



Agenda Report

2725 Judge Fran Jamieson
Way
Viera, FL 32940

New Business - Development and Environmental Services Group

J.1.

3/8/2022

Subject:

Legislative intent and permission to advertise amendments to Chapter 62, Article X, Division 4, entitled Wetland Protection.

Fiscal Impact:

FY21/22: Advertising Costs

Dept/Office:

Natural Resources Management Department

Requested Action:

Staff requests legislative intent and permission to advertise amendments to Chapter 62, Article X, Division 4, entitled Wetland Protection.

Summary Explanation and Background:

On February 3, 2022, the Board of County Commissioners (Board) requested proposed code language options relating to Board-level public interest determination (PID) for wetland impacts associated with commercial and industrial land development and redevelopment activities, agricultural activities, and abandoned mine reclamation. Specifically, the Board seeks to clarify a sentence found in Sections 62-3694(c)(3), (7), (8), and (9), "Impacts to high functioning and landscape level wetlands shall be prohibited unless the proposed impacts are found to be in the public interest, or of overriding public benefit."

It has been contemplated that the sentence can be read to mean that a wetland must be high functioning and landscape level to require a PID. However, considering the language in context of the Countywide Wetlands Study, the intent appears to be that PID is required for wetland impacts when a wetland is 1) high functioning, 2) landscape level, or 3) both. Whichever approach the Board prefers, clarifying the language will remove ambiguity for applicants.

Background

In October 2012, the Board adopted Comprehensive Plan (Plan) amendments related to Wetland Protection. Concurrently, the Board approved the commission of a Countywide Wetlands Study to identify "high functioning" and "landscape level" wetlands. The intent was to prioritize these wetlands for protection, while allowing mitigation of wetlands of inferior quality for commercial, industrial, and institutional land development activities.

The Wetlands Study, completed in September 2013, included a wetlands assessment toolbox (Wetlands Toolbox), a methodology to identify high functioning and landscape level wetlands. The Board, in special session on January 16, 2014, accepted the Wetlands Study to include the high function assessment matrix, the landscape level polygon map, reference wetland document, and the Wetlands Toolbox. In May 2014, the Board adopted final Plan modifications, with the Wetlands Study and Toolbox adopted by reference. Associated ordinance modifications were adopted on September 16, 2015. The Wetlands Toolbox states the following:

“The toolbox has been developed in order to help end-users utilize the wetland assessment tool. The toolbox follows the assessment of a wetland throughout the process.”

“Wetlands are assessed on two criteria. The two criteria are whether the wetlands are “landscape level” or they are considered “high functioning.”

“First determine if the wetland is or part of a landscape level wetland system. This is done by analyzing a combination of parameters that include location, hydrologic connectivity and size of the wetland system. If the wetland system is located within the landscape level polygon AND is defined as hydrologically connected to the St. Johns River or the Indian River watersheds OR five (5) acres or greater in size then **the system is determined to be a landscape level system. Potential impacts to the wetland will have to be evaluated by the County Commission.**

“Then the wetland will be assessed to determine if it is a high functioning wetland system. **If the system is determined to be high functioning, impacts to the system will have to be evaluated by the County Commission...**” The wetlands assessment method must yield a score of 0.66 or greater for a wetland to be considered high functioning.

This methodology reflects the intent to prioritize for protection wetlands that provide public value (e.g., flood storage, water quality treatment, natural habitat), while allowing mitigation for wetlands of inferior quality for commercial, industrial, and institutional land development activities. Since the Board’s acceptance and adoption of the Wetlands Study and Toolbox, staff have provided this guidance to applicants proposing wetland impacts under Section 62-3694(c)(3), (7), (8), and (9). The Board has approved seven PIDs for wetland impacts for commercial site development, with no denials.

Attached are the Countywide Wetlands Study documents presented to the Board during a special session regarding the subject on January 16, 2014:

- Agenda Report
- Staff Report
- Wetlands Assessment Method
- Reference Wetlands
- Landscape Level Polygon Development
- Landscape Level Polygon Map
- Wetlands Toolbox
- Clerk’s Memo

The entire meeting materials package can be found here:

<http://brevardcountyfl.iqm2.com/Citizens/FileOpen.aspx?Type=1&ID=1166&Inline=True>

Options for Board Consideration

Option 1: Approve legislative intent and permission to advertise amendments to Chapter 62, Article X, Division 4, entitled Wetland Protection, as follows:

- **Option 1a:** Clarify language to be consistent with established intent that impacts to **either** high functioning **or** landscape level wetlands require a Public Interest Determination:

“Impacts to either high functioning ~~and~~ or landscape level wetlands shall be prohibited unless the proposed impacts are found to be in the public interest, or of overriding public benefit.”

- **Option 1b:** Revise the language to reflect that a wetland must be **both** high functioning **and** landscape level to require a Public Interest Determination:

“Impacts to wetlands that are both high functioning and landscape level ~~wetlands~~ shall be prohibited unless the proposed impacts are found to be in the public interest, or of overriding public benefit. Impacts to wetlands that are solely high functioning or solely landscape level shall not be prohibited.”

Option 2: Take no action.

Option 3: Provide other direction.

Clerk to the Board Instructions:

None.



Kimberly Powell, Clerk to the Board, 400 South Street • P.O. Box 999, Titusville, Florida 32781-0999

Telephone: (321) 637-2001
Fax: (321) 264-6972
Kimberly.Powell@brevardclerk.us

March 9, 2022

MEMORANDUM

TO: Virginia Barker, Natural Resources Management Director Attn: Amanda Elmore

RE: Item J.1., Legislative Intent and Permission to Advertise Amendments to Chapter 62, Article X, Division 4, entitled Wetland Protection

The Board of County Commissioners, in regular session on March 8, 2022, granted legislative intent and permission to advertise amendments to Chapter 62, Article X, Division 4, entitled Wetland Protection.

Your continued cooperation is always appreciated.

Sincerely,

BOARD OF COUNTY COMMISSIONERS
RACHEL M. SADOFF, CLERK

A handwritten signature in cursive script that reads "Kimberly Powell".

Kimberly Powell, Clerk to the Board

cc: Finance
Budget

Meeting Date
January 16, 2014



| AGENDA | |
|----------|----------|
| Section | Workshop |
| Item No. | II.A |

AGENDA REPORT
BREVARD COUNTY BOARD OF COUNTY COMMISSIONERS

| | |
|---------------------|---|
| SUBJECT: | Presentation of the Countywide Wetlands Study (Study) |
| DEPT/OFFICE: | Natural Resources Management Department (NRM) |

Requested Action:

Staff requests that the Board accept the Wetlands Study completed by BKI, Inc. Consulting Ecologists to include the High Function Wetlands Assessment Method, the High Function Assessment Matrix, the Landscape Level Polygon Map, Reference Wetland document and the Wetlands Assessment Toolbox. (Actual Comprehensive Plan language will be addressed under separate agenda).

Summary Explanation & Background:

On May 29, 2012, the Board authorized advertisement for and acceptance of proposals from qualified firms for ecological services to complete a Countywide Wetland Study (Study), with cost not to exceed \$50,000. The Study was to be completed by a consulting firm with specific qualifying experience in ecological systems, quantifying and qualifying wetlands, and extensive knowledge of the unique wetland systems within Brevard. BKI, Inc. Consulting Ecologists (BKI), was awarded the contract in December 2012.

BKI, Inc. Consulting Ecologists initiated the Study in January 2013. BKI completed the final draft of the Study in September 2013. The completed Study provides a regional look at Brevard County wetland systems for the purposes of comprehensive planning and providing resource based information for development within wetlands. Specifically, the Study provides science and technology based tools to identify high functioning wetlands and landscape level systems of connected wetlands.

The attached Staff Report summarizes the history of the Wetlands Working Group; Comprehensive Plan, Conservation Element Policy amendments; associated Board authorization of the Study; and Study results.

BKI, Inc. Consulting Ecologists (BKI) will present the Study for Board consideration. Staff requests that the Board accept the High Function Wetlands Assessment Method, the High Function Assessment Matrix, the Landscape Level Polygon Map, Reference Wetland document, and the Wetlands Assessment Toolbox. Actual Comprehensive Plan language will be addressed under a separate agenda.

Fiscal Impact: FY 13-14 No Fiscal Impact.
FY 14-15 No Fiscal Impact.

Name: Ernest Brown (x52439) or Darcie McGee (x52433), NRM, 633-2016

Clerk to the Board instruction:

| | |
|---|---|
| Exhibits Attached: Attachment II.A-1-Staff Report | Attachment II.A-4-Landscape Level Polygon Development |
| Attachment II.A-2-Wetlands Assessment Method | Attachment II.A-5-Landscape Level Polygon Map |
| Attachment II.A-3-Reference Wetlands | Attachment II.A-6-Wetland Assessment Toolbox |

Contract /Agreement (If attached): Reviewed by County Attorney Yes No PR

| | | |
|----------------|--------------------------|---------------------------------|
| County Manager | Deputy County Manager | Department Director / Extension |
| Howard Tipton | Stockton Whitten | Ernest Brown/x52439 |
| | Assistant County Manager | |
| | Mel Scott | |

**ATTACHMENT II.A-1
STAFF REPORT
COUNTYWIDE WETLANDS STUDY**

History

On February 23, 2011, the Board of County Commissioners (Board) approved Resolution 11-032, creating a 17-member stakeholder Working Group to evaluate and recommend changes to Conservation Element Objective 5-Wetlands relative to those policies addressing commercial, industrial, and institutional land uses in wetlands. The Group held seven independently facilitated public meetings on March 15, April 4, April 19, May 2, May 10, May 17, and August 25, 2011.

The Working Group policy recommendations were presented to the Board on November 1, 2011. The Board had the following concerns:

- The County Attorney's review revealed several issues related to implementability, clarity, and consistency.
- The "commercial corridor" policies omitted a significant portion of north Brevard, creating inequity of application.
- Identification of the major issues on which Group members disagreed.
- Establishing flexibility for the agricultural community.

After discussion and public comment, the Board directed staff to work with the County Attorney to resolve the identified issues, and tabled further consideration of the recommended policy amendments to the February 2, 2012 meeting.

On February 2, 2012, staff presented Revised Recommendations to the Board. The Board approved the Revised Recommendations with some final language modification. The Board also directed staff to create a Scope of Services for a regional examination of Brevard County wetland systems for the purposes of comprehensive planning and providing resource based information for development within wetlands.

On April 4, 2012, the Board approved the transmittal of amendments to the Brevard County Comprehensive Plan, Conservation Element, Objective 5-Wetlands. As part of the approval, the Board reaffirmed staff direction to conduct a study which, by 2013, identifies high functioning wetlands and landscape level systems of connected wetlands.

On May 29, 2012, the Board authorized advertisement for, and acceptance of proposals from qualified firms for ecological services to complete a Countywide Wetland Study (Study), with cost not to exceed \$50,000. The Study was to be completed by a consulting firm with specific qualifying experience in ecological systems, quantifying and qualifying wetlands, and extensive knowledge of the unique wetland systems within Brevard. BKI, Inc. Consulting Ecologists (BKI), was awarded the contract in December 2012.

On October 9, 2012, the Board, approved policy language for the 2012-1 Comprehensive Plan Amendment Adoption package, as follows:

- Inclusion of Definitions of High Functioning Wetlands and Landscape Level Systems into LDRs and Comprehensive Plan by amendment at Study completion and prior to implementation.
- Impacts to high functioning and landscape level wetlands are not permitted until the Study is complete and subsequent plan amendment and land development regulations are enacted to incorporate definitions that contain meaningful and predictable standards. In the interim, the Board approved Green Light Doctrine for certain development applications prior to LDR development but after adoption; and authorized processing submittals where the applicant proposes to impact wetlands defined by the State (FDEP or SJRWMD) as: 1) low quality or low functioning with a total cumulative impact of less than 5 acres; or 2) less than 0.1 acre of impact to isolated wetlands where the State does not require mitigation, with all submittals being approved by the Board.

BKI, Inc. Consulting Ecologists initiated the Study in January 2013. It was anticipated that the Study would take six months; however, three additional months were required due to the scope of the project. BKI completed the final draft of the Study in September 2013.

Study Scope of Work & Resulting Products

Task 1: *Create a Brevard County specific method to quantify and qualify high functioning wetlands within incorporated and unincorporated Brevard County. The method may incorporate, but not exclusively rely upon, current regulatory tools.*

Attachment II.A-1, “Brevard County – Wetland Assessment Method” provides a description of the established methodology. This methodology includes the use of a Microsoft Excel document, “High Function Assessment Matrix,” used to score wetland functionality based on landscape location, water environment, and vegetative community. This is not a desktop-only evaluation; field inspection is required for an accurate evaluation. The specific use of this evaluation tool will be presented to the Board at the Workshop. Examples can be found in Attachments II.A-2 (Reference Wetlands for High Functioning Wetlands) and II.A-5 (Wetland Assessment Toolbox).

