	1.57	7.47	52.36
Typha domingensis	5.06	2.05	0.53	4.44	56.79
Schizachyrium scoparium	4.08	2.02	0.79	4.37	61.17
Eleocharis geniculata	3.51	1.99	0.81	4.32	65.48
Cyperus surinamensis	3.54	1.97	0.80	4.28	69.76
Sesbania herbacea	3.64	1.97	0.80	4.28	74.04
Baccharis glomeruliflora	3.97	1.76	0.73	3.81	77.85
Cyperus haspan	3.16	1.61	0.67	3.49	81.33
Cyperus polystachyos	2.80	1.18	0.55	2.55	83.88
Leptochloa fusca ssp. fascicularis	3.01	1.17	0.51	2.53	86.41
Fuirena breviseta	2.69	1.08	0.50	2.35	88.76
Mitreola petiolata	2.36	0.95	0.50	2.05	90.80
Group MFRHm (5.2.4.2.1 Hempvine-Mixed herbaceous marsh)					
Average similarity: 40.19					
Mikania scandens	7.05	4.71	1.73	11.72	11.72
Mitreola petiolata	5.66	4.04	1.38	10.06	21.78
Bacopa monnieri	5.44	3.78	1.19	9.41	31.19
Ludwigia microcarpa	5.21	3.35	1.06	8.34	39.53
Lythrum alatum var. lanceolatum	5.02	3.31	1.07	8.23	47.76
Eleocharis geniculata	5.12	3.24	1.05	8.07	55.83
Spermacoce floridana	5.03	3.20	1.06	7.96	63.79
Cyperus haspan	4.63	2.61	0.84	6.50	70.29
Andropogon virginicus	3.39	1.44	0.55	3.59	73.88
Fuirena breviseta	3.37	1.38	0.54	3.44	77.32
Setaria parviflora	3.25	1.38	0.54	3.43	80.75
Cyperus polystachyos	2.63	1.01	0.47	2.51	83.25
Conoclinium coelestinum	2.57	0.93	0.44	2.31	85.57
Eupatorium capillifolium	2.14	0.64	0.36	1.59	87.16
Ludwigia octovalvis	2.04	0.57	0.33	1.41	88.57
Baccharis glomeruliflora	2.04	0.53	0.30	1.32	89.89
Dichanthelium dichotomum var. ensifolium	2.05	0.53	0.31	1.31	91.20

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Group MFRBb (5.2.4.3.1 Water hyssop Marsh)					
Average similarity: 30.56					
Bacopa monnieri	11.92	5.53	0.97	18.08	18.08
Leptochloa fusca ssp. fascicularis	4.71	2.15	0.79	7.04	25.12
Cyperus haspan	3.61	1.97	0.99	6.46	31.58
Ludwigia microcarpa	5.02	1.94	0.72	6.36	37.94
Symphyotrichum subulatum	3.74	1.90	0.82	6.21	44.15
Mikania scandens	3.83	1.80	0.87	5.90	50.05
Panicum rigidulum	5.33	1.73	0.56	5.67	55.71
Fuirena breviseta	3.55	1.56	0.71	5.10	60.81
Mitreola petiolata	3.55	1.46	0.69	4.79	65.60
Lythrum alatum var. lanceolatum	2.21	1.03	0.63	3.38	68.98
Schizachyrium scoparium	2.61	0.87	0.49	2.84	71.82
Sagittaria lancifolia	2.47	0.86	0.46	2.82	74.64
Andropogon virginicus	2.60	0.84	0.50	2.74	77.38
Panicum hemitomon	2.43	0.81	0.45	2.65	80.03
Eleocharis geniculata	2.29	0.70	0.45	2.29	82.32
Conoclinium coelestinum	2.47	0.58	0.38	1.89	84.21
Ludwigia octovalvis	3.18	0.55	0.33	1.81	86.03
Juncus megacephalus	1.53	0.50	0.42	1.63	87.66
Iva microcephala	1.85	0.41	0.32	1.35	89.00
Setaria parviflora	2.23	0.40	0.29	1.32	90.32
Group MFRBl (5.2.4.3.2 Sprangletop Marsh)					
Average similarity: 35.48					
Leptochloa fusca ssp. fascicularis	29.14	14.50	1.13	40.87	40.87
Mikania scandens	10.05	6.95	2.16	19.58	60.46
Symphyotrichum subulatum	6.61	3.38	0.79	9.52	69.98
Lythrum alatum var. lanceolatum	5.00	2.50	0.70	7.03	77.01
Panicum hemitomon	4.35	1.78	0.52	5.02	82.04
Cyperus surinamensis	3.42	1.24	0.45	3.51	85.54
Andropogon virginicus	3.98	1.08	0.34	3.05	88.60
Mitreola petiolata	3.22	0.82	0.34	2.30	90.90
Group MFRBm (5.2.4.3.3 Water Primrose Marsh)					
Average similarity: 37.20					
Ludwigia microcarpa	22.57	15.86	1.53	42.63	42.63
Andropogon virginicus	5.10	3.01	1.20	8.09	50.71
Schizachyrium scoparium	3.19	1.70	0.89	4.56	55.27
Rhynchospora colorata	2.96	1.24	0.68	3.34	58.61
Cyperus haspan	2.42	1.15	0.71	3.10	61.71
Fuirena breviseta	2.61	1.13	0.65	3.04	64.75
Centella asiatica	2.82	1.10	0.69	2.96	67.71
Rhynchospora microcarpa	2.89	1.03	0.61	2.76	70.47

