2005 Vegetation Map Report

Stormwater Treatment Areas 1E, 1W, 2, 3/4, 5 & 6

SFWMD Contract No. C-C19905P, Work Order 08

NMI Project No. 1048.002

Prepared for:

South Florida Water Management District

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TABLE OF CONTENTS

OVERVIEW OF THE PROJECT

The South Florida Water Management District (District) operates Stormwater Treatment Areas (STA's) to improve the quality of agricultural stormwater runoff before its discharge to the Everglades Protection Area (EPA). The purpose of this project is to characterize the vegetative communities within each treatment cell of STA One East (STA-1E), One West (STA-1W), Two (STA-2), Three/Four (STA-3/4), Five (STA-5), and Six (STA-6). Large-scale color infrared aerial photography was used to identify the vegetation communities within each STA. This report describes the specific methods and procedures used in creating the vegetation maps.

PROJECT TEAM

Nick Miller, Inc. led the project team under District Contract No. C-C19905P, Work Order 08. Following are the team members and their respective roles:

Firm	Role
Nick Miller, Inc.	Project management and survey control for aerial photography.
Scheda Ecological Associates, Inc.	Vegetation identification and mapping.
Pickett & Associates, Inc.	Aerial photography.

ITEMS DELIVERED TO THE DISTRICT

The following items are provided to the District in conjunction with this report to form a complete, comprehensive deliverable.

1. Hard copy detailed vegetation maps for each STA.
2. Hard copy summary vegetation map for each STA.
2.3. Digital aerial photographs at negative scales of 1:6000.
4. Prints of each aerial photo frame.
5. Field notes taken by Scheda Ecological Associates, Inc. (scanned).
3.6. ArcGIS 9.1 map documents for each STA.
4.7. ArcGIS 9.1 geodatabase containing the vegetation polygons for each STA.

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SPATIAL REFERENCE FOR THE PROJECT

The spatial reference (coordinate system) for the project is as follows:

Datum:	North American Vertical Datum of 1983, 1999 Adjustment.
Coordinate System:	State Plane Coordinate System of 1983, Florida East Zone
Linear Unit:	US Survey Foot

VEGETATION MAPPING METHODS

FIELD RECONNAISSANCE

The project team performed field reconnaissance of STA-1E, 1W, 2, 3/4, 5, and 6 to identify and groundtruth vegetation signatures. Team members used an airboat on March 3, 4, 16, 21, 22, 23, and on Nov. 14, 2005. The team used a helicopter on Feb. 24, 2005, and on March 3, 2005. Roadside and kayak investigations were performed on March 3, 4, 10, 16, 21, 22, 23, and on Sept. 28 and 29, 2005.

Accessibility and seasonal changes in water levels posed challenges during field reconnaissance. When water levels decreased during the winter months, it was impossible to access the more interior areas by kayak or airboat, thus impeding positive identification of some vegetation signatures. Increased helicopter use was necessary to correctly identify species.

Vegetative mapping provides a snapshot representation of signatures for a particular day and season. Project aerial photographs were flown on Feb. 11, 2005; however, the project team performed groundtruthing over a three-month period after receiving the photographs in March. This resulted in a one- to three-month time lapse in obtaining signatures, meaning that field observations - particularly pertaining to species dominance - were not always consistent with the photographs.

MAPPING METHODOLOGY, CLASSIFICATION, AND PHOTO-INTERPRETATION

Mapping Methodology

The project team used ArcGIS ArcView 9.1 and ArcEditior 9.1 to digitize the vegetation signatures on screen. This software allows zooming in and out when appropriate to better define areas for delineation, and to accurately delineate individual signatures. Most delineation was performed at a 1:1000 scale, which provided clear identification of vegetation boundaries while maintaining an accuracy of +/- 10 feet. We used a minimum mapping unit of 400 square meters except in cases when significantly different vegetation signatures occurred within the unit. In these instances, we delineated slightly smaller polygons. The principal photo interpreter reviewed all mapping efforts for quality control and consistency of delineation; assignment of vegetation signatures and edits were made accordingly.