Task 2: *Provide reference examples of each type of high functioning wetland within incorporated and unincorporated Brevard County. Only Federal, State and local lands within Brevard County shall be utilized for reference examples. Consultants shall request the usage of these lands through the managing entity. It is expected that the process shall include GIS and ground-truthing.*

Attachment II.A-2, “Reference Wetlands for High Functioning Wetlands” provides specific reference examples of each type of high functioning wetland within incorporated and unincorporated Brevard County. Functional wetland assessments for each of the presented reference wetlands are provided within.

Task 3: *Map landscape level systems of connected wetlands within incorporated and unincorporated Brevard County. It is expected that this will be a GIS based task utilizing current aerials and LIDAR. Brevard County will supply these tools to the consultant upon award of contract.*

Attachment II.A-3 provides information describing the development of the Landscape Level Potential Map (Map). The resulting Map (Attachment II.A-4) is not a regulatory tool. The Landscape Level Polygon represents lands that likely have a hydrological connection to the major watersheds within Brevard County. Wetlands within the polygon have the potential to meet Landscape Level criteria.

Landscape Level Wetlands are defined as wetlands that are EITHER 1) five (5) acres or larger; OR 2) located within the Landscape Level polygon AND the Army Corps of Engineers (ACOE) determines the wetland is hydrologically connected to the St. Johns River or Indian River Lagoon System.

Task 4: *The Consultant shall provide Brevard County with a training toolbox to include a reproducible manual that gives clear and concise instructions on use of the Brevard County Specific methodology.*

The Wetland Assessment Toolbox is included as Attachment II.A-5, and will be presented in detail during the Workshop.

Existing Comprehensive Plan Policies

The following Comprehensive Plan Policies regarding commercial, industrial, and agricultural land uses contain references to “high functioning wetlands and landscape level systems of connected wetlands.”

Policy 5.2.E.3. Commercial and industrial land development activities shall be prohibited in wetlands contained in properties designated on the Future Land Use Map as commercial or industrial, and in surrounding upland buffers for such wetlands, except as provided below for I-95 interchanges, mitigation qualified roadways, abutting properties, and access to uplands. In no instance shall a proposed land development activity result in increased flooding on adjacent properties. Where the State does not require a buffer, wetland buffers specifications shall be established in land development regulations and be based on peer-reviewed publications to include, but not be limited to, Buffer Zones for Water, Wetlands, and Wildlife in the East Central Florida Region, (1990, Brown, M.T., Schaefer, and K. Brandt, published by the Center for Wetlands, University of Florida). Where impacts are permitted, the applicant is encouraged to propose innovative wetland preservation alternatives.

- a. Impacts to wetlands are permissible for commercial or industrial land development activities on a property that is designated as commercial or industrial on the Future Land Use map, and is located within one-half mile of the intersection of the off-ramp of the I-95 interchange with the connecting roadway. The one-half mile radius shall extend from

the end of the limited access boundary of I-95. This shall not include those interchanges where I-95 intersects a limited access highway as defined by Florida Statute. Where the State does not require mitigation for any wetland impact, mitigation shall be provided to meet the County's no net loss policy as defined in Objective 5.

- b. In mitigation qualified roadways, commercial or industrial land development activities may be permitted in wetlands contained in properties designated for commercial or industrial land uses on the Future Land Use Map. Mitigation qualified roadways are depicted and identified in a table on Map 8.

An amendment to the Comprehensive Plan shall be required to add a mitigation qualified roadway to Map 8 and the associated table. High functioning wetlands and landscape level systems of connected wetlands shall be identified through a study, and these wetlands shall be protected unless the proposed impacts are found to be in the public interest, or overriding public benefit.¹ Where the State does not require mitigation for any wetland impact, mitigation shall be provided to meet the County's no net loss policy as defined in Objective 5.

- c. Commercial or industrial land development activities may be permitted in wetlands contained in properties designated for commercial or industrial land uses on the Future Land Use Map prior to February 23, 1996, if the property abuts land(s) developed as commercial or industrial as of December 31, 2010, and has sufficient infrastructure available to serve the commercial or industrial use. This shall not apply to properties that are addressed under Policies 5.2.E.3.a, b, and d. High functioning wetlands and landscape level systems of connected wetlands shall be identified through a study, and these wetlands shall be protected unless the proposed impacts are found to be in the public interest, or overriding public benefit.¹ Where the State does not require mitigation for any wetland impact, mitigation shall be provided to meet the County's no net loss policy as defined in Objective 5.
- d. Impacts to wetlands for commercial or industrial land development activities limited solely to providing access to uplands, and for no other purpose than providing access as required by Brevard County land development regulations may be permitted in wetlands contained in properties designated on the Future Land Use Map as commercial or industrial of February 23, 1996, only if all of the following criteria are met:
 - (i) Sufficient uplands exist for the intended use except for access to uplands.
 - (ii) The property was not subdivided from a larger property after December 31, 2010. This shall not preclude a single shared access through wetlands for properties subdivided after December 31, 2010.
 - (iii) Where the State does not require mitigation for any wetland impact, mitigation shall be provided to meet the County's no net loss policy as defined in Objective 5.

Policy 5.2.F. Agricultural Activities

1. An exemption for agricultural pursuits, utilizing best management practices, which do not result in permanent degradation or destruction of the wetlands shall be included within the land development regulation.
2. Wetland impacts for activities listed in agricultural zoning classifications as permitted, permitted with conditions, or approved by the Board of County Commissioners as a Conditional Use on properties designated as bona fide agricultural lands per F.S. 193.461 and 823.14, may be allowed subject to the following criteria:
 - a. The property shall be classified as bona fide agricultural per F.S. 193.461 and 823.14 for not less than ten consecutive years as of the date of the proposed impact;
 - b. The property shall have Agriculture Future Land Use designation or DRI Future Land Use designation and the proposed use is consistent with the defined agricultural uses under an approved DRI Development Order.
 - c. Upon approval of the impact, no less than 50 percent of the property area shall retain bona fide agricultural use pursuant to F.2.a above;
 - d. High functioning wetlands and landscape level systems of connected wetlands shall be identified through a study, and these wetlands shall be protected unless the proposed impacts are found to be in the public interest, or overriding public benefit;¹ and
 - e. The property shall have an agricultural zoning classification or be zoned PUD and the proposed use is consistent with the defined agricultural uses in the PUD zoning resolution or approved Preliminary Development Plan.

Where the allowable use is residential, residential policies shall apply. Sufficient buffer setbacks of the activity from incompatible land uses shall be provided. Buffer setbacks shall be established through the land development regulations. The property shall meet all other State regulatory criteria.

¹ **The Board authorized a study to identify high functioning wetlands and landscape level systems. Impacts to high functioning and landscape level wetlands are not permitted until the study is complete and subsequent plan amendment and land development regulations are enacted to incorporate definitions that contain meaningful and predictable standards. In the interim, impact to wetlands described by the State (FDEP or SJRWMD) as: 1) low quality or low functioning with a total cumulative impact of less than 5 acres; or 2) less than 0.1 acre of impact to isolated wetlands where the State does not require mitigation, may be approved by the Board.**

ATTACHMENT II.A-2

Brevard County – Wetland Assessment Method

September, 2013

**Developed for Brevard County
By
BKI, Inc. and Ecospatial Analysts, Inc.**

Brevard County – Wetland Assessment Method

The intent is to develop a wetland assessment method used by Brevard County to identify “high-functioning” wetlands. The method evaluates three criteria to assess the functionality of a wetland system. The three criteria are: landscape location, water environment, and vegetative community.

1) Landscape Location:

Landscape location evaluates the surrounding landscape and the influences the landscape has on the wetland. The influences would include impacts or enhancement of water quality, wildlife utilization, and potential introduction of exotic species. A score is calculated by using a landscape support index (LSI). The LSI quantifies the proportions of different land uses within a 100m buffer around the wetland to be assessed. The percentage that a specific land use contributes to that buffer is multiplied by the established coefficient for that specific land use (Table 1 coefficient values range from 1 to 10). All of the values are summed and the value will range within 1 to 10.

| Land Use | LSI Coefficient |
|---|-----------------|
| Natural Community | 10.00 |
| Natural Open water | 10.00 |
| Pine Plantation | 9.36 |
| Recreational / Open Space (Low-intensity) | 9.08 |
| Woodland Pasture (with livestock) | 8.87 |
| Pasture (without livestock) | 8.03 |
| Low Intensity Pasture (with livestock) | 7.32 |
| Citrus | 7.02 |
| High Intensity Pasture (with livestock) | 6.96 |
| Row crops | 6.07 |
| Single Family Residential (Low-density) | 3.57 |
| Recreational / Open Space (High-intensity) | 3.42 |
| High Intensity Agriculture (Dairy farm) | 3.33 |
| Single Family Residential (Med-density) | 2.81 |
| Single Family Residential (High-density) | 2.72 |
| Mobile Home (Medium density) | 2.56 |
| Highway (2 lane) | 2.43 |
| Railroads | 2.43 |
| Low Intensity Commercial | 2.22 |
| Institutional | 2.14 |
| Highway (4 lane) | 1.91 |
| Mobile Home (High density) | 1.90 |
| Industrial | 1.87 |
| Multi-family Residential (Low rise) | 1.49 |
| High Intensity Commercial | 0.91 |
| Multi-family Residential (High rise) | 0.90 |
| Central Business District (Average 2 stories) | 0.64 |
| Central Business District (Average 4 stories) | 0.00 |

Based on coefficients developed by Reiss and Brown, 2005 as described in Bardi et al., 2005

For example, an approximate 24 acre wetland that has a 100m buffer (39.6 acres) that includes 40% woodland pasture and 60% single family low-density residential would be 0.4 (percentage expressed as decimal) times the 8.87 (coefficient) plus 0.6 times the 3.57, respectively. The resulting LSI value is 5.69 (3.548 + 2.142).

The coefficients were proposed and developed by several authors including Bardi et al. 2005, Reiss and Brown 2005, Cohen et al. 2004, Lane et al. 2004, and Doherty et al. 1999. The coefficients were developed by evaluating the potential effects of adjacent land-use on wetland systems.

2) Water Environment:

The hydrologic functions of the wetland being assessed are evaluated for two criteria including water quality and hydrology (depth and duration of inundation). Water quality is assessed by evaluating the treatment that water inflows undergo prior to entering to the wetland. The hydrology is assessed by reviewing plant morphological characteristics and the plant community structure.

Water Quality Treatment Category Score

The water quality treatment is assessed utilizing criteria developed for Wetland Rapid Assessment Procedure (WRAP) analysis of wetlands (Miller and Gunsalus, 1999). The treatment is assessed based on the analysis of the contributing watershed lands surrounding the wetland and the water quality treatment that the lands provide. Treatment of stormwater pollution can be achieved by several methods. Wet detention can achieve up to 90 percent reduction for nutrients and solids. Treatment by dry retention is considered to be inferior to wet detention. If the treatment system present is not operational then the score should reflect the condition of the system.

Therefore, if the wetland being assessed is in a larger wetland system, then the water quality treatment category is natural. The analysis determines which type of water quality treatment, if any, is occurring. If a system is entirely cut-off from its natural contributing basin and is solely rainfall dependent, a standard score of 4.6 is entered.

| Category | Coefficient |
|---|-------------|
| Natural undeveloped area | 5.0 |
| Only rainfall dependent – no contributing basin | 4.6 |
| Wet detention with swales | 4.2 |
| Wet detention with dry detention | 4.2 |
| Combination grass swales with dry detention | 3.3 |
| Grass swales only / vegetative buffer strip | 1.7 |
| Dry Detention only | 1.7 |
| No treatment | 0 |

Coefficients were based on values developed and utilized by Miller and Gunsalus, 1999

The coefficient is multiplied by the percentage (expressed as decimal) that the surrounding area contributes to the treatment type. The different treatment types are then summed resulting in a value

between 0 and 5. For example a wetland buffer with 50% *natural*, 25% *wet detention with swales*, and 25% *dry detention only* ($0.50 \times 5.0 + 0.25 \times 4.2 + 0.25 \times 1.7=3.975$) would result in a water quality treatment score of 3.975.