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Mikania scandens	2.33	1.01	0.65	2.72	73.19
Setaria parviflora	2.20	0.94	0.60	2.51	75.71
Sagittaria lancifolia	2.33	0.88	0.56	2.38	78.09
Ludwigia octovalvis	2.27	0.85	0.57	2.30	80.38
Lythrum alatum var. lanceolatum	2.28	0.84	0.56	2.26	82.65
Mitreola petiolata	2.02	0.84	0.60	2.26	84.91
Eragrostis atrovirens	2.04	0.77	0.51	2.08	86.99
Symphyotrichum subulatum	2.57	0.71	0.49	1.92	88.91
Saccharum giganteum	2.16	0.45	0.34	1.22	90.13
Group MFRBr (5.2.4.3.4 Creeping Primrose Willow Marsh)					
Average similarity: 62.39					
Ludwigia repens	64.15	53.07	3.62	85.07	85.07
Sagittaria lancifolia	8.91	3.59	1.05	5.75	90.83
Group MFRBs (5.2.4.3.5 Lax Hornpod-False Buttonweed Marsh)					
Average similarity: 41.23					
Spermacoce floridana	7.29	5.67	2.09	13.76	13.76
Ludwigia microcarpa	7.24	5.66	2.10	13.72	27.49
Mitreola petiolata	7.53	4.57	1.32	11.09	38.58
Lythrum alatum var. lanceolatum	5.43	3.18	0.95	7.71	46.29
Cyperus polystachyos	5.37	3.18	0.95	7.71	54.00
Cyperus haspan	5.26	2.82	0.82	6.83	60.83
Ammannia latifolia	5.10	2.72	0.82	6.59	67.42
Eleocharis geniculata	5.04	2.56	0.73	6.22	73.64
Ludwigia octovalvis	3.58	1.24	0.47	3.01	76.65
Rhynchospora colorata	3.29	1.21	0.48	2.93	79.59
Scoparia dulcis	3.29	1.21	0.48	2.93	82.52
Bacopa monnieri	3.39	1.20	0.48	2.90	85.42
Verbena scabra	2.72	0.82	0.41	2.00	87.42
Spermacoce tetraquetra	2.72	0.73	0.35	1.77	89.18
Pluchea odorata	2.47	0.61	0.35	1.49	90.67
Group MFRBp (5.2.4.3.6 Arrowhead-Mermaidweed Marsh)					
Average similarity: 30.64					
Sagittaria lancifolia	10.32	5.52	1.17	18.02	18.02
Proserpinaca palustris	10.91	3.95	0.85	12.89	30.91
Rhynchospora microcarpa	7.94	3.52	0.61	11.48	42.39
Schizachyrium scoparium	4.70	2.16	0.71	7.05	49.44
Ludwigia microcarpa	4.45	2.12	0.72	6.91	56.35
Fuirena breviseta	4.32	1.76	0.59	5.73	62.08
Mitreola petiolata	4.23	1.74	0.59	5.68	67.76
Cyperus haspan	3.98	1.73	0.59	5.63	73.40
Mikania scandens	3.98	1.73	0.59	5.63	79.03

Species Name	Average Importance Value (IV)	Average Similarity	Ratio (Similarity/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
Eragrostis atrovirens	4.12	1.43	0.45	4.66	83.69
Centella asiatica	3.67	1.17	0.45	3.82	87.51
Panicum rigidulum	4.75	1.16	0.45	3.79	91.29
Group MFO (5.2.6 Open Freshwater Marsh)					
Average similarity: 30.34					
Cladium mariscus ssp. jamaicense	35.40	17.65	0.84	58.18	58.18
Eleocharis cellulosa	19.98	9.63	0.82	31.73	89.91
Rhynchospora tracyi	6.17	1.28	0.30	4.21	94.12
Group MFWO (5.2.7 Open Freshwater Priarie)					
Average similarity: 17.92					
Cladium mariscus ssp. jamaicense	20.82	8.23	0.61	45.94	45.94
Bacopa caroliniana	6.51	1.35	0.37	7.54	53.47
Rhynchospora divergens	6.60	1.06	0.26	5.90	59.37
Rhynchospora tracyi	5.19	0.97	0.24	5.39	64.76
Muhlenbergia capillaris	4.99	0.96	0.31	5.38	70.14
Schizachyrium rhizomatum	3.37	0.69	0.43	3.84	73.98
Panicum tenerum	2.72	0.66	0.37	3.66	77.64
Centella asiatica	3.91	0.58	0.31	3.25	80.90
Eragrostis elliottii	1.26	0.49	0.61	2.74	83.64
Rhynchospora	2.84	0.35	0.44	1.95	85.60
Symphyotrichum bracei	1.31	0.34	0.42	1.88	87.48
Phyla nodiflora	1.60	0.25	0.29	1.40	88.87
Ipomoea sagittata	1.46	0.24	0.28	1.35	90.22
Group MFPGeU (Spikerush-Bladderwort Marsh atTrexler_FISHMON Sites)					
Average similarity: 53.62					
Eleocharis	24.50	19.32	2.72	36.04	36.04
Utricularia	16.72	10.82	1.24	20.18	56.22
Panicum hemitomon	12.76	8.30	1.36	15.48	71.70
Nymphaea odorata	9.98	3.59	0.52	6.70	78.40
Bacopa caroliniana	7.28	3.29	0.71	6.14	84.54
Sagittaria	7.13	2.84	0.64	5.30	89.84
Paspalidium geminatum	5.99	2.69	0.73	5.01	94.85
Group MFPGeU (Spikerush-Beakrush Marsh atTrexler_FISHMON Sites)					
Average similarity: 54.24					
Eleocharis	43.49	33.52	3.72	61.79	61.79
Sagittaria	14.49	6.46	0.81	11.91	73.7
Rhynchospora	15.95	6.13	0.59	11.29	84.99
Utricularia	13.92	5.75	0.68	10.6	95.59