Classification Methodology

Vegetation signatures were classified based on a system modified from the Vegetation Classification System for South Florida National Parks (Jones *et al.*, 2002), and approved by the District. Vegetation that was the most likely to occur within the STA's was included in the classification system. Additional information from other District documents, previous STA mapping efforts, and scientific review were included in the vegetation descriptions to better define their subclasses (Table 1). Most subclasses listed in Table 1 were found within STA 1E, 1W, 2, 3/4, 5, and 6; however, not all subclasses were present. The subclasses that did not occur in the STA's remain in the table for subsequent STA vegetative mapping. These vegetative subclasses were expanded and modified from the previous classification system, based on the

possibility of converting other mapping efforts to a unified mapping system for future trend analysis.

The project team assigned vegetation signatures to a subclass based on species dominance with more than 50% cover. However, this guideline forced the assignment of some vegetation signatures in categories that often did not reflect the species within an area. Therefore, we developed split subclasses (two subclasses separated by a forward slash) to represent mixed signatures when they were clearly different, and when dominance was either indistinguishable or the signatures could not be delineated separately. To reduce the number of split subclasses, some general categories, such as PG/PE, were used to represent mixed vegetation. This meant the signature of a subclass sometimes varied depending on the vegetation present. For example, the signature of panicum grasses (*Panicum* spp.) mixed with smartweeds (*Polygonum* spp.) (PG/PE) differs from that of sawgrass (*Cladium jamaicense*) mixed with arrowhead (*Sagittaria* spp.), and with pickerelweed (*Pontederia cordata*) but both combinations would result in a subclass labeled PG/PE.

The project team used the class and subclass designation of "W" to represent open water, either with or without submerged aquatic vegetation (SAV). Modifiers were used for open water with periphyton (W-9), open water with hydrilla, *Hydrilla verticillata*, (W-14), and open water with pondweed, *Potamogeton illinoensis*, (W-15). These modifiers (-9, -14, and –15) also were used in conjunction with other subclasses when appropriate. Subclass lower-case modifiers were created for dominant species signatures having distinctly different texture, color, and relief, and ~~whichwere~~which were field verified.

We delineated vegetation signatures based primarily on the high-resolution aerial photography, and applicable field verification. Scanning the aerial photography produced an image of slightly lower resolution and clarity. Although the delineation of species usually was performed on screen, all classifications were verified by photo-interpretation of the original infrared photographs. Vegetation signatures for a species varied depending on its height, density, water levels, and growth patterns. For example, short and tall cattails (*Typha* spp.) were sometimes detectable as different color values, but were not delineated as separate signatures. Other vegetation such as paspalum grasses (*Paspalum* spp.) and panicum grasses varied in color signature, but were similar in texture and relief and were mapped together as PGx. In addition, species growing in the spring and summer did not accurately represent the presence or dominance depicted in the winter photography. The dominance of willow (*Salix caroliniana*) may be different than that depicted on the photographs due to lack of foliage during the winter months, and the presence of some spring/summer growing species were not represented in the photography. Open water features sometimes appeared gray or opaque on screen, suggesting the presence of vegetation, but appeared clear in the higher resolution hard copy aerial photographs and were thus mapped as W (open water). In addition, some field observations were difficult to differentiate on screen, such as the distinction between open water with hydrilla and open water with pondweed. These areas were delineated and classified primarily based on field observation. As per the 2004 mapping effort, dead vegetation was not mapped; only the surrounding dominant vegetation.