Hydrologic Indicators Score

The wetland is assessed based on evaluation of indicators of the hydrologic conditions present in the wetland which describe the hydrologic regime and the water environment. These scores result in values between 0 and 5.

| Indicators | Coefficient |
|--|-------------|
| <p>Hydrology severely altered with strong evidence of succession to transitional/upland or open water plant community</p> <ul style="list-style-type: none"> • Hydrology severely modified • Hydroperiod will not support wetland plant species associated with the particular community type • Substantial evidence that upland plant species are encroaching into the wetland because of decreased hydroperiod • Wetland plants dying-off because of increased hydroperiod • Substantial soil subsidence of organic soil substrates | 0 |
| <p>Hydrology inadequate to maintain a viable wetland system</p> <ul style="list-style-type: none"> • Hydroperiod not adequate to maintain the type of wetland system that is being assessed • Appropriate vegetation stressed or dying from too much or too little water; encroachment of transitional/upland plant species into wetland • Evidence of soil subsidence of organic soil substrates | 1.7 |
| <p>Hydrology adequate to maintain a viable wetland system, external features may affect wetland hydrology</p> <ul style="list-style-type: none"> • Hydroperiod appears adequate, but adjacent features (canals, ditches, swales, berms, reduced drainage area, culverts, pumps, control elevations, or wellfields) are possibly influencing the hydroperiod of the wetland being assessed • Plants appear healthy, but some signs of improper hydrology are present • Little evidence of soil subsidence of organic soil substrates | 3.3 |
| <p>Hydrology maintaining a viable, high functioning wetland system</p> <ul style="list-style-type: none"> • Plants appear healthy, no signs of stress from improper hydrology are present • Wetland has natural hydroperiod • Not adjacent to features (canals, ditches, swales, berms, reduced drainage area, culverts, pumps, control elevations, or wellfields) that could negatively impact the wetland • No sign of soil subsidence of organic soil substrates | 5.0 |

Coefficients were based on values developed and utilized by Miller and Gunsalus, 1999

Indicators of negative conditions would include would be shifts in vegetation from wetland species (Obligate and Facultative Wet) to more transitional (Facultative) species and Upland species. An additional negative indicator could be large amounts of soil subsidence. Die-offs of plant species due to inappropriate, increased inundation would also be a negative indicator.

Positive indicators could include, appropriate plant species composition, stain and lichen lines, moss collars, and appropriate adventitious rooting.

The Hydrologic Indicator Score is a value between 0 and 5.

The two water criteria values are summed and produce a total water environment score that ranges from 0 to 10. This represents the overall water environment score for the assessment wetland. If the example wetland had a hydrologic indicator score of 3.3, then the water environment score would be 7.275

3) Vegetative Community:

The Vegetative Community Score is developed by evaluating the species of vegetation present in the wetland being assessed. There are two scoring matrixes; one score evaluates the percentages of wetland vegetative species present and the other evaluates the percentages of exotic or invasive species present. The Vegetative Community Score is the average of the scores from the matrixes, unless 1) the wetland vegetation is less than 30 percent or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exists the Vegetative Community Score will equal zero. For example, if the percentage of wetland vegetation is approximately 40% than Wetland Vegetation Score is 3 (see Table 1. Wetland Vegetation Score). If the wetland that you are scoring includes a small percentage (10%) of Brazilian pepper the Exotic Vegetation Score would be 8 (see Table 2. Exotic Vegetation Score). The Total Vegetative Community score would be $(3+8)/2$ or 5.5.

The rationale for the plant community scoring is derived from literature that indicates the plant community shifts in response to conditions in the wetland. Drier conditions will allow less wetland vegetation to be established in a wetland. The introduction of exotic species typically occurs in systems that are undergoing disturbance or stress (Zedler and Kercher, 2004). Additionally, a wetland may exist with a low level of exotics for many years. When the density of exotic species reaches a particular threshold, the exotic species out compete the native species and the community will undergo a shift to becoming an exotic monoculture. This shift is believed to occur when a system becomes approximately 30% exotic species. This value is supported by regulatory agencies since agencies will not give mitigation credit for exotic removal until a system includes approximately 30% exotic plant species.

Table 1. Wetland Vegetation Score

| % | score |
|----------|--------------|
| 0 | 0 |
| 10 | 0 |
| 20 | 0 |
| 30 | 2 |
| 40 | 3 |
| 50 | 6 |
| 60 | 8 |
| 70 | 9 |
| 80 | 10 |
| 90 | 11 |
| 100 | 12 |

Table 2. Exotic Vegetation Score

| % | Score |
|----------|--------------|
| 0 | 8 |
| 15 | 7 |
| 25 | 5 |
| 30 | 4 |
| 50 | 2 |
| 100 | 0 |

Table 3. Vegetation Score

| Vegetation Criteria | Percentages (from other tabs) | Score | Thresholds |
|----------------------------|--------------------------------------|--------------|---|
| Wetland Vegetation | 40 | 3 | a perfect wetland would have a maximum score of 10 |
| Exotic Vegetation | 10 | 8 | |
| Total Percentage | 50 | 5.5 | <p>Vegetative Community Score (average)</p> <p>The Vegetative Community Score is calculated as the average of the wetland vegetation score and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) if the percent of exotic vegetation is > the percent of wetland vegetation. If either of these two conditions exist the Community Vegetative Score will = 0.</p> |

Evaluation Score

Overall scores are summed and divided by thirty. The resulting calculation ranges from 0 to 1 and is the value that determines if the assessed system is considered a high functioning system. A pristine system free from any anthropomorphic effects would score 1 (30 divided by 30). The value of high functioning wetlands will be 0.70 or above. This value could also be interpreted that the system is operating at 70% of its functional potential.

The cut-off for defining a wetland system as “High-Functioning” was developed from analyzing more than thirty wetland systems throughout Brevard County. These systems varied in conditions and qualities. A wetland system must have a score of **0.70** or above to be considered “High-Functioning”.

References:

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- Langeland, K. and K. C. Burks. *Identification and Biology of Non-Native Plants in Florida's Natural Areas*. University of Florida, Gainesville, 165 pp., 1998. Web. Feb. 2013.
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- Vivas, M.B. and M.T. Brown. *Landscape development intensity index*. *Environmental Monitoring and Assessment* 101 (2005):289-309. Web. Feb. 2013.
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ATTACHMENT II.A-3

Reference Wetlands for High Functioning Wetlands

Brevard County Natural Resource Management



Developed by

B.K.I., Inc. and Ecospatial Analysts, Inc.

For

Brevard County

Natural Resource Management Office

September 30, 2013

Reference Wetlands for High Functioning Wetlands

Brevard County Natural Resource Management

The document describes and assesses wetland systems located throughout Brevard County. These reference wetlands were chosen to be representative of different types of high-quality wetlands within Brevard County.

The wetlands were assessed utilizing the Brevard County-Wetland Assessment Method. The method was developed to evaluate wetlands and identify if a wetland is considered high functioning.

The assessment includes data for each reference wetland. The data includes: location map, description of the wetland vegetation and hydrology, large-scale location map, functional assessment data, functional assessment scores, and aerial map of wetland.

The reference wetlands were developed to be used for comparison while completing assessment of a subject wetland. Utilizing the reference wetlands should result in more consistency in the assessment of wetlands.

Reference Wetlands for High Functioning Wetlands

Brevard County Natural Resource Management

Table of Contents for Reference Wetlands (RW)

| |
|--|
| FLUCCS 4280 Cabbage Palm Hammock (RW21) - Pages 4-7 |
| FLUCCS 4280 Cabbage Palm Hammock (RW22) - Pages 8-11 |
| FLUCCS 6110 Bay Swamp (RW19) - Pages 12-15 |
| FLUCCS 6120 Mangrove Swamp (RW1) - Pages 16-19 |
| FLUCCS 6120 Mangrove Swamp (RW2) - Pages 20-23 |
| FLUCCS 6120 Mangrove Swamp (RW16) - Pages 24-27 |
| FLUCCS 6170 Mixed Wetland Hardwood (RW6) - Pages 28-31 |
| FLUCCS 6210 Cypress (RW24) - Pages 32-35 |
| FLUCCS 6250 Hydric Pine Flatwoods (RW11) - Pages 36-39 |
| FLUCCS 6300 Wetland Forest Mixed (RW29) - Pages 40-43 |
| FLUCCS 6310 Wetland Scrub (RW18) - Pages 44-47 |
| FLUCCS 6310 Wetland Scrub (RW17) - Pages 48-51 |
| FLUCCS 6410 Freshwater Marsh (RW10) - Pages 52-55 |
| FLUCCS 6410 Freshwater Marsh (RW7) - Pages 56-59 |
| FLUCCS 6420 Saltwater Marsh (RW14) - Pages 60-63 |
| FLUCCS 6420 Saltwater Marsh (RW15) - Pages 64-67 |
| FLUCCS 6420 Saltwater Marsh (RW30) - Pages 68-71 |
| FLUCCS 6430 Wet Prairie (RW12) - Pages 72-75 |
| FLUCCS 6430 Wet Prairie (RW 31) - Pages 76-79 |

Cabbage Palm Hammock

River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

LOCATION

Brevard County
Latitude 28.2121665738 N, Longitude -80.8345821717 E

COMMUNITY DESCRIPTION

Cabbage Palm Hammocks is a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within floodplains. Trees are often buttressed, and the understory and groundcover are sparse. The canopy is dominated by cabbage palms (*Sabal palmetto*) but may contain other trees such as laurel oak (*Quercus laurifolia*), live oak (*Q. virginiana*) or southern red cedar (*Juniperus virginiana* var. *silicicola*). Cabbage palm hammocks can often occur within a complex mixture of communities including alluvial forest, bottomland forest, and baygall.



Cabbage Palm Hammock

River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

This produces a variable assemblage of canopy and subcanopy species, with less flood tolerant trees and shrubs found on small hummocks and ridges within the wetland. A groundcover of flood tolerant ferns and herbs are found in some cabbage palm hammocks, including lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), royal fern (*Osmunda regalis* var. *spectabilis*) and smartweed (*Polygonum* sp.). Eastern poison ivy (*Toxicodendron radicans*) is a frequent vine.

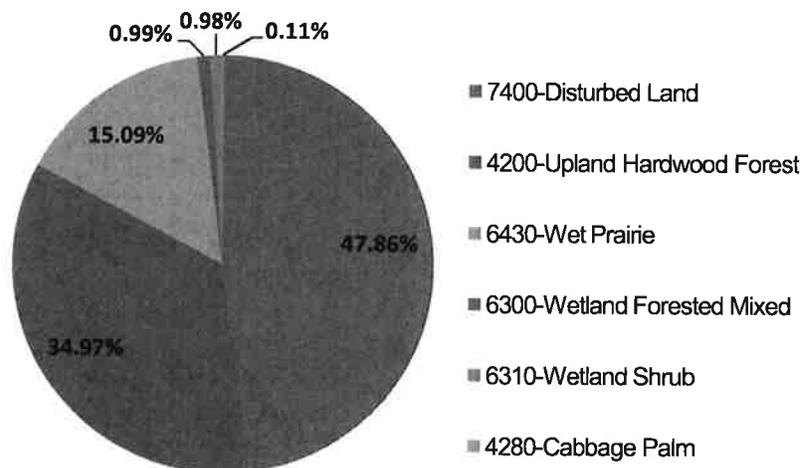
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|-----------------------------|---------------------|------------------|--------------------------|---|
| 7400-Disturbed Land | 57.75 | 9.08 | 0.479 | 4.346 |
| 4200-Upland Hardwood Forest | 42.20 | 10 | 0.350 | 3.497 |
| 6430-Wet Prairie | 18.21 | 10 | 0.151 | 1.509 |
| 6300-Wetland Forested Mixed | 1.20 | 10 | 0.010 | 0.099 |
| 6310-Wetland Shrub | 1.18 | 10 | 0.010 | 0.098 |
| 4280-Cabbage Palm | 0.13 | 10 | 0.001 | 0.011 |
| TOTAL | 120.67 | 59.08 | 1.00 | 9.56 |

Landcover Percent within 100 m buffer



Cabbage Palm Hammock River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 65 | 8 |
| Exotic Vegetation | 20 | 7 |
| Vegetative Community Score | | 7.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 20%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

(Landscape Location + Water Environment + Vegetative Community)/30 =

$$(9.56 + 10 + 7.5) / 30 = 0.902$$

Cabbage Palm Hammock River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Cabbage Palm Hammock
River Lakes Conservation Area
Brevard County, Florida**

- 4280-Cabbage Palm
-  River Lakes Conservation Area

Cabbage Palm Hammock

Indian River Lagoon Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

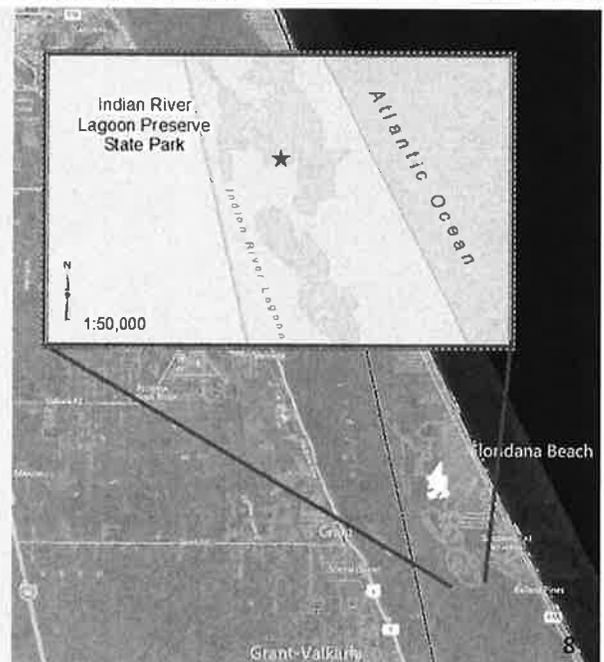
LOCATION

Brevard County

Latitude 27.9373607132 N, Longitude -80.5030258371E

COMMUNITY DESCRIPTION

Cabbage Palm Hammocks are a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels and in depressions and oxbows within floodplains. Trees are often buttressed, and the understory and groundcover are sparse. The canopy is dominated by cabbage palms (*Sabal palmetto*) but may contain other trees such as laurel oak (*Quercus laurifolia*), live oak (*Q. virginiana*) or southern red cedar (*Juniperus virginiana* var. *silicicola*). Cabbage palm hammocks can often occur within a complex mixture of communities including alluvial forest, bottomland forest, and baygall.