Appendix 3: SIMPER (Similarity percentage) analysis of species contributions (%) to the average dissimilarity between vegetation types that had overall mean dissimilarity <60%.

Groups (Ave. Dissimilarity)	Species	Average Importance Value (Group 1)	Average Importance Value (Group 2)	Average Dissim.	Ratio (Dissim/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
(1) Muhly grass Wet Prairie (MFWGm) and (2) Little Blue Stem Wet Prairie (MFWGs) Ave. dissim.= 57.59	*Schizachyrium rhizomatum*	8.28	31.36	11.67	1.96	20.26	20.26
	Muhlenbergia capillaris	28.55	7.89	10.54	1.63	18.31	38.56
	Cladium mariscus ssp. jamaicense	24.55	20.01	5.27	1.33	9.15	47.71
	Paspalum monostachyum	0.68	3.22	1.70	0.60	2.96	50.67
	Centella asiatica	3.64	3.39	1.69	1.24	2.93	53.60
	Rhynchospora divergens	1.99	1.90	1.52	0.69	2.64	56.25
	Rhynchospora tracyi	1.72	2.36	1.46	0.88	2.54	58.79
	Cassytha filiformis	1.29	2.57	1.42	1.01	2.47	61.26
	Schoenus nigricans	1.78	1.50	1.40	0.58	2.43	63.69
	Rhynchospora microcarpa	1.73	2.43	1.21	1.09	2.09	65.78
	Panicum tenerum	2.13	2.46	1.15	1.18	2.00	67.78
	Pluchea rosea	1.78	1.95	1.13	1.00	1.97	69.75
	Panicum virgatum	0.59	2.19	1.12	0.83	1.94	71.69
	Aristida purpurascens	1.75	0.76	0.90	0.96	1.56	73.25
	Phyla nodiflora	1.34	0.46	0.78	0.69	1.36	74.61
	Hymenocallis palmeri	1.02	1.33	0.77	0.99	1.34	75.95
	Eragrostis elliottii	1.18	0.96	0.75	0.76	1.30	77.25
	Solidago stricta	1.15	0.96	0.70	0.93	1.22	78.47
(1) Muhly grass Wet Prairie MFWGm and (2) Sawgrass Wet Prairie (MFWGcD) Ave. dissim. = 53.99	*Muhlenbergia capillaris*	28.55	11.50	9.24	1.47	17.12	17.12
	Cladium mariscus ssp. jamaicense	24.55	36.17	7.96	1.45	14.75	31.86
	Schizachyrium rhizomatum	8.28	8.47	4.74	1.24	8.79	40.65
	Centella asiatica	3.64	3.65	2.03	1.06	3.76	44.41
	Rhynchospora tracyi	1.72	2.82	1.69	0.82	3.14	47.55
	Cassytha filiformis	1.29	2.76	1.55	0.87	2.87	50.42
	Schoenus nigricans	1.78	1.74	1.52	0.56	2.81	53.23