STA-1E Summary

STA-1E is located directly east of the Arthur R. Marshall Loxahatchee (NWR) and consists of approximately 5,200 acres. Excess runoff from water deposited by hurricanes Frances, Jeanne, and Ivan was pumped into STA-1E during September and pumped out during October. This stormwater treatment area is comprised of seven cells and there are 38 various vegetation subclasses found throughout it. Cell 1 in the ~~northeastis~~northeast is dominated by new-growth primrose willow *(Ludwigia* spp.*)* and cattail with mixed graminoids in open water. The mixed graminoids classification is used throughout STA-1E due to the difficulty in interpreting the breaks between paragrass *(Urochloa mutica)* and maidencane *(Panicum hemitomon)*, both remotely and during field verification. Concentrations of hydrilla also occur here. Cell 2 lies directly south of Cell 1, and is the driest area in the STA. The eastern half is dominated by a large upland with a few pockets of primrose willow. A mix of graminoids and emergents, and spotty primrose willow dominates the western half. Cell 3 lies directly west of Cell 1, and is dominated by mixed graminoids and areas of open water. Cell 4N lies south of cell 3, and contains mostly open water. There is a large area of hydrilla in the southern area, and some bands of new cattail with pockets of emergents. Cell 4S lies directly south of cell 4N and is also dominated by open water. Along the northern edge are areas of graminoid/emergent mix, and primrose willow. The southwestern edge is a large area of hydrilla. Cell 5, just west of cell 3, can be broken into two dominant halves. The dominant vegetation in the northeast is a graminoid/emergent mix with less frequent hydrilla and floating emergents bordering open water along the north. The southwestern area is dominated by paragrass and maidencane (*Panicum hemitomon)* mapped and is classified as mixed graminoids. Within this are areas of open water. Cell 6, to the south of cells 5 and 7, is dominated by open water with areas of graminoids with periphyton or hydrilla. Cell 7 also is dominated by open water with areas of hydrilla, cattail, and mixed graminoids.

STA-1W Summary

STA-1W is located just west of the Arthur R. Marshall Loxahatchee NWR and is approximately 6,670 acres. There are 36 vegetation subclasses assigned to the six STA cells. The majority of the northeastern cell (Cell 5A) is open water. Cell 5B, directly west of 5A, is dominated by open water throughout the entire cell and water with hydrilla in the southern and northwestern sections. Cell 2 is directly south of 5B, and contains water throughout as well as water with hydrilla in the southeastern area. East of Cell 2 is cell 1, which contains water throughout, cattail and emergent marsh species in the south, cattails in the southeastern section, a combination of primrose willow, cattail, and mixed graminoids in the northeast, and emergent marsh species mixed with primrose willow in the northern and eastern sections. The smallest of the cells, cell 4, is located south of cell 2. It is dominated by water throughout, and water with hydrilla in the southern portion. Cell 3, the southernmost cell of STA-1W, is dominated by cattail throughout, water in the western section, and graminoid marsh species in the southeast.

STA-2 Summary

The mapping area for STA-2 is approximately 6,430 acres and is located west of the L-6 Borrow Canal. Thirty (30) vegetation subclasses are assigned to this three-cell area. The central and eastern cells were flooded in 1999, and the western cell - designed almost entirely as open water - was flooded in 2000. The western cell (cell 1) is dominated by cattail transitioning to a mix of

cattail, graminoids, and emergents to the south. There are pockets of sawgrass throughout the cell. Along the northern edge is a large strip of a cattail-emergent mix bordering open water along with some areas of floating emergents. A utility easement for power lines along the eastern edge contains these same species but in a more mixed pattern. Cell 2, in the center, can be broken up into three classification areas. The northwestern corner is predominately open water and southern naiad *(Najas guadalupensis)*, with two large areas of hydrilla and some isolated pockets of cattail. The central-eastern portion of the cell is a large monoculture of sawgrass. The remainder of the cell is almost entirely cattail. Southern naiad with open water and some large areas of pondweed dominate the western cell, cell 3.

STA-3/4 Summary

STA-3/4, the largest of the six areas mapped, is approximately 16,543 acres and is located between U.S. Highway 27 and the Holey Land Wildlife Management Area (WMA). This STA contains five cells with 38 assigned vegetation subclasses. Cell 3 is the western most cell and contains several large monocultures of cattail dominating the area. There are sections of willow in the southwest, water in the north, combinations of cattail with willow in the south and southwest, and cattail with mixed graminoids in the west. A significant portion of cell 3 was impacted by the construction of an interior levee through the middle of the cell. Portions of the cell were drained to build the levee, resulting in areas of bare sand and/or mud. To properly label these areas, the project team added a new vegetation subclass called bare areas (BA). The north-central cell, cell 2A, is dominated by large areas of cattail. There is an area of open water in the center of the cell, and a large area of willow in the central-western portion. Cell 1A is the northeastern cell and is dominated by open water. Large areas of mixed cattail with floating/attached emergents occur in the northeast and northwest. Several patches of cattails are located throughout the central and southwestern region of cell 1A, with cattail in the central and southwest portion and cattail mixed with willow in the northern areas. Directly south of cell 2A is 2B, which is dominated by open water. Cell 1B is east of 2B, and is the most detailed region of STA-3/4. Its most frequently occurring species is willow in the northeast, southeast, and central portions of the cell. Large areas of cattail occur in the southeast and central regions.