Cabbage Palm Hammock

Indian River Lagoon Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

This produces a variable assemblage of canopy and subcanopy species, with less flood tolerant trees and shrubs found on small hummocks and ridges within the wetland. A groundcover of flood tolerant ferns and herbs are found in some cabbage palm hammocks, including lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), royal fern (*Osmunda regalis* var. *spectabilis*) and smartweed (*Polygonum* sp.). Eastern poison ivy (*Toxicodendron radicans*) is a frequent vine.

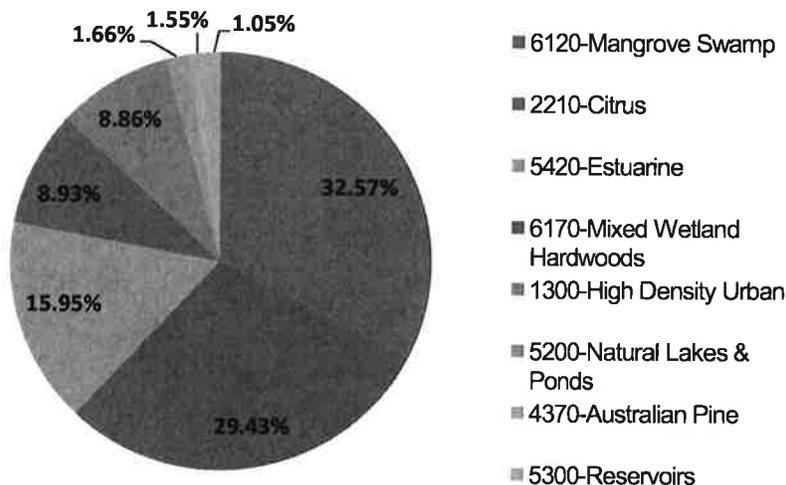
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value* Landcover Percent) |
|------------------------------|--------------|--------------|-------------------|--|
| 6120-Mangrove Swamp | 25.14 | 10 | 0.326 | 3.257 |
| 2210-Citrus | 22.72 | 7.02 | 0.294 | 2.066 |
| 5420-Estuarine | 12.31 | 10 | 0.159 | 1.595 |
| 6170-Mixed Wetland Hardwoods | 6.89 | 10 | 0.089 | 0.893 |
| 1300-High Density Urban | 6.84 | 0.91 | 0.089 | 0.081 |
| 5200-Natural Lakes & Ponds | 1.28 | 10 | 0.017 | 0.166 |
| 4370-Australian Pine | 1.20 | 8.87 | 0.016 | 0.137 |
| 5300-Reservoirs | 0.81 | 10 | 0.011 | 0.105 |
| TOTAL | 77.20 | 66.80 | 1.00 | 8.30 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 2.5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 7.5 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 70 | 9 |
| Exotic Vegetation | 25 | 5 |
| Vegetative Community Score | | 7.0 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 25%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$\begin{aligned}
 & (\text{Landscape Location} + \text{Water Environment} + \text{Vegetative Community}) / 30 = \\
 & \quad \mathbf{(8.3 \quad + \quad 7.5 \quad + \quad 7.0) \quad / \quad 30 = 0.760}
 \end{aligned}$$

Bay Swamp

St. Sebastian River Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

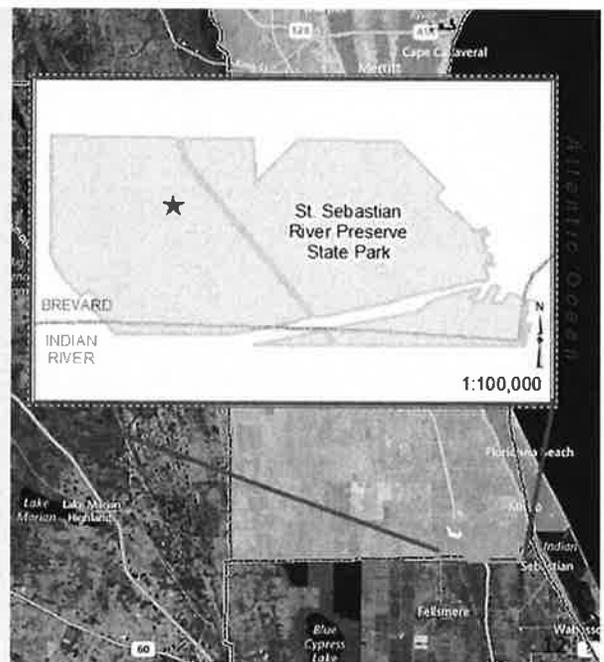
LOCATION

Brevard County

Latitude 27.8524621439 N, Longitude -80.5917447513E

COMMUNITY DESCRIPTION

Bay Swamps are an evergreen forested wetland of bay species situated at the base of a slope or in a depression. Loblolly bay (*Gordonia lasianthus*), sweetbay (*Magnolia virginiana*), or swamp bay (*Persea palustris*) form an open to dense tree canopy and are also dominant in the understory along with fetterbush (*Lyonia lucida*), large gallberry (*Ilex coriacea*), dahoon (*I. cassine*), myrtle dahoon (*I. cassine* var. *myrtifolia*), wax myrtle (*Myrica cerifera*), red maple (*Acer rubrum*), or Carolina willow (*Salix caroliniana*). Composition of the understory varies regionally. Slash pine (*Pinus elliottii*) or Loblolly pine (*P. taeda*) are often found in the canopy, as well as sweetgum (*Liquidambar styraciflua*).



COMMUNITY DESCRIPTION (cont)

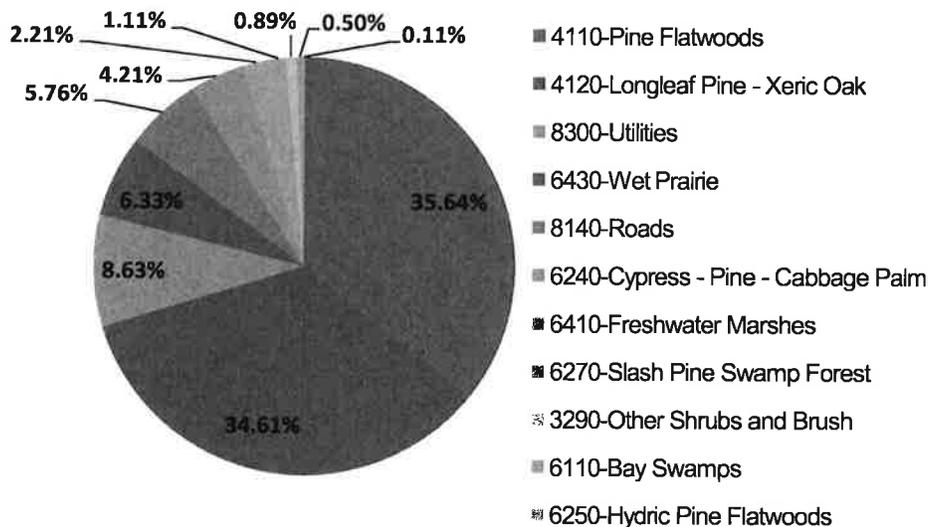
The canopy and understory do not generally form distinct strata but may appear as a dense, tall thicket. Vines, especially laurel greenbrier (*Smilax laurifolia*), coral greenbrier (*S. walteri*), and muscadine (*Vitis rotundifolia*), may be abundant and contribute to the often impenetrable nature of the understory. Herbs are absent or few, and typically consist of ferns such as cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), and Virginia chain fern (*W. virginica*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value * Landcover Percent) |
|------------------------------------|---------------|--------------|-------------------|---|
| 4110-Pine Flatwoods | 59.219895 | 10 | 0.356 | 3.564 |
| 4120-Longleaf Pine - Xeric Oak | 57.516285 | 10 | 0.346 | 3.461 |
| 8300-Utilities | 14.346212 | 2.43 | 0.086 | 0.210 |
| 6430-Wet Prairie | 10.52398 | 10 | 0.063 | 0.633 |
| 8140-Roads | 9.570417 | 1.91 | 0.058 | 0.110 |
| 6240-Cypress - Pine - Cabbage Palm | 6.9938081 | 10 | 0.042 | 0.421 |
| 6410-Freshwater Marshes | 3.6751105 | 10 | 0.022 | 0.221 |
| 6270-Slash Pine Swamp Forest | 1.8418448 | 10 | 0.011 | 0.111 |
| 3290-Other Shrubs and Brush | 1.4783683 | 10 | 0.009 | 0.089 |
| 6110-Bay Swamps | 0.8297886 | 10 | 0.005 | 0.050 |
| 6250-Hydric Pine Flatwoods | 0.1880281 | 10 | 0.001 | 0.011 |
| TOTAL | 166.18 | 94.34 | 1.00 | 8.88 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.95 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.95 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 5 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics present in less than 5%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(8.88 + 9.95 + 9.5) / 30 = 0.943$$

Bay Swamp

St. Sebastian River Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community



Location Map - Bay Swamp
St. Sebastian River Preserve State Park
Brevard County, Florida

- 6110-Bay Swamps
-  St. Sebastian River Preserve State Park

Mangrove Swamp

Thousand Island Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

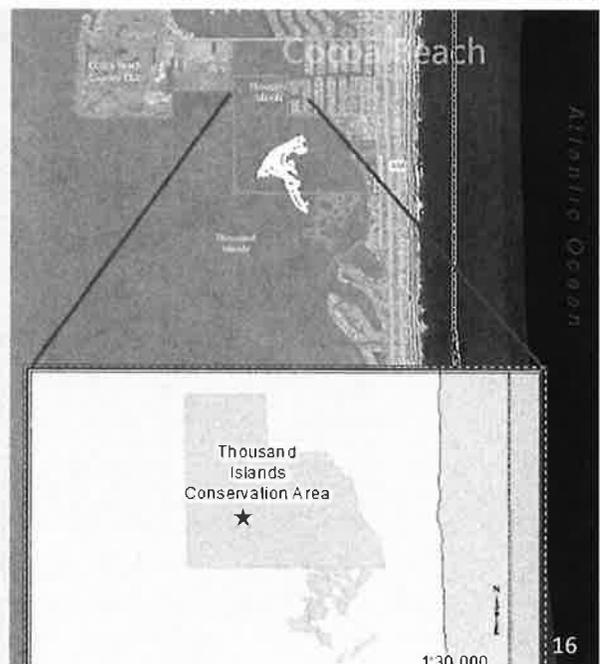
LOCATION

Brevard County

Latitude 28.3063049442 N, Longitude -80.6209608436E

COMMUNITY DESCRIPTION

Mangrove swamp is a dense forest occurring along relatively flat, low wave energy, marine and estuarine shorelines. The dominant plants of mangrove swamp are red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). These four species can occur either in mixed stands or often in differentiated, monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. 298 Red mangrove often dominates the lowest (or deep-water) zone, followed by black mangrove in the



COMMUNITY DESCRIPTION (cont)

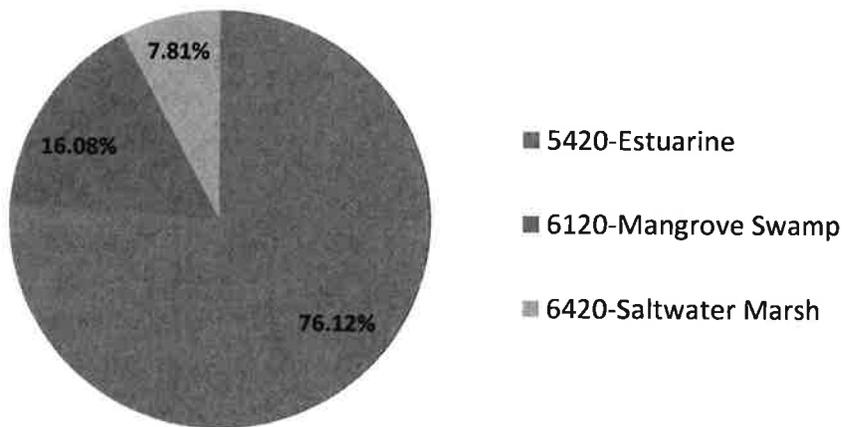
intermediate zone, and white mangrove and buttonwood in the highest, least tidally-influenced zone. Buttonwood often occupies an ecotone, or transition zone, to the adjacent upland community.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
 Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|-----------------------|---------------------|------------------|--------------------------|---|
| 5420-Estuarine | 58.28 | 10 | 0.761 | 7.612 |
| 6120-Mangrove Swamp | 12.31 | 10 | 0.161 | 1.608 |
| 6420-Saltwater Marsh | 5.98 | 10 | 0.078 | 0.781 |
| TOTAL | 76.57 | 30.00 | 1.00 | 10.00 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10.0 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 100 | 12 |
| Exotic Vegetation | | 8 |
| Vegetative Community Score | | 10.0 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are not present