Groups (Ave. Dissimilarity)	Species	Average Importance Value (Group 1)	Average Importance Value (Group 2)	Average Dissim.	Ratio (Dissim/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
	Panicum tenerum	2.13	3.45	1.51	0.98	2.80	56.03
	Phyla nodiflora	1.34	1.82	1.24	0.76	2.29	58.31
	Pluchea rosea	1.78	2.25	1.23	1.00	2.29	60.60
	Rhynchospora microcarpa	1.73	2.18	1.22	0.95	2.25	62.85
	Panicum virgatum	0.59	2.08	1.11	0.64	2.05	64.90
	Rhynchospora divergens	1.99	0.71	1.10	0.58	2.04	66.94
	Aristida purpurascens	1.75	0.90	0.94	0.92	1.74	68.68
	Paspalum monostachyum	0.68	1.33	0.86	0.58	1.60	70.28
	Eragrostis elliottii	1.18	0.90	0.72	0.90	1.34	71.62
	Symphyotrichum bracei	0.65	1.28	0.70	0.86	1.30	72.91
	Solidago stricta	1.15	0.79	0.69	0.91	1.27	74.19
	Hymenocallis palmeri	1.02	0.89	0.68	0.91	1.26	75.45
	Schizachyrium scoparium	0.72	0.71	0.68	0.36	1.26	76.70
	Ipomoea sagittata	0.50	0.95	0.57	0.68	1.06	77.76
(1) Little Blue Stem Wet Prairie (MFWGs) and (2) Sawgrass Wet Prairie (MFWGcD) Ave. dissim. = 56.90	*Schizachyrium rhizomatum*	31.36	8.47	11.52	1.96	20.25	20.25
	Cladium mariscus ssp. jamaicense	20.01	36.17	9.22	1.56	16.20	36.45
	Muhlenbergia capillaris	7.89	11.50	4.36	1.23	7.67	44.11
	Centella asiatica	3.39	3.65	2.01	1.03	3.54	47.65
	Paspalum monostachyum	3.22	1.33	1.89	0.65	3.31	50.96
	Rhynchospora tracyi	2.36	2.82	1.73	0.95	3.04	54.01
	Cassytha filiformis	2.57	2.76	1.72	1.04	3.02	57.03
	Panicum tenerum	2.46	3.45	1.54	1.00	2.70	59.73
	Panicum virgatum	2.19	2.08	1.46	0.83	2.57	62.29
	Schoenus nigricans	1.50	1.74	1.39	0.56	2.45	64.74
	Pluchea rosea	1.95	2.25	1.31	1.02	2.30	67.04
	Rhynchospora microcarpa	2.43	2.18	1.29	1.06	2.27	69.31
	Rhynchospora divergens	1.90	0.71	1.10	0.64	1.92	71.23
	Phyla nodiflora	0.46	1.82	1.02	0.61	1.80	73.03
	Hymenocallis palmeri	1.33	0.89	0.76	0.95	1.34	74.37

Groups (Ave. Dissimilarity)	Species	Average Importance Value (Group 1)	Average Importance Value (Group 2)	Average Dissim.	Ratio (Dissim/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
	Eragrostis elliottii	0.96	0.90	0.72	0.63	1.26	75.63
	Symphyotrichum bracei	0.74	1.28	0.70	0.92	1.23	76.86
	Ipomoea sagittata	0.86	0.95	0.65	0.80	1.14	78.00
	Symphyotrichum dumosum var. dumosum	0.71	0.93	0.64	0.75	1.13	79.13
	Aristida purpurascens	0.76	0.90	0.64	0.73	1.12	80.25
	Solidago stricta	0.96	0.79	0.63	0.88	1.10	81.35
(1) Sawgrass Dominant Marsh (MFSGcD) and (2) Sawgrass-Spikerush Marsh (MFSGcS) Ave. dissim. = 55.40	*Cladium mariscus ssp. jamaicense*	70.24	43.37	15.28	1.48	27.59	27.59
	Utricularia purpurea	0.92	18.84	9.28	1.06	16.76	44.35
	Eleocharis cellulosa	1.32	14.28	6.90	1.14	12.46	56.81
	Bacopa caroliniana	1.80	4.11	2.46	0.67	4.44	61.25
	Utricularia foliosa	1.16	3.52	2.09	0.60	3.78	65.02
	Utricularia gibba	0.15	2.68	1.39	0.37	2.52	67.54
	Sagittaria lancifolia	1.65	0.95	1.21	0.39	2.18	69.72
	Rhynchospora tracyi	1.21	1.14	1.05	0.51	1.89	71.61
	Crinum americanum	1.24	1.04	1.03	0.48	1.86	73.47
	Justicia angusta	0.95	1.19	0.94	0.53	1.71	75.18
	Panicum hemitomon	0.45	1.29	0.81	0.49	1.45	76.63
	Peltandra virginica	0.77	0.84	0.74	0.42	1.34	77.97
	Panicum tenerum	1.22	0.37	0.74	0.50	1.34	79.31
	Pluchea rosea	1.06	0.27	0.62	0.50	1.12	80.42
	Pontederia cordata	0.70	0.59	0.61	0.32	1.11	81.53
(1) Sawgrass-Spikerush Marsh (MFSGcS) and (2) Spikerush-Sawgrass Marsh (MFPGeC) Ave. dissim. = 58.19	*Utricularia purpurea*	18.84	46.59	16.63	1.78	28.58	28.58
	Cladium mariscus ssp. jamaicense	43.37	12.68	15.60	1.85	26.81	55.39
	Eleocharis cellulosa	14.28	20.01	6.62	1.30	11.37	66.76
	Utricularia foliosa	3.52	4.66	3.05	0.87	5.23	71.99
	Bacopa caroliniana	4.11	2.85	2.69	0.76	4.62	76.61
	Panicum hemitomon	1.29	3.80	2.09	0.79	3.59	80.20