STA-5 Summary

The mapping area for STA-5 is approximately 4,110 acres and is found east of the L-2 Canal and west of the Rotenberger WMA. STA-5 was flooded in 1998, and contains monocultures of several vegetative species. This area had 35 assigned vegetative subclasses. Cell 1B, in the northeast, consists mainly of open water bodies with significant cover of hydrilla interspersed with small pockets of water. There is a narrow area of open water along the western boundary of the cell. Cell 1A, which lies directly west of cell 1B, contains cattail and water with hydrilla in the eastern section, water with periphyton and hydrilla in the southeast, and open water in the south-central region. The southwestern cell, cell 2A, contains cattail throughout ~~t~~ and primrose willow primarily in the western section. Cell 2B, in the southeast, has cattail mixed with water in the eastern portion, a large area of cattail in the western area, and open water in the central portion.

STA-6 Summary

The mapping area for STA 6 is approximately 870 acres and is located east of the L-3 Borrow Canal and west of the Rotenberger WMA. STA-6 exhibits the most diversity for its size with 35 assigned vegetative subclasses, including open water and spoil areas. Though the District initially flooded this STA 1998, it has been used as a wetland by an adjacent sugar farm since 1989. The longer period of hydration has increased the overall diversity of hydrophytic vegetation in STA 6 compared to the other STA's. There are two cells in STA 6: Cell 5 in the northern section, and Cell 3 in the south. Cell 5 is dominated by cattail and water with periphyton in the eastern section, and by mixed graminoids with cattail and a monoculture of mixed graminoids in the western area. The northwest corner shows little variation from the 2004 data, in which napiergrass (*Pennisetum purpureum*), paragrass, and southern wild rice (*Zizaniopsis milacea*) were previously mapped. Cell 3 is dominated by mixed sawgrass with willow in the central portion, mixed graminoid and non-graminoid emergent marsh in the south, cattail in the northeast, sawgrass mixed with willow in the northeast and northwest, willow in the southwest, and several sections of sawgrass throughout the entire cell.

VEGETATION CLASSIFICATION TABLE

Vegetation Sub-Class	Vegetation Class Name	Vegetation Subclass Name	Additional Descriptions	Summary Map Habitat
BA	BARE AREAS		Areas within a wetland that have no vegetation and consist of sand or mud.	OTHER
E	EXOTICS		For sparse to low-density stands, modifiers are used to indicate (1) the vegetation matrix in which the exotic occurs, and (2) the original vegetation replaced by the exotic, when applicable.	OTHER
EM	EXOTICS	Cajeput (*Melaleuca quinquenervia*)	Areas dominated by cajeput (*Melaleuca quinquenervia*).	OTHER
ES	EXOTICS	Brazilian pepper (*Schinus terebinthifolius*)	Areas dominated by Brazilian pepper *Schinus terebinthifolius*).	OTHER
P	PRAIRIES AND MARSHES		[1]	
PC	PRAIRIES AND MARSHES	Cattail (*Typha* spp.) Marsh	Areas dominated by cattail (*Typha latifolia* and/or *Typha domingensis*).	EMERGENT
PC/PE	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Non-graminoid Emergent Marsh	A mixture of cattail (*Typha* spp.) and non-graminoid emergent species.	EMERGENT
PC/PEb	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and broadleaf emergents	A mixture of cattail (*Typha* spp.) and broadleaf emergent species.	EMERGENT
PC/PEf	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Floating/Floating Attached Emergents Marsh	A mixture of cattail (*Typha* spp.) and floating/floating attached emergent species.	FLOATING
PC/PGc	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Sawgrass (*Cladium jamaicense*) Marsh	A mixture of cattail (*Typha* spp.) and sawgrass (*Cladium jamaicense*).	EMERGENT
PC/PGx	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Mixed Graminoids Marsh	A mixture of cattail (*Typha* spp.) and graminoid species.	EMERGENT
PC/SB1	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Primrose (*Ludwigia* spp.) Marsh	A mixture of *Typha* spp. (cattail) and primrose willow (*Ludwigia* spp.).	SHRUB
PC/SBs	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Willow (*Salix caroliniana)*	A mixture of cattail (*Typha* spp.) and willow (*Salix caroliniana*).	SHRUB