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

None

ASSESSMENT SCORE

$$\begin{aligned}
 & \text{(Landscape Location + Water Environment + Vegetative Community)} / 30 = \\
 & \quad \mathbf{(10.0 \quad + \quad 10.0 \quad + \quad 10.5) \quad / \quad 30 = 1.00}
 \end{aligned}$$

Mangrove Swamp Thousand Island Conservation Area

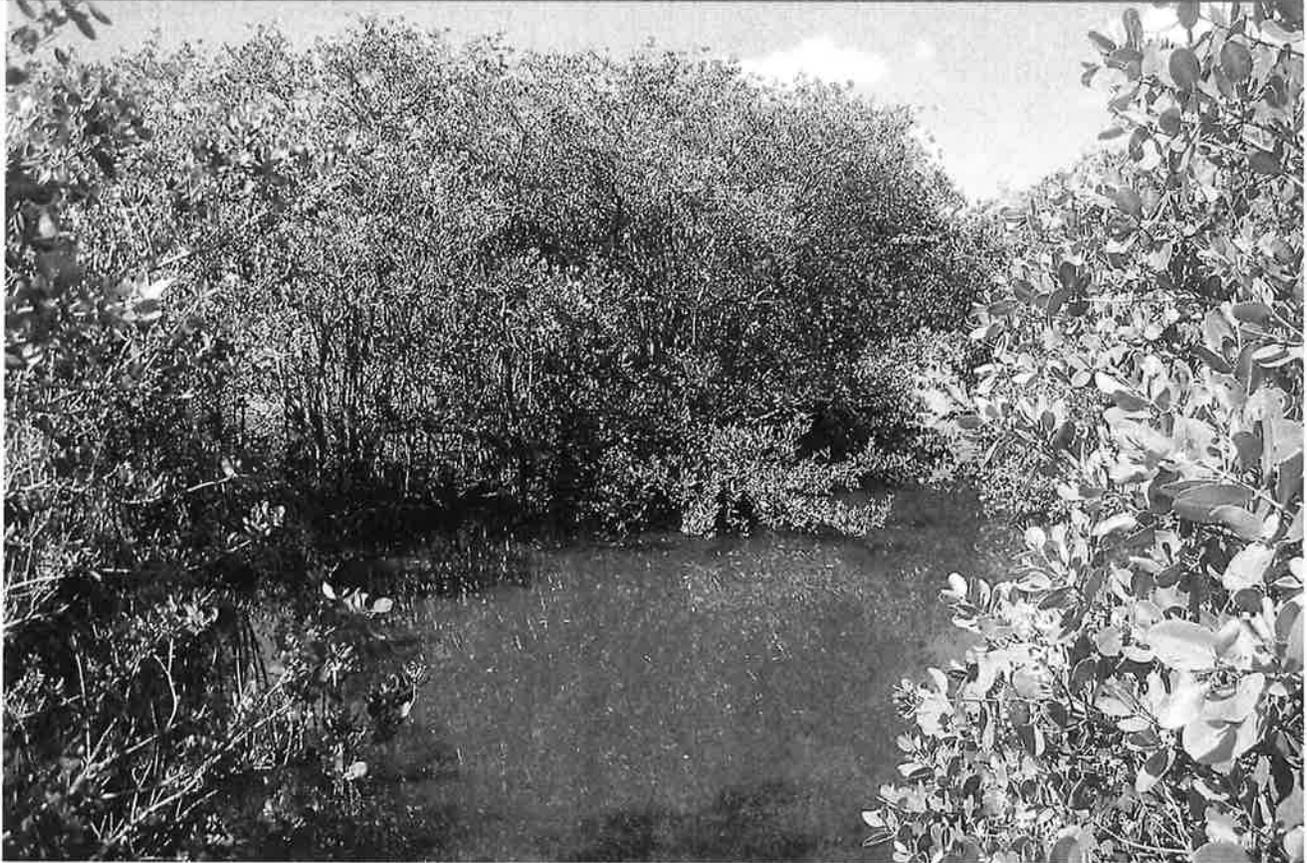


**Location Map - Mangrove Swamps
Thousand Island Conservation Area
Brevard County, Florida**

- 6120-Mangrove Swamp
- Thousand Islands Conservation Area

Mangrove Swamp Ulumay Wildlife Sanctuary

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

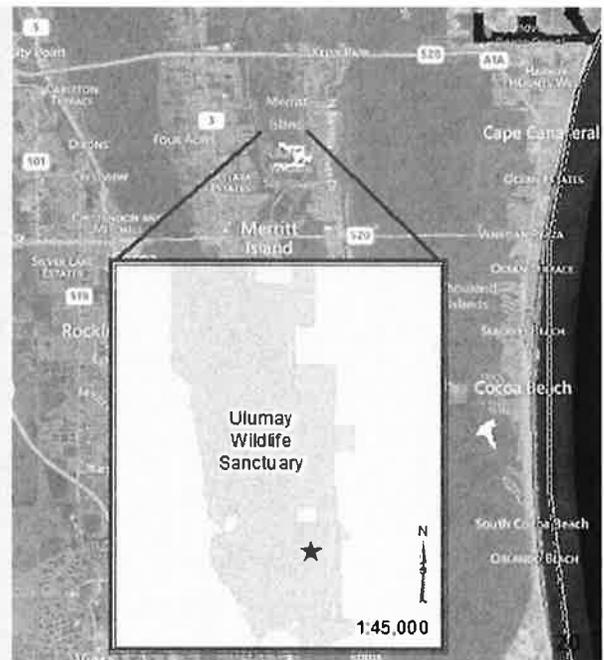
LOCATION

Brevard County

Latitude 28.3785424759 N, Longitude -80.6781411412E

COMMUNITY DESCRIPTION

Mangrove swamp is a dense forest occurring along relatively flat, low wave energy, marine and estuarine shorelines. The dominant plants of mangrove swamp are red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). These four species can occur either in mixed stands or often in differentiated, monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. Red mangrove often dominates the lowest (or deep-water) zone, followed by black mangrove in the



Mangrove Swamp

Ulumay Wildlife Sanctuary

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

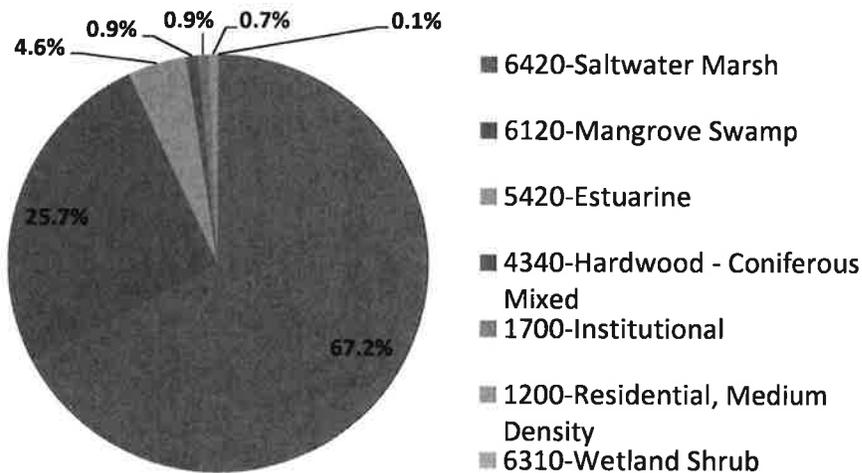
intermediate zone, and white mangrove and buttonwood in the highest, least tidally-influenced zone. Buttonwood often occupies an ecotone, or transition zone, to the adjacent upland community.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
 Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of</i> | | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|----------------------------------|---------------|------------------|------------------------------|---|
| | <i>Acres</i> | <i>LSI_Value</i> | | |
| 6420-Saltwater Marsh | 113.60 | 10.00 | 0.672 | 6.72 |
| 6120-Mangrove Swamp | 43.50 | 10.00 | 0.257 | 2.57 |
| 5420-Estuarine | 7.75 | 10.00 | 0.046 | 0.46 |
| 4340-Hardwood - Coniferous Mixed | 1.51 | 10.00 | 0.009 | 0.09 |
| 1700-Institutional | 1.44 | 2.14 | 0.009 | 0.02 |
| 1200-Residential, Medium Density | 1.13 | 2.81 | 0.007 | 0.02 |
| 6310-Wetland Shrub | 0.12 | 10.00 | 0.001 | 0.01 |
| TOTAL | 169.03 | 54.95 | 1.00 | 9.89 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10.0 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 5 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 15%.

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(9.89 + 10.0 + 9.5) / 30 = 0.980$$

Mangrove Swamp Ulumay Wildlife Sanctuary



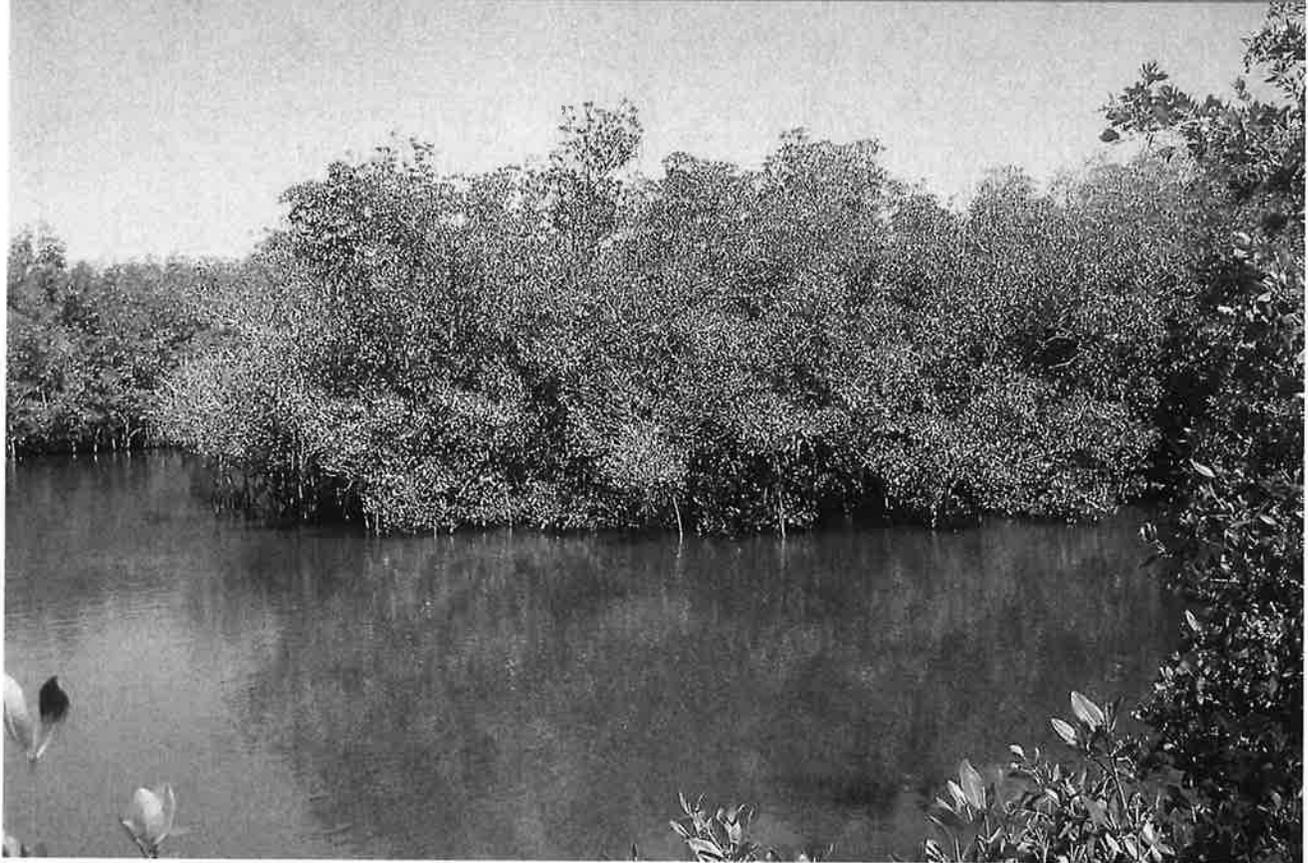
**Location Map - Mangrove Swamps
Ulumay Wildlife Sanctuary
Brevard County, Florida**