Groups (Ave. Dissimilarity)	Species	Average Importance Value (Group 1)	Average Importance Value (Group 2)	Average Dissim.	Ratio (Dissim/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
	Utricularia gibba	2.68	0.10	1.38	0.36	2.37	82.57
	Rhynchospora tracyi	1.14	1.91	1.37	0.50	2.36	84.93
	Sagittaria lancifolia	0.95	1.01	0.89	0.46	1.53	86.46
	Justicia angusta	1.19	0.57	0.79	0.52	1.36	87.82
	Crinum americanum	1.04	0.48	0.71	0.43	1.22	89.04
	Paspalidium geminatum	0.27	1.12	0.66	0.42	1.13	90.17
(1) Beak Rush-Sawgrass	*Cladium mariscus ssp. jamaicense*	28.16	9.14	9.79	1.80	17.20	17.20
Marsh (MFSGrC) and	*Rhynchospora tracyi*	17.92	33.15	8.66	1.27	15.21	32.41
(2) Beak Rush-	*Eleocharis cellulosa*	6.79	13.26	4.92	1.44	8.64	41.05
Spikerush Marsh	*Bacopa caroliniana*	9.15	10.90	3.97	1.30	6.98	48.03
(MFSGrS)	*Panicum hemitomon*	3.76	4.15	2.49	1.10	4.37	52.40
Ave. dissim. = 56.91	*Panicum tenerum*	4.85	1.49	2.27	0.96	4.00	56.40
	Rhynchospora inundata	0.84	4.01	2.18	0.67	3.84	60.24
	Crinum americanum	3.24	3.28	2.13	1.06	3.74	63.98
	Sagittaria lancifolia	1.10	3.71	1.91	0.97	3.35	67.33
	Rhynchospora microcarpa	3.21	0.96	1.83	0.55	3.21	70.54
	Hymenocallis palmeri	0.86	3.09	1.70	0.70	2.98	73.52
	Panicum virgatum	2.96	1.47	1.69	0.89	2.97	76.49
	Cassytha filiformis	2.25	0.00	1.13	0.45	1.98	78.47
	Pluchea rosea	2.09	0.17	1.06	0.67	1.86	80.33
	Justicia angusta	1.32	1.38	0.95	0.95	1.68	82.01
	Leersia hexandra	1.50	0.59	0.86	0.73	1.50	83.51
	Fuirena scirpoidea	0.37	1.05	0.68	0.35	1.19	84.70
(1) Cattail Dominant	*Typha domingensis*	90.02	40.73	25.27	1.87	43.34	43.34
Marsh (MFPGtD) and	*Cladium mariscus ssp. jamaicense*	0.00	21.41	10.81	1.29	18.54	61.88
(2) Cattail-Sawgrass	*Sagittaria lancifolia*	1.65	6.59	3.46	0.81	5.94	67.82
Marsh (MFPGtC)	*Rhynchospora filifolia*	0.00	4.10	2.07	0.36	3.55	71.37
Ave. dissim. = 58.30	*Pontederia cordata*	0.00	3.91	1.98	0.57	3.39	74.76

Groups (Ave. Dissimilarity)	Species	Average Importance Value (Group 1)	Average Importance Value (Group 2)	Average Dissim.	Ratio (Dissim/ SD)	Species Contrib. (%)	Cum. Contrib. (%)
	Polygonum hydropiperoides	0.00	2.46	1.24	0.49	2.13	76.89
	Utricularia foliosa	0.00	2.29	1.16	0.49	1.98	78.87
	Ludwigia repens	1.51	1.00	1.14	0.51	1.95	80.83
	Cyperus haspan	1.67	0.24	0.91	0.52	1.56	82.39
	Ludwigia octovalvis	1.67	0.16	0.89	0.50	1.52	83.91
	Nymphoides aquatica	0.00	1.55	0.78	0.27	1.34	85.25
	Utricularia gibba	0.00	1.52	0.77	0.26	1.32	86.57
	Mikania scandens	0.76	0.88	0.75	0.62	1.28	87.85

Appendix 4: Crosswalk between two classifications – Rutchey et al. 2007 and data-based classification (Sah et al. 2010)

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
M	500000	Marsh	1	Graminoid and/or herbaceous emergent or floating vegetation in shallow water that stands at or above the ground surface for varying period in a year.	M	500000	Marsh	1
MS	510000	Salt Marsh	2	A marsh consisting of salt tolerant graminoid and/or herbaceous vegetation.	MS	510000	Salt Marsh	2
MSO	511000	Oligohaline Salt Marsh	3	Salt marsh dominated low salt-tolerant species, occasionally mixed with freshwater species.				
MSOG	511100	Oligohaline Graminoid Salt Marsh	4	Low salt-tolerant graminoid dominated salt marsh.				
MSOGs	511110	Sand Cordgrass Salt Marsh	5	Sand Cordgrass (*Spartina bakeri*) dominated salt marsh.	MSGs	511400	Cordgrass	4
MSM	512000	Mesohaline Salt Marsh	3	Salt marsh dominated by medium salt-tolerant species.				
MSMG	512100	Mesohaline Graminoid Salt Marsh	4	Medium salt-tolerant graminoid dominated salt marsh.				
MSMGd	512110	Saltgrass Salt Marsh	5	Saltgrass (*Distichlis spicata*) dominated salt marsh.	MSGd	511100	Saltgrass	4
MSMGj	512120	Black Rush Salt Marsh	5	Black Rush (*Juncus roemerianus*) dominated salt marsh.	MSGj	511200	Black Rush	4
					MSGm	511300	Keysgrass	4