Vegetation Sub-Class	Vegetation Class Name	Vegetation Subclass Name	Additional Descriptions	Summary Map Habitat
PC/W	PRAIRIES AND MARSHES	Mixed Cattail (*Typha* spp.) and Open Water Marsh	A mixture of cattail and open water where the signatures cannot be delineated separately.	OPEN WATER WITH OR WITHOUT VEGETATION
PE	PRAIRIES AND MARSHES	Non-graminoid Emergent Marsh	Mixed species may include pickerelweed (*Pontedaria cordata*), duck potato/arrowhead (*Sagittaria* spp.), waterlily (*Nymphaea* spp.), cattail (*Typha* spp.), with creeping seedbox (*Ludwigia repens*) or bladderwort (*Utricularia* spp.) as possible submergents. This subclass designation is also used when a mixed signature occurs that includes any of the non-graminoid emergent species.	EMERGENT
PE/SB1	PRAIRIES AND MARSHES	Non-graminoid Emergent Marsh and Primrose willow (*Ludwigia* spp.)	A mixture of non-graminoid emergent marsh species and primrose willow (*Ludwigia* spp.).	SHRUB
PE/W	PRAIRIES AND MARSHES	Non-graminoid Emergent and Open Water Marsh	A mixture of a non-graminoid species and open water where the signatures cannot be delineated separately.	OPEN WATER WITH OR WITHOUT VEGETATION
PEa	PRAIRIES AND MARSHES	Leather fern (*Acrostichum* spp.)	Areas dominated by leather fern (*Acrostichum* spp.).	EMERGENT
PEb	PRAIRIES AND MARSHES	Broadleaf Emergents	Area dominated by specific species broadleaf emergents, *e.g.* include pickerelweed (*Pontedaria cordata*), duck potato/arrowhead (*Sagittaria* spp.), fire flag (*Thalia geniculata*), waterlily (*Nymphaea* spp.), dollarweed/pennywort (*Hydrocotyle* spp.)	EMERGENT
PEb/PEf	PRAIRIES AND MARSHES	Broadleaf Emergents and Floating/Floating Attached Emergents	A mixture of broadleaf emergents and floating/floating attached emergents.	FLOATING
PEb/SB1	PRAIRIES AND MARSHES	Broadleaf Emergents and Primrose willow (*Ludwigia* spp.)	A mixture of broadleaf emergents and primrose willow (*Ludwigia* spp.).	SHRUB
PEf	PRAIRIES AND MARSHES	Floating/Floating Attached Emergents	Areas covered by dense floating mats of water hyacinth (*Eichhornia crassipes*) or water lettuce (*Pistia stratiotes*). May contain some water fern (*Salvinia minima*), duckweed (*Lemna* spp./*Spirodela* spp.).	FLOATING
PEo	PRAIRIES AND MARSHES	Other Mixed Non-Graminoids	Other non-grass species, *e.g.* hempvine (*Mikania*), smartweed (*Polygonum* spp.), alligatorweed (*Alternanthera philoxeroides*), water hemlock (*Cicuta maculata*).	EMERGENT
PG	PRAIRIES AND MARSHES	Graminoid Prairie/Marsh	Contains mixture of grasses, sedges, and rushes. This subclass designation is used when a mixed signature occurs that includes any of the graminoid species.	EMERGENT
PG/PE[2]	PRAIRIES AND MARSHES	Mixed Graminoid and Non-graminoid Emergent Prairie/Marsh	A mixture of miscellaneous graminoid and non-graminoid emergent species.	EMERGENT
PG/W	PRAIRIES AND MARSHES	Mixed Graminoid and Open Water Marsh	A mixture of graminoid species and open water where the signatures cannot be delineated separately.	OPEN WATER WITH OR WITHOUT VEGETATION
PGa	PRAIRIES AND MARSHES	Maidencane (*Panicum hemitomon*)	Areas dominated by maidencane (*Panicum hemitomon*).	EMERGENT
PGc	PRAIRIES AND MARSHES	Sawgrass (*Cladium jamaicense*)	Areas dominated [3] by sawgrass (*Cladium jamaicense*). The modifier 't' is used to distinguish tall sawgrass, *e.g.*, PGct	EMERGENT
PGc/SBs	PRAIRIES AND MARSHES	Sawgrass (*Cladium jamaicense*) and Willow (*Salix caroliniana*) Marsh	A mixture of sawgrass (*Cladium jamaicense*) and willow (*Salix caroliniana*).	SHRUB
PGe	PRAIRIES AND MARSHES	Spike rush (*Eleocharis cellulose*)	Areas dominated by spike rush (*Eleocharis cellulose*).	EMERGENT