- 6120-Mangrove Swamp
- Ulumay Wildlife Sanctuary

Mangrove Swamp

Sebastian Inlet State Park

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

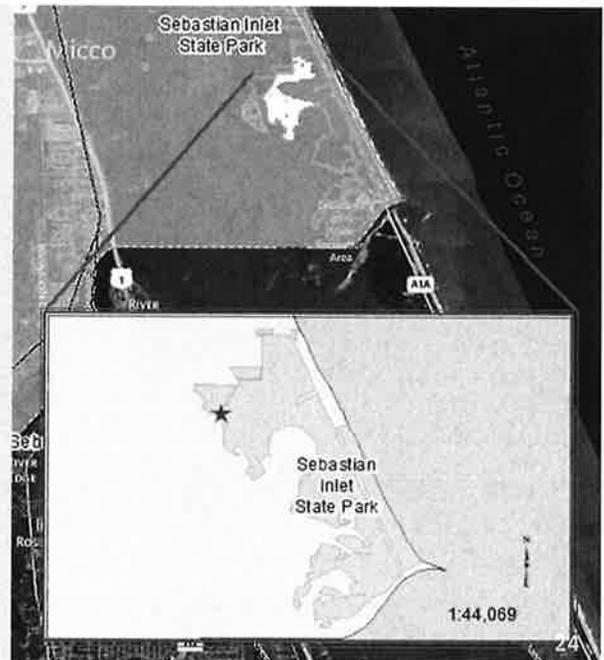
LOCATION

Brevard County

Latitude 27.8752898263 N, Longitude -80.4642015971E

COMMUNITY DESCRIPTION

Mangrove swamp is a dense forest occurring along relatively flat, low wave energy, marine and estuarine shorelines. The dominant plants of mangrove swamp are red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). These four species can occur either in mixed stands or often in differentiated, monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. Red mangrove often dominates the lowest (or deep-water) zone, followed by black mangrove in the



Mangrove Swamp

Sebastian Inlet State Park

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

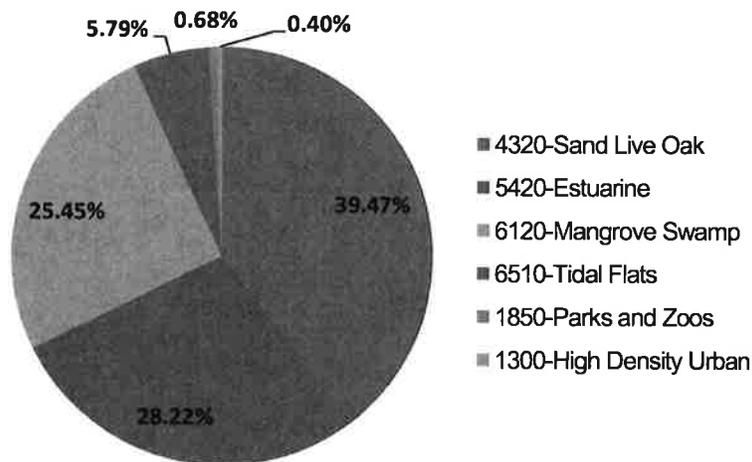
intermediate zone, and white mangrove and buttonwood in the highest, least tidally-influenced zone. Buttonwood often occupies an ecotone, or transition zone, to the adjacent upland community.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
- Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|-------------------------|---------------------|------------------|--------------------------|---|
| 4320-Sand Live Oak | 49.38 | 10 | 0.395 | 3.947 |
| 5420-Estuarine | 35.30 | 10 | 0.282 | 2.822 |
| 6120-Mangrove Swamp | 31.84 | 10 | 0.254 | 2.545 |
| 6510-Tidal Flats | 7.24 | 10 | 0.058 | 0.579 |
| 1850-Parks and Zoos | 0.85 | 3.42 | 0.007 | 0.023 |
| 1300-High Density Urban | 0.51 | 0.91 | 0.004 | 0.004 |
| TOTAL | 125.11 | 44.33 | 1.00 | 9.92 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.5 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 85 | 10 |
| Exotic Vegetation | 15 | 7 |
| Vegetative Community Score | | 8.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 15%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

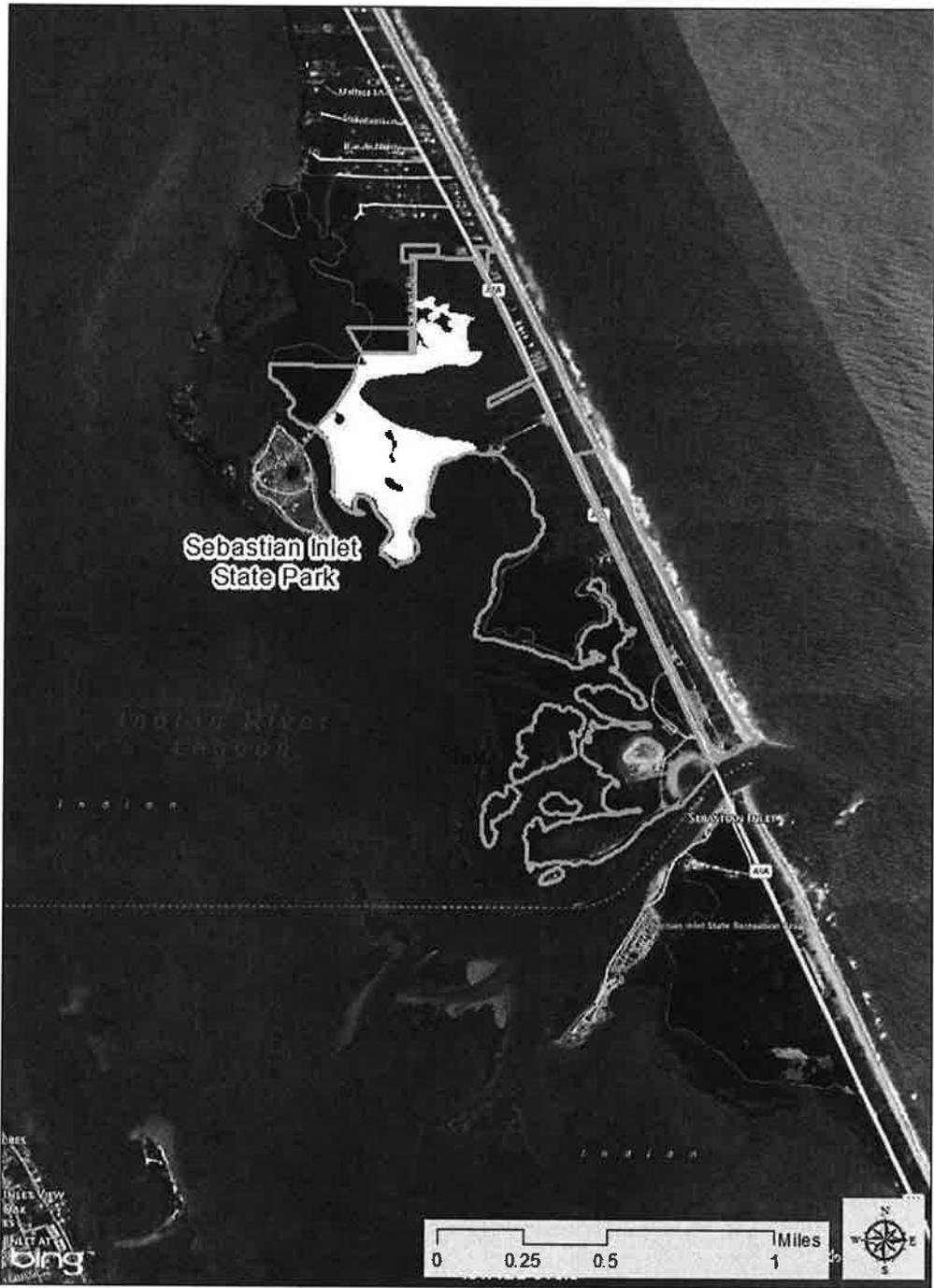
Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$\begin{aligned}
 & \text{(Landscape Location + Water Environment + Vegetative Community)} / 30 = \\
 & \quad (9.92 \quad + \quad 9.5 \quad + \quad 8.5) \quad / \quad 30 = 0.931
 \end{aligned}$$

Mangrove Swamp Sebastian Inlet State Park

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Mangrove Swamps
Sebastian Inlet State Park
Brevard County, Florida**

- 6120-Mangrove Swamp
- Sebastian Inlet State Park

Mixed Wetland Hardwoods

Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

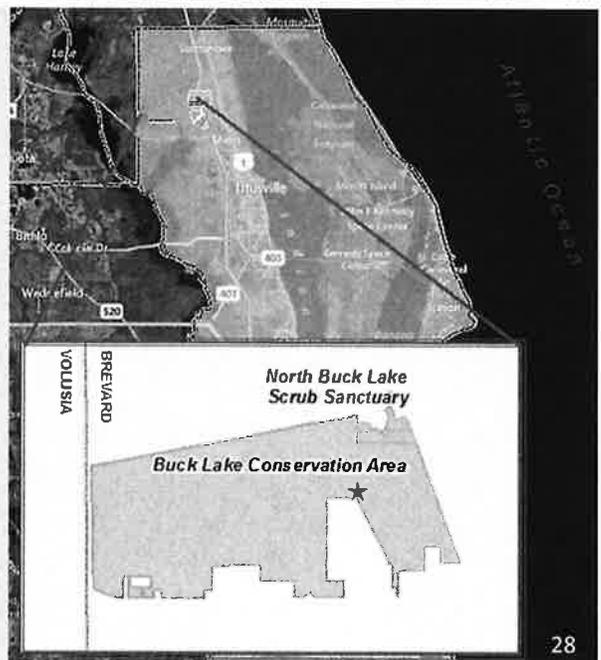
LOCATION

Brevard County

Latitude 28.6875918253 N, Longitude -80.8868622564 E

COMMUNITY DESCRIPTION

Mixed wetland hardwoods are composed of a large variety of hardwood species tolerant of hydric conditions yet exhibit an ill defined mixture of species. The evergreen hardwood and/or palm forest has a variable understory typically dominated by palms and ferns occurring on moist soils. While species composition varies, the community generally has a closed canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. The canopy is dominated by swamp laurel oak (*Quercus laurifolia*) and/or live oak (*Q. virginiana*) with varying amounts of cabbage palm (*Sabal palmetto*), American elm (*Ulmus americana*), sweetbay (*Magnolia virginiana*), red cedar (*Juniperus virginiana*), red maple (*Acer rubrum*) and sugarberry (*Celtis laevigata*). Not publically accessible.



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Mixed Wetland Hardwoods

Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

Cabbage palm is a common to dominant component of hydric hammock. Slash pine (*Pinus elliottii*) and Loblolly pine (*Pinus taeda*) may be frequent in some areas. In addition to saplings of canopy species, the understory may contain a number of small trees and shrubs. Various woody species that may be present including swamp dogwood (*Cornus foemina*), small-leaf viburnum (*Viburnum obovatum*), common persimmon (*Diospyros virginiana*), swamp bay (*Persea palustris*), wax myrtle (*Myrica cerifera*), dwarf palmetto (*Sabal minor*), American beautyberry (*Callicarpa americana*), and needle palm (*Rhaphidophyllum hystrix*). Vines may be frequent and diverse; common species are eastern poison ivy (*Toxicodendron radicans*), peppervine (*Ampelopsis arborea*), greenbriers (*Smilax* spp.), summer grape (*Vitis aestivalis*), and muscadine (*Vitis rotundifolia*).

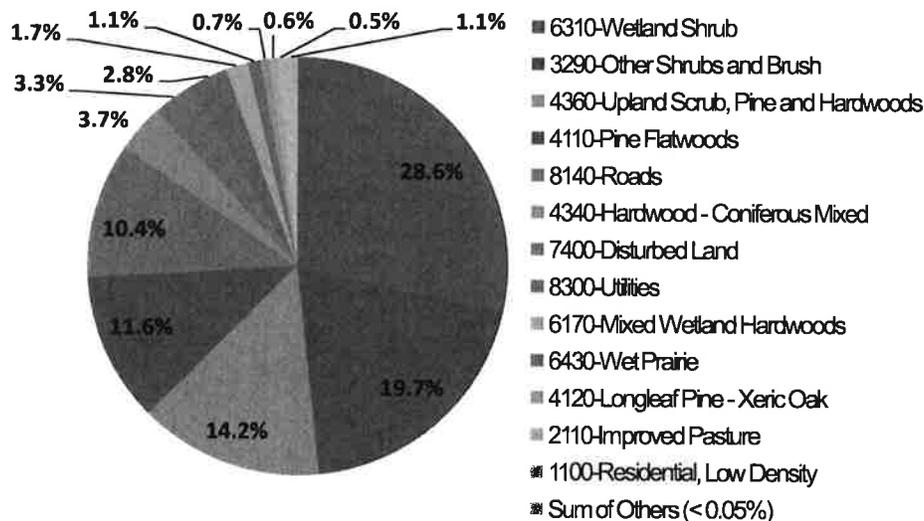
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value * Landcover Percent) |
|---------------------------------------|---------------|---------------|-------------------|---|
| 6310-Wetland Shrub | 150.18 | 10 | 0.285 | 2.85 |
| 3290-Other Shrubs and Brush | 103.86 | 10 | 0.197 | 1.97 |
| 4360-Upland Scrub, Pine and Hardwoods | 74.78 | 10 | 0.142 | 1.42 |
| 4110-Pine Flatwoods | 60.83 | 10 | 0.116 | 1.16 |
| 8140-Roads | 54.73 | 1.91 | 0.104 | 0.20 |
| 4340-Hardwood - Coniferous Mixed | 19.55 | 10 | 0.037 | 0.37 |
| 7400-Disturbed Land | 17.40 | 9.08 | 0.033 | 0.30 |
| 8300-Utilities | 14.94 | 2.43 | 0.028 | 0.07 |
| 6170-Mixed Wetland Hardwoods | 8.98 | 10 | 0.017 | 0.17 |
| 6430-Wet Prairie | 5.59 | 10 | 0.011 | 0.11 |
| 4120-Longleaf Pine - Xeric Oak | 3.53 | 10 | 0.007 | 0.07 |
| 2110-Improved Pasture | 3.32 | 6.96 | 0.006 | 0.04 |
| 1100-Residential, Low Density | 2.40 | 3.57 | 0.005 | 0.02 |
| 6410-Freshwater Marshes | 2.02 | 10 | 0.004 | 0.04 |
| 6210-Cypress | 1.08 | 10 | 0.002 | 0.02 |
| 6300-Wetland Forested Mixed | 0.77 | 10 | 0.001 | 0.01 |
| 1820-Golf courses | 0.77 | 3.42 | 0.001 | 0.00 |
| 2500-Specialty Farms | 0.72 | 3.33 | 0.001 | 0.00 |
| 6440-Freshwater Marshes | 0.51 | 10 | 0.001 | 0.01 |
| TOTAL | 525.96 | 150.70 | 1.00 | 8.84 |