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MSMGs	512140	Gulf Cordgrass Salt Marsh	5	Gulf Cordgrass (*Spartina spartinae*) dominated salt marsh.	MSGs	511400	Cordgrass	4
MSMGp	512150	Dropseed Salt Marsh	5	Dropseed (*Sporobulus* spp.) dominated salt marsh.	MSGp	511500	Dropseed	4
					MSH	512000	Herbaceous Salt Marsh	3
					MSO	513000	Open Salt Marsh	3
MSH	513000	Hypersaline Salt Marsh	3	Salt marsh dominated by high salt-tolerant species.				
MSHS	513100	Hypersaline Succulent Salt Marsh	4	High salt-tolerant succulent dominated salt marsh.	MSS	514000	Succulent Salt Marsh	3
MSHSb	513110	Saltwort Salt Marsh	5	Saltwort (*Batis maritima*) dominated salt marsh.	MSSb	514100	Saltwort	4
					MSSs	514200	Glasswort	4
					MSSe	514300	Sea Purslane	4
MF	520000	Freshwater Marsh	2	Freshwater graminoid and/or herbaceous marsh.	MF	520000	Freshwater Marsh	2
MFW	521000	Seasonally flooded Wet Prairie	3	Freshwater graminoid and/or herbaceous marsh seasonally flooded for 2-7 months.				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFWG	521100	Seasonally flooded Graminoid Wet Prairie	4	Short hydroperiod marsh characterized by a mix of graminoids that includes low-stature sawgrass (*Cladium mariscus* ssp. *jamaicense*), Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), Little Bluestem (*Schizachyrium rhizomatum*), and Black Sedge (*Schoenus nigricans*), among others.	MFGP	523000	Graminoid Freshwater Prairie	3
MFWGm	521110	Muhly Grass Wet Prairie	5	Muhly Grass (*Muhlenbergia capillaris* var. *filipes*) dominated wet prairie. Blue stem (Schizachyrium rhizomatum) and low stature Sawgrass (*Cladium mariscus* ssp. *jamaicense*) commmonly found.	MFGPm	523500	Muhly Grass	4
MFWGs	521120	Little Bluestem Wet Prairie	5	Little Bluestem (*Schizachyrium scoparium*) dominated wet prairie. Muhly grass (*Muhlenbergia capillaris* var. *filipes*) and low stature Sawgrass (Cladium mariscus ssp. jamaicense) commonly found.	MFGPs	523600	Little Bluestem	4
MFWGc	521130	Sawgrass Wet Prairie	5	Sawgrass (*Cladium mariscus ssp. jamaicense*) dominated wet prairie with average height less than 1.5 meters.	MFGPc	523100	Sawgrass Prairie	4