Vegetation Sub-Class	Vegetation Class Name	Vegetation Subclass Name	Additional Descriptions	Summary Map Habitat
PGp	PRAIRIES AND MARSHES	Elephant grass or Napiergrass (*Pennisetum purpureum*)	Areas dominated [3] by elephant grass (*Pennisetum purpureum*).	EMERGENT
PGu	PRAIRIES AND MARSHES	Paragrass (*Urochloa mutica*)	Areas dominated [3] by paragrass (*Urochloa mutica*).	EMERGENT
PGw	PRAIRIES AND MARSHES	Maidencane-Spike rush	Mix of shallow open water, spike rush (*Eleocharis* spp.) and maidencane (*Panicum hemitomon*) which can include sparse associations of low stature sawgrass (*Cladium jamaicense*), cattail (*Typha* spp.), duck potato (*Sagittaria lancifolia*), pickerelweed (*Pontedaria cordata*), waterlily (*Nymphaea* spp.), etc. typical of SFWMD impounded conservation areas.	EMERGENT
PGx	PRAIRIES AND MARSHES	Mixed Graminoids	Specific mixtures of graminoids, when identified, will be distinguished as subgroups [4], *e.g.*, bulrush (*Scirpus* spp.), paragrass (*Urochloa mutica*), torpedograss (*Panicum repens*), knotgrass (*Paspalum distichum*), elephant grass (*Pennisetum purpureum*) or Southern wild rice (*Zizaniopsis milacea*).	EMERGENT
PGz	PRAIRIES AND MARSHES	Southern wild rice (*Zizaniopsis milacea*)	Areas dominated [3] by Southern wild rice (*Zizaniopsis milacea*).	EMERGENT
SA	SPOIL AREAS		Spoil areas typically vegetated with upland species.	OTHER
SB	SHRUBLANDS		Mix of shrubs that could include any combination of common buttonbush (*Cephalanthus occidentalis*), willow (*Salix caroliniana*), wax myrtle (*Myrica cerifera*), primrose willow (*Ludwigia* spp.), or saltbush (*Baccharis*). This subclass designation is used when a mixed signature occurs that includes any of the shrub species.	SHRUB
SB1	SHRUBLANDS	Primrose willow (*Ludwigia* spp.)	Areas dominated by primrose willow (*Ludwigia* spp.).	SHRUB
SBm	SHRUBLANDS	Wax myrtle *(Myrica cerifera*)	Areas dominated by wax myrtle (*Myrica cerifera*).	SHRUB
SBs	SHRUBLANDS	Willow (*Salix caroliniana)*	Areas dominated by willow (*Salix caroliniana*).	SHRUB
U	UPLAND		Areas dominated by upland species.	OTHER
W	OPEN WATER	Open Water with or without SAV	Open water without SAV or with SAV that is not distinguishable by signature.	OPEN WATER WITH OR WITHOUT VEGETATION
W-14	OPEN WATER	Open Water with Hydrilla (*Hydrilla verticillata*)	Open water with hydrilla (*Hydrilla verticillata*).	OPEN WATER WITH HYDRILLA
W-15	OPEN WATER	Open Water with Pondweed (*Potamogeton illinoensis*)	Open water with pondweed (*Potamogeton illinoensis*).	OPEN WATER WITH SAV
W-9	OPEN WATER	Open Water with Periphyton	Open water with periphyton	OPEN WATER WITH OR WITHOUT VEGETATION