Landcover Percent within 100 m buffer



Mixed Wetland Hardwoods

Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.505 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.505 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 80 | 10 |
| Exotic Vegetation | 15 | 7 |
| Vegetative Community Score | | 8.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics present in less than 15%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(8.846 + 9.505 + 8.5) / 30 = 0.895$$

Mixed Wetland Hardwoods Buck Lake Conservation Area

Brevard County Natural Resource Management



**Location Map - Mixed Wetland Hardwoods
Buck Lake Conservation Area/
North Buck Lake Scrub Sanctuary
Brevard County, Florida**

- 6170-Mixed Wetland Hardwoods
-  North Buck Lake Scrub Sanctuary
-  Buck Lake Conservation Area

Cypress

Three Forks Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

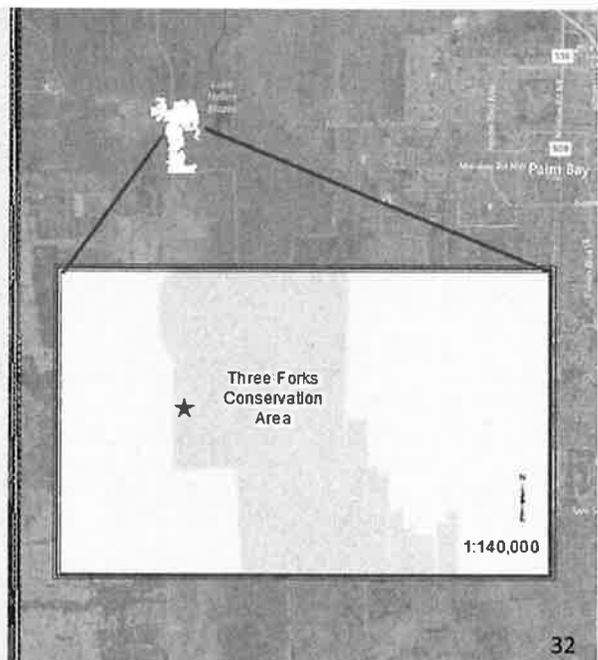
LOCATION

Brevard County

Latitude 28.0109407722 N, Longitude -80.8121163428E

COMMUNITY DESCRIPTION

Cypress is a basin wetland vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Cypress wetlands are highly variable in size, shape, and species composition. While mixed species canopies are common, the dominant trees are pond cypress (*Taxodium ascendens*). Other typical canopy and subcanopy trees include slash pine (*Pinus elliotii*), red maple (*Acer rubrum*), dahoon (*Ilex cassine*), swamp bay (*Persea palustris*), sweetbay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), laurel oak (*Quercus laurifolia*), sweetgum (*Liquidambar styraciflua*), water oak (*Quercus nigra*) and American elm (*Ulmus americana*).



COMMUNITY DESCRIPTION (cont)

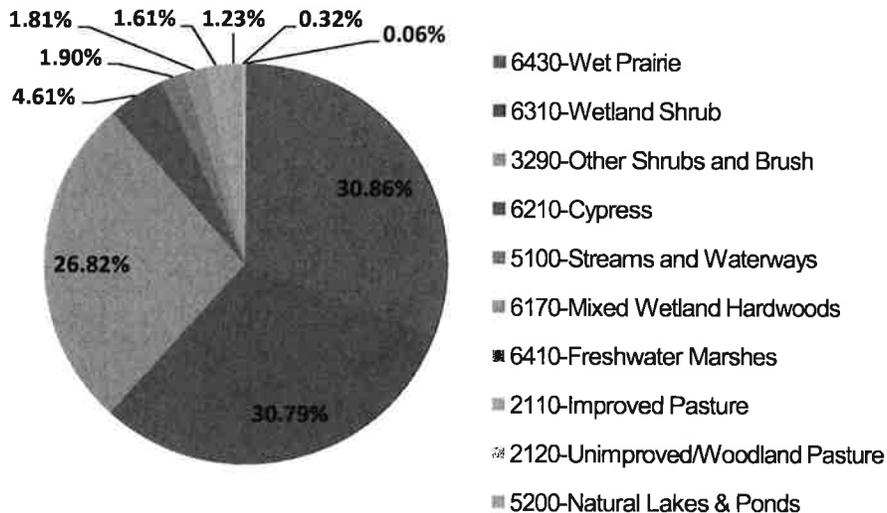
Depending on the hydrology and fire history, shrubs may be found throughout a cypress swamp or they may be concentrated around the perimeter. Common species include Carolina willow (*Salix caroliniana*), myrtle dahoon (*Ilex cassine* var. *myrtifolia*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*) and common buttonbush (*Cephalanthus occidentalis*). The herbaceous layer is also variable and includes a wide array of species including maidencane (*Panicum hemitomon*), Virginia chain fern (*Woodwardia virginica*), arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), beaksedges (*Rhynchospora* spp.), bladderworts (*Utricularia* spp.), and royal fern (*Osmunda regalis* var. *spectabilis*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|----------------------------------|---------------------|------------------|--------------------------|---|
| 6430-Wet Prairie | 115.61 | 10 | 0.309 | 3.086 |
| 6310-Wetland Shrub | 115.35 | 10 | 0.308 | 3.079 |
| 3290-Other Shrubs and Brush | 100.47 | 10 | 0.268 | 2.682 |
| 6210-Cypress | 17.28 | 10 | 0.046 | 0.461 |
| 5100-Streams and Waterways | 7.12 | 10 | 0.019 | 0.190 |
| 6170-Mixed Wetland Hardwoods | 6.78 | 10 | 0.018 | 0.181 |
| 6410-Freshwater Marshes | 6.03 | 10 | 0.016 | 0.161 |
| 2110-Improved Pasture | 4.62 | 6.96 | 0.012 | 0.086 |
| 2120-Unimproved/Woodland Pasture | 1.19 | 8.03 | 0.003 | 0.025 |
| 5200-Natural Lakes & Ponds | 0.21 | 10 | 0.001 | 0.006 |
| TOTAL | 374.65 | 94.99 | 1.00 | 9.96 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.88 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.88 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 85 | 10 |
| Exotic Vegetation | 15 | 7 |
| Vegetative Community Score | | 8.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 15%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

Japanese Climbing Fern (Lygodium japonicum)

ASSESSMENT SCORE

$$(9.96 + 9.88 + 8.5) / 30 = 0.945$$

Cypress

Three Forks Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



Location Map - Cypress
Three Forks Conservation Area
Brevard County, Florida

6210-Cypress

Three Forks Conservation Area

Hydric Pine Flatwoods

Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

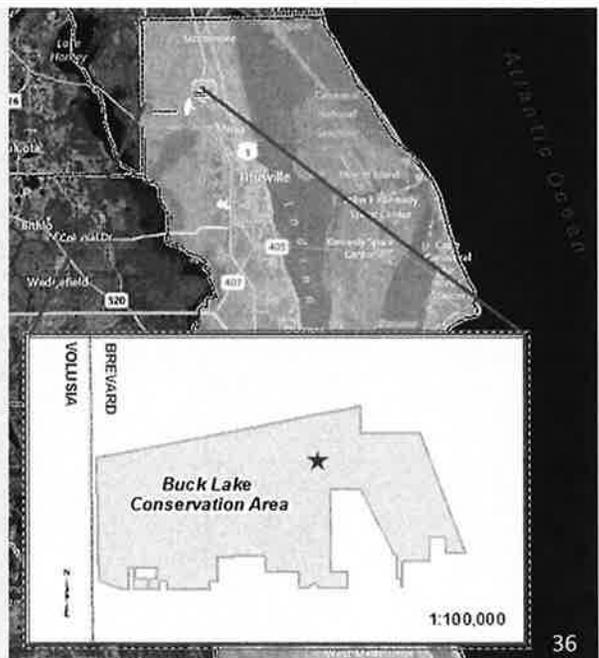
LOCATION

Brevard County

Latitude 28.6910319585 N, Longitude -80.9086244882 E

COMMUNITY DESCRIPTION

Hydric pine flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The pine canopy typically consists of one or a combination of longleaf pine (*Pinus palustris*), slash pine (*P. elliottii*), pond pine (*P. serotina*), or South Florida slash pine (*P. elliottii* var. *densa*). The subcanopy, if present, consists of scattered sweetbay (*Magnolia virginiana*), swamp bay (*Persea palustris*), loblolly bay (*Gordonia lasianthus*), pond cypress (*Taxodium ascendens*), dahoon (*Ilex cassine*), sabal palm (*Sabal palmetto*), or wax myrtle (*Myrica cerifera*). Not publically accesible.



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Hydric Pine Flatwoods Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

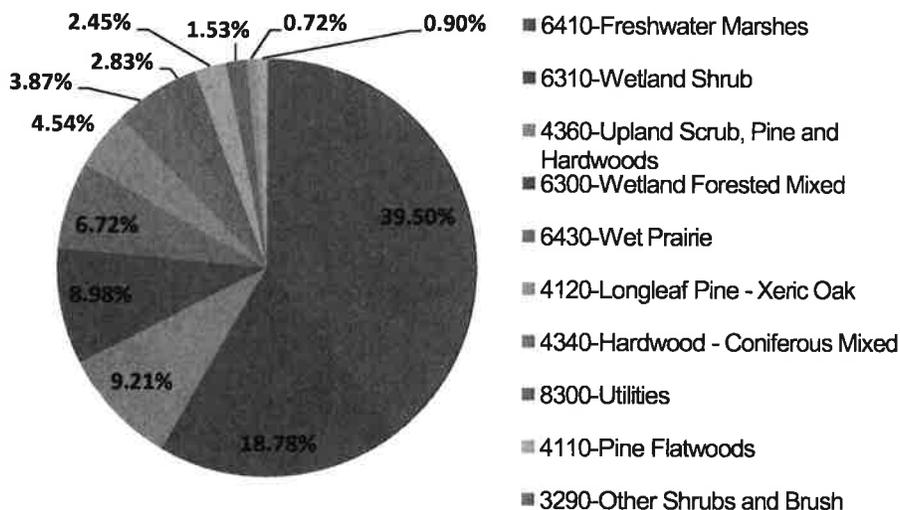
Shrubs include large gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida*), titi, black titi (*Cliftonia monophylla*), sweet pepperbush (*Clethra alnifolia*), red chokeberry (*Photinia pyrifolia*), and azaleas (*Rhododendron canescens*, *R. viscosum*). Saw palmetto (*Serenoa repens*) and gallberry (*I. glabra*), species also found in mesic flatwoods sites, may be present. Herbs include wiregrass (*Aristida stricta* var. *beyrichiana*), blue maidencane (*Amphicarpum muhlenbergianum*), or hydrophytic species such as toothache grass (*Ctenium aromaticum*), Curtiss' sandgrass (*Calamovilfa curtissii*), cutover muhly (*Muhlenbergia expansa*), coastalplain yellow-eyed grass (*Xyris ambigua*), Carolina redroot (*Lachnanthes caroliana*), and beaksedges (*Rhynchospora chapmanii*, *R. latifolia*, *R. compressa*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| FLUCFCS Legend | Sum of | | Landscape | | Landscape Location Score (=LSI_Value* Landcover Percent) |
|---------------------------------------|---------------|---------------|-------------|-------------|--|
| | Acres | LSI_Value | Percent | Percent | |
| 6410-Freshwater Marshes | 89.98 | 10 | 0.395 | 3.950 | |
| 6310-Wetland Shrub | 42.77 | 10 | 0.188 | 1.878 | |
| 4360-Upland Scrub, Pine and Hardwoods | 20.98 | 10 | 0.092 | 0.921 | |
| 6300-Wetland Forested Mixed | 20.46 | 10 | 0.090 | 0.898 | |
| 6430-Wet Prairie | 15.32 | 10 | 0.067 | 0.672 | |
| 4120-Longleaf Pine - Xeric Oak | 10.34 | 10 | 0.045 | 0.454 | |
| 4340-Hardwood - Coniferous Mixed | 8.81 | 10 | 0.039 | 0.387 | |
| 8300-Utilities | 6.45 | 2.43 | 0.028 | 0.069 | |
| 4110-Pine Flatwoods | 5.58 | 10 | 0.024 | 0.245 | |
| 3290-Other Shrubs and Brush | 3.48 | 10 | 0.015 | 0.153 | |
| 6440-Freshwater Marshes | 1.65 | 10 | 0.007 | 0.072 | |
| Other Communities (<= 0.05%) | 1.97 | 10 | 0.009 | 0.086 | |
| TOTAL | 227.79 | 112.43 | 1.00 | 9.79 | |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.735 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.735 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 0 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are not present