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFWGcD	521131	Sawgrass Prairie	6	Sawgrass (*Cladium mariscus ssp. jamaicense*) dominated wet prairie.				
MFWGcM	521132	Sawgrass-Mixed Prairie	6	Sawgrass (*Cladium mariscus* ssp. *jamaicense*) prairie but very diverse with several co-dominant species, and/or presence of some woody species in herb stratum (<1 m height).				
MFWGh	521140	Black-top Sedge Wet Prairie	5	Black Sedge (*Schoenus nigricans*) dominated wet prairie. Some low stature Sawgrass (*Cladium mariscus* ssp. *jamaicense*) present.	MFGPh	523700	Black Sedge	4
MFWGp	521150	Gulfdune Paspalum Wet Prairie	5	Gulfdune Paspalum (*Paspalum monostachyum*) dominated wet prairie.	MFGpa	528100	Gulfdune Paspalum	4
MFWGpD	521151	Gulfdune Paspalum dominated Wet Prairie	6	Gulfdune Paspalum (*Paspalum monostachyum*) dominated marsh. Paspalum found in the substantial presence (> 10%) of Little Bluestem (*Schizachyrium scoparium*) and/or Muhly Grass (*Muhlenbergia capillaris var. filipes*) is characteristic of a Graminoid Freshwater Prairie (MFGP).				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	**Raster ID**	**Name**	**Level**		**R_Class ID**	**R_Raster ID**	**R_Name**	**R_Level**
MFWGpM	521152	Gulfdune Paspalum-Spreading Beak Rush	6	Gulfdune Paspalum (*Paspalum monostachyum*) dominated wet prairie, but with strong presence of Spreading Beak Rush (*Rhynchospora divergens*), and occasionally (*Rhynchospora tracyi).*				
MFWGa	521160	Muhlenberg maidencane Wet Prairie	5	Muhlenberg maidencane (*Amphicarpum muehlenbergianum*)-dominated wet prairie.				
MFWGr	521170	Torpedo grass Wet Prairie	5	Torpedo grass *(Panicum repens)* dominated prairie.				
MFS	522000	Seasonally flooded Freshwater Marsh	3	Freshwater graminoid and/or herbaceous marsh seasonally flooded for 4-10 months.				
MFSG	522100	Seasonally flooded Graminoid Marsh	4	Graminoid dominated freshwater marsh.	MFG	522000	Graminoid Freshwater Marsh	3
MFSGc	522110	Sawgrass Marsh	5	Sawgrass (*Cladium mariscus* ssp. *jamaicense*) dominated marsh.	MFGc	522100	Sawgrass	4
					MFGcS	522110	Sawgrass-Short	5
					MFGcT	522120	Sawgrass-Tall	5
MFSGcD	522111	Sawgrass Dominant Manrsh	6	Sawgrass (*Cladium mariscus* ssp. *jamaicense*) dominated marsh with relative cover >70%.				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFSGcS	522112	Sawgrass-Spikerush Marsh	6	Sawgrass (*Cladium mariscus* ssp. *jamaicense*) marsh co-dominated with Spikerush (*Eleocharis cellulosa*).				
MFSGcM	522113	Sawgrass-Mixed Marsh	6	Sawgrass (*Cladium mariscus* ssp. *jamaicense*) marsh but very diverse with several co-dominant species, and/or presence of some woody species in herb stratum (<1 m height)				
MFSGr	522120	Beakrush Marsh	5	Beakrush (*Rynchospora* spp.) dominated marsh. Llow stature Sawgrass (*Cladium mariscus* ssp. *jamaicense*) and spikerush (*Eleocharis cellulosa*) commonly found. Beakrush found in the substantial presence (> 10%) of Little Bluestem (*Schizachyrium rhizomatum*) and/or Muhly Grass (*Muhlenbergia capillaris* var. *filipes*) is characteristic of a Seasonally flooded Graminoid Wet Prairie (MFWG).	MFGr	522900	Beakrush	4
MFSGrC	522121	Beakrush-Sawgrass Marsh	6	Beakrush (*Rynchospora* spp.) dominated marsh with co-dominance of sawgrass (*Cladium mariscus* ssp. *jamaicense*).				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFSGrS	522122	Beakrush-Spikerush Marsh	6	Beakrush (*Rynchospora* spp.) dominated marsh with co-dominance of spikerush (*Eleocharis cellulosa*).				
MFSGa	522130	Panicgrass Marsh	5	Maidencane (*Panicum hemitomon*) dominated marsh.	MFGa	522400	Panicgrass	4
MFSGe	522140	Slim Spikerush Marsh	5	Slim Spikerush (*Eleocharis elongata*) - dominated marsh.				
					MFGz	522800	Giant Cutgrass	4
MFP	523000	Semi-permanently flooded Freshwater Marsh	3	Freshwater graminoid and/or herbaceous marsh that remains flooded much of the year				
MFPB	523100	Semi-permanently Flooded Broadleaf Emergent Marsh	4	Broadleaf emergent dominated freshwater marsh.	MFB	521000	Broadleaf Emergent Marsh	3
					MFBa	521100	Leather Fern	4
MFPBp	523110	Pickerelweed Marsh	5	Pickerelweed (*Pontederia cordata*) dominated marsh.	MFBp	521200	Pickerelweed	4
MFPBs	523120	Arrowhead Marsh	5	Lanceleaf Arrowhead (*Sagittaria lancifolia*) dominated marsh.	MFBs	521300	Arrowhead	4
MFPBt	523130	Alligator Flag Marsh	5	Alligator Flag (*Thalia geniculata*) dominated marsh.	MFBt	521400	Alligator Flag	4
MFRBa	523140	Lemon bacopa Marsh	5	Lemon bacopa (*Bacopa caroliniana*) dominated marsh				
MFPG	523200	Semi-permanently Flooded Graminoid Marsh	4					

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	**Raster ID**	**Name**	**Level**		**R_Class ID**	**R_Raster ID**	**R_Name**	**R_Level**
MFPGt	523210	Cattail Marsh	5	Southern Cattail (*Typha domingensis*) and/or Broadleaf Cattail (*T. latifolia*) dominated marsh.	MFGt	522700	Cattail	4
MFPGtD	523211	Cattail Monotypic	6	Greater than or equal to 90% areal coverage of Cattail.	MFGtM	522710	Cattail Monotypic	5
MFPGtC	523212	Cattail-Sawgrass Marsh	6	50% to 89% areal coverage of Cattail, with the co-dominance of Sawgrass (*Cladium mariscus* ssp. *jamaicense*)	MFGtD	522720	Cattail Dominant	5
MFPGtM	523213	Cattail -Mixed Marsh	6	10% to 49% areal coverage of Cattail, mixed with several herbaceous and woody (<1 m height).	MFGtS	522730	Cattail Sparse	5
MFPGe	523220	Spikerush Marsh	5	Coastal Spikerush (*Eleocharis cellulosa*)-dominated marsh.	MFGe	522200	Spikerush	4
MFPGeD	523221	Spikerush Dominant	6	Coastal Spikerush (*Eleocharis cellulosa*)-dominated marsh.				
MFPGeC	523222	Spikerush-Sawgrass Marsh	6	Coastal Spikerush (Eleocharis cellulosa)-dominated marsh with co-dominace of Sawgrass (Cladium mariscus ssp. jamaicense) and Bladderworts (Utricularia sp.) are co-dominant.				
MFPGeP	523223	Spikerush-Maidencane Marsh	6	Coastal Spikerush (*Eleocharis cellulosa*)-dominated marsh with co-dominace of Maidencane (*Panicum hemitomon*) and Bladderworts (*Utricularia* sp.) are co-dominant.				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFPGeO	523224	Spikerush Coastal Marsh	6	Coastal Spikerush (*Eleocharis cellulosa*)-dominated marsh in coastal region where coastal salt marsh and/or mangrove species (<1 m height) frequently present.				
MFPGeU	523225	Spikerush-Bladderwort	6	Spikerush (*Eleocharis* sp.) -dominated with co-dominance of bladderwort (*Utricularia*).				
MFPGeR	523226	Spikerush-Beakrush	6	Spikerush (*Eleocharis* sp.) -dominated with co-dominance of Beakrush (*Rhynchospora*).				
					MFGj	522300	Soft Rush	4
					MFGh	522500	Common Reed	4
					MFGs	522600	American Cupscale	4
MFPF	523300	Semi-permanently Flooded Floating-leaved Marsh	4	Floating emergent dominated freshwater marsh.	MFF	524000	Floating Emergent Marsh	3
					MFFl	524100	Duckweed	4
					MFFn	524200	Spatterdock	4
MFPFy	523310	White Waterlily Marsh	5	Waterlily (*Nymphaea odorata*) dominated marsh. Bladderwort *(Utricularia purpurea)* is commonly present.	MFFy	524300	Waterlily	4