Notes:

1) The extent of periphyton cover is expressed as a modifier (-9) for all appropriate PRAIRIE AND MARSHES subclasses, i.e., cattails with periphyton would be designated as PC-9.
2) A split subclass designation is used for mixed signatures where there are clearly different vegetation signatures, and either dominance is indistinguishable or the signatures are too mixed to be delineated separately.
3) Dominance is defined as being greater than 50% cover.
4) For a dominant species where there is no designated modifier, a subclass lower case modifier will be created.

REPORT OF SURVEY FOR AERIAL PHOTOGRAPHY

PICKETT
SURVEYING & PHOTOGRAMMETRY

REPORT OF SURVEY

NOTE: THIS REPORT AND ACCOMPANYING DIGITAL DISK ARE NOT FULL AND COMPLETE WITHOUT THE OTHER AND ARE NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER

PICKETT & ASSOCIATES PROJECT NO.: 13663
TITLE/TYPE OF SURVEY: ORTHOPHOTOGRAPHIC IMAGERY
DATE OF IMAGERY: 02/11/05
SUBJECT: STA-1E, STA-1W, STA-2, STA-3/4, STA-5 & STA-6
CLIENT: SOUTH FLORIDA WATER MANAGEMENT DISTRICT.

ACCURACY STATEMENT: The following stated plus or minus tolerances encompass a minimum of 90% of the difference between photogrammetrically measured values and ground truth of all well-identified features.

VERTICAL:
Whilst a 3-D Digital Terrain Model or Digital Elevation Model is used in the correction of the imagery, Orthophotographic image products do not utilize the elevation. The scale at which this orthorectification was performed could produce DTM/DEM files whose vertical accuracy could be stated to be +/- 0.5' on hard surface features.

HORIZONTAL:
Well-identified features may be measured to an estimated horizontal positional accuracy of 3.33' if compared against same features measured by field methods.

MAP PLOTTING:
This map is intended to be displayed at a scale of 1" = 100' (1:1200) or smaller.

DATUM:

HORIZONTAL: Florida State Plane Coordinate System, East Zone, NAD 1983. Ground control provided by Nick Miller, Inc.

VERTICAL: Vertical datum used was NAVD 1988. This was only necessary for Aerial Triangulation and DTM generation as vertical is not required for delivery.

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Control Points Used:

Airborne GPS techniques were used to triangulate and control the photography. Post-processing the data collected by the on-board receiver with the simultaneously collected ground placed GPS base station generated a photocenter coordinate file. This file when used in a photogrammetric aerial triangulation creates the coordinates for all ground control, pass points and check points. All the points used in the final solution, as well as all misclosures of ground control and check points can be delivered in a separate ascii file. Root mean square error (RMSE) summaries can be given for control data, pass points and tie points. Aerial targets were placed at the corners of each site and were used to strengthen the control network.

Measurement Methods:

The project was flown at a negative scale of 1:6000 with Color Infrared photography. The scan resolution was 15 microns and the final ground pixel size was one-half foot. The orthorectification was done from a Digital Terrain Model generated by softcopy photogrammetric methods.

T. Jeffrey Young — 02/11/05

T. JEFFREY YOUNG, PSM, CP
FLORIDA REGISTRATION NO. 5440
PICKETT AND ASSOCIATES, INC.
FLORIDA REGISTRATION NO. 364

PHOTO DATE