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFPFa	523320	Banana Lily Marsh	5	Waterlily (*Nymphaea aquatica*) dominated marsh. Bladderwort (*Utricularia purpurea)* is common.				
					MFFs	524400	Water Spangles	4
MFR	524000	Ruderal Freshwater Marsh	3	Vegetation consisting of early successional species colonized in disturbed areas.				
MFRG	524100	Ruderal Graminoid Marsh	4	Graminoids-dominated vegetation consisting of early successional species colonized in disturbed areas.				
MFRGa	524110	Broom sedge Marsh	5	Broom Sedge (*Andropogon virginicus*) dominated marsh.				
MFRGaD	524111	Broom sedge Dominant Marsh	6	Broom Sedge (*Andropogon virginicus*) dominated marsh.				
MFRGaM	524112	Broom sedge Mixed Marsh	6	Broom Sedge (*Andropogon virginicus*) mixed with many ruderal graminoids and/or herbaceous species.				
MFRH	524200	Ruderal Herbaceous Marsh	4	Herbaceous dominated freshwater marsh.	MFH	525000	Herbaceous Freshwater Marsh	3
					MFHc	525100	Water Hemlock	4
					MFHi	525200	Morning Glory	4
MFRHm	524210	Hempvine Marsh	5	Hempvine (*Mikania* spp.) dominated marsh.	MFHm	525300	Hempvine	4
					MFHp	525400	Smartweed	4

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFRB	524300	Ruderal Broadleaved Emergent Freshwater Marsh	4	Broad-leaved emergent-dominated vegetation consisting of early successional species colonized in disturbed areas.				
MFRBb	524310	Water hyssop Marsh	5	Water hyssop (*Bacopa monnieri*) mixed with several herbaceous species.				
MFRBl	524310	Sprangletop Marsh	5	Sprangletop (*Leptochloa fusca*) dominated marsh				
MFRBm	524330	Water Primerose Marsh	5	Water Prime-rose (*Ludwigia microcarpa*) dominated marsh				
MFRBr	524340	Creeping Primerose Willow Marsh	5	Creeping primerose willow (*Ludwigia repens*) dominated Marsh				
MFRBs	524350	Lax Hornpod-False Buttonweed Marsh	5	Lax hornpod (*Mitreola petiolata*) and False buttonwood (*Spermacoce floridana*) co-dominat with other several species.				
MFRBp	524360	Arrowhead - Mermaidweed Marsh	5	Arrowhead (*Sagittaria lancifolia*) and Mermaidweed (*Proserpinaca palustris*) co-dominant with several other species				

Field data-based Classification of SF Vegetation (2008)				Description/ Characteristic species	Rutchey's et al. (2007)			
SFVeg_ID	Raster ID	Name	Level		R_Class ID	R_Raster ID	R_Name	R_Level
MFO	526000	Open Marsh	3	Open water dominated freshwater marsh often with a mix of sparse graminoids, herbaceous, and/or emergent freshwater vegetation, such as Spikerush (*Eleocharis* spp.), Panicgrass (*Panicum* spp.), low stature Sawgrass (*Cladium jamaicense*) , Cattail (*Typha* spp.), Arrowhead (*Sagittaria* spp.), Pickerelweed (*Pontederia cordata*), Waterlily (*Nymphaea* spp.), Green Arum (*Peltandra virginica*), Swamp-Lily (*Crinum americanum*), Spider-lilies (*Hymenocallis* spp.), among others.	MFO	526000	Open Marsh	3
MFWO	527000	Open Prairie	3	Open ground, exposed rock, and/or open water dominated short hydroperiod marsh often with a mix of sparse graminoids and/or herbaceous vegetation, such as Muhly Grass (*Muhlenbergia capillaris* var. *filipes*), low stature Sawgrass (*Cladium mariscus* ssp. *jamaicense*), Gulfdune Paspalum (*Paspalum monostachyum*), Little Bluestem *(Schizachyrium rhizomatum*), among others.	MFPO	527000	Open Prairie	3