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

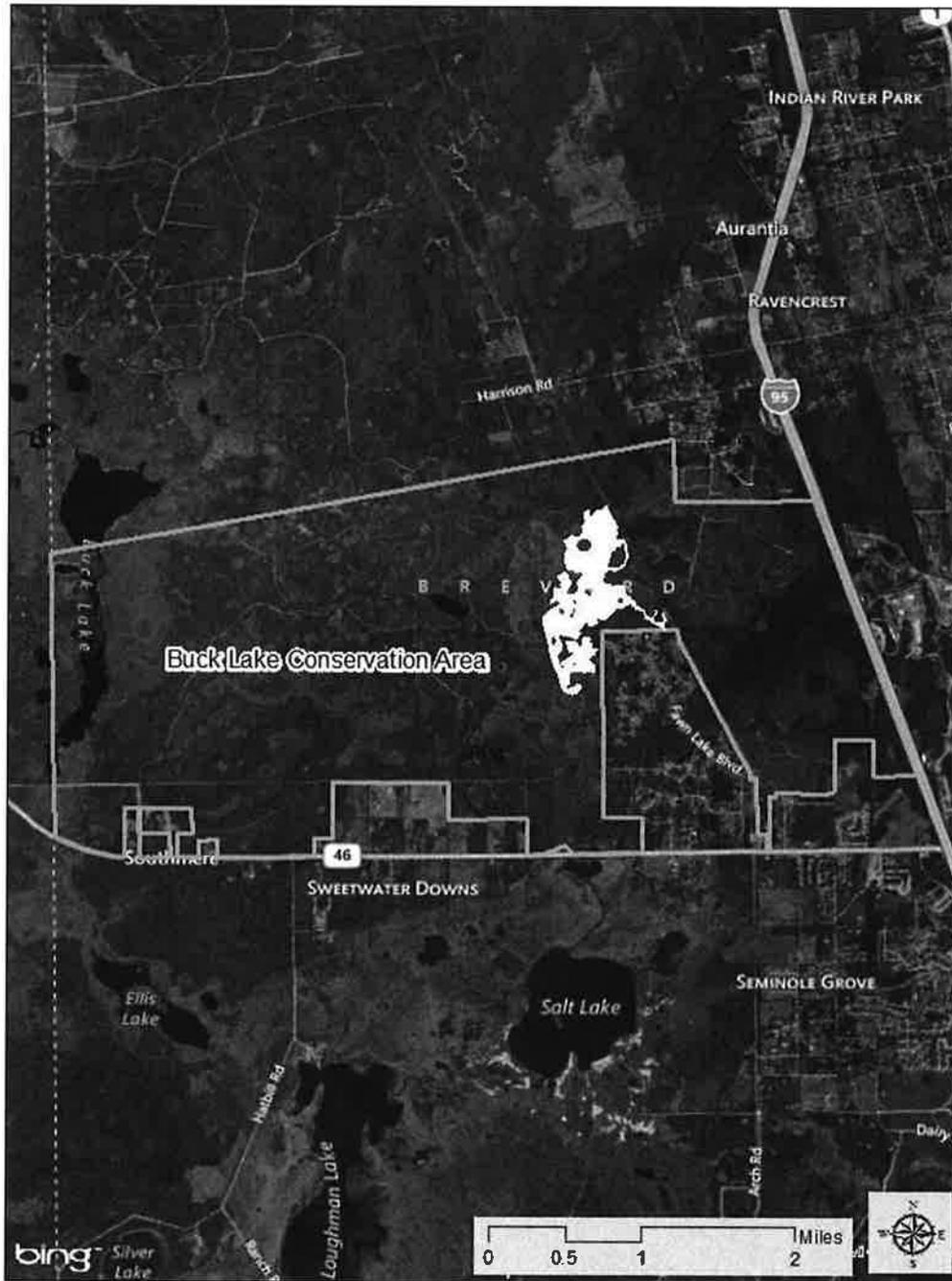
none

ASSESSMENT SCORE

$$(9.79 + 9.735 + 9.5) / 30 = 0.967$$

Hydric Pine Flatwoods Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Hydric Pine Flatwoods
Buck Lake Conservation Area
Brevard County, Florida**

- 6250-Hydric Pine Flatwoods
- Buck Lake Conservation Area

Wetland Forest Mixed Kings Park

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

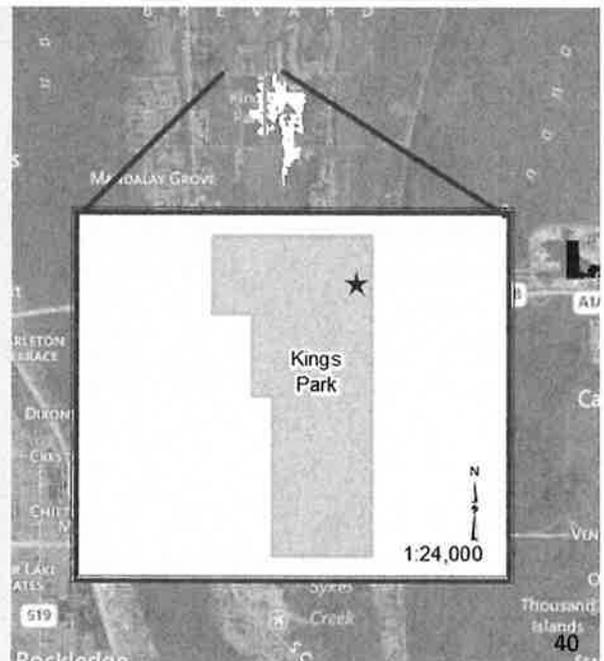
LOCATION

Brevard County

Latitude 28.4407538546 N, Longitude -80.6888681754E

COMMUNITY DESCRIPTION

Wetland Forest Mixed are composed of a large variety of conifer and hardwood species tolerant of hydric conditions yet neither hardwoods or conifers achieve a 66 percent dominance of the crown canopy composition. The evergreen hardwood or palm forest has a variable understory typically dominated by palms and ferns occurring on moist soils. While species composition varies, the community generally has a closed canopy of pines, oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. The canopy is dominated by slash pine (*Pinus elliotii*), laurel oak (*Quercus laurifolia*) and/or live oak (*Q. virginiana*) with varying amounts of



Wetland Forest Mixed Kings Park

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

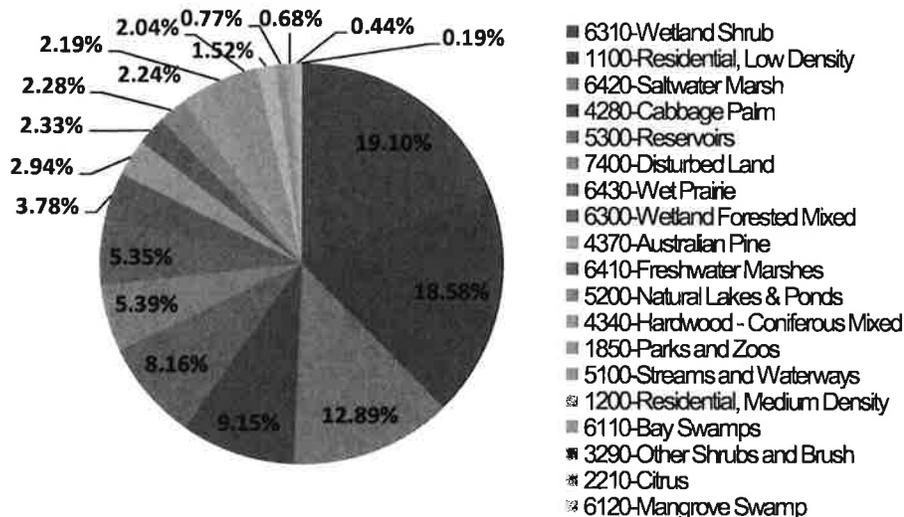
cabbage palm (*Sabal palmetto*), American elm (*Ulmus americana*), southern red cedar (*Juniperus virginiana*) and red maple (*Acer rubrum*). In addition to saplings of canopy species, the understory may contain a number of small trees and shrubs. Various woody species that may be present including small-leaf viburnum (*Viburnum obovatum*), swamp bay (*Persea palustris*), wax myrtle (*Myrica cerifera*) and dwarf palmetto (*Sabal minor*), American beautyberry (*Callicarpa americana*), and needle palm (*Rhaphidophyllum hystrix*). Vines may be frequent and diverse; common species are eastern poison ivy (*Toxicodendron radicans*), peppervine (*Ampelopsis arborea*), greenbriers (*Smilax* spp.), summer grape (*Vitis aestivalis*), and muscadine (*Vitis rotundifolia*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| FLUCFCS_ Legend | Sum of Acres | LSI_Value | Landcover Percent | Landcover Percent | Landscape Location Score (=LSI_Value* Landcover Percent) |
|----------------------------------|---------------|---------------|-------------------|-------------------|--|
| 6310-Wetland Shrub | 54.84 | 10 | 0.191 | 1.910 | |
| 1100-Residential, Low Density | 53.36 | 3.57 | 0.186 | 0.663 | |
| 6420-Saltwater Marsh | 37.02 | 10 | 0.129 | 1.289 | |
| 4280-Cabbage Palm | 26.26 | 10 | 0.091 | 0.915 | |
| 5300-Reservoirs | 23.44 | 10 | 0.082 | 0.816 | |
| 7400-Disturbed Land | 15.48 | 9.08 | 0.054 | 0.489 | |
| 6430-Wet Prairie | 15.37 | 10 | 0.054 | 0.535 | |
| 6300-Wetland Forested Mixed | 10.87 | 10 | 0.038 | 0.378 | |
| 4370-Australian Pine | 8.45 | 8.87 | 0.029 | 0.261 | |
| 6410-Freshwater Marshes | 6.68 | 10 | 0.023 | 0.238 | |
| 5200-Natural Lakes & Ponds | 6.56 | 10 | 0.023 | 0.228 | |
| 4340-Hardwood - Coniferous Mixed | 6.42 | 10 | 0.022 | 0.224 | |
| 1850-Parks and Zoos | 6.29 | 3.42 | 0.022 | 0.075 | |
| 5100-Streams and Waterways | 5.85 | 10 | 0.020 | 0.204 | |
| 1200-Residential, Medium Density | 4.35 | 2.81 | 0.015 | 0.043 | |
| 6110-Bay Swamps | 2.20 | 10 | 0.008 | 0.077 | |
| 3290-Other Shrubs and Brush | 1.95 | 10 | 0.007 | 0.068 | |
| 2210-Citrus | 1.25 | 7.02 | 0.004 | 0.031 | |
| 6120-Mangrove Swamp | 0.54 | 10 | 0.002 | 0.019 | |
| TOTAL | 287.18 | 164.77 | 1.00 | 8.46 | |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 2.85 |
| Hydrologic Indicator Score | 3.3 |
| Water Environment Score | 6.15 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 75 | 9 |
| Exotic Vegetation | 20 | 7 |
| Vegetative Community Score | | 8.0 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics present in less than 20%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(8.46 + 6.15 + 8.0) / 30 = 0.754$$

Wetland Forest Mixed Kings Park

Brevard County Natural Resource Management



**Location Map - Wetland Forest Mixed
Kings Park
Brevard County, Florida**

6300-Wetland Forested Mixed
Kings Park

Wetland Scrub

River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

LOCATION

Brevard County

Latitude 28.2893606192 N, Longitude -80.7788960996 E

COMMUNITY DESCRIPTION

Wetland Scrub is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Wetland Scrub systems are highly variable in size, shape, and species composition. AS a result of the hydrology and fire history, shrubs are common throughout. Common species include coastalplain willow (*Salix caroliniana*), small red maple (*Acer rubrum*), myrtle dahoon (*Ilex cassine* var. *myrtifolia*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*) and common buttonbush (*Cephalanthus occidentalis*). The herbaceous layer is also variable and includes a wide array of species including maidencane



Wetland Scrub

River Lakes Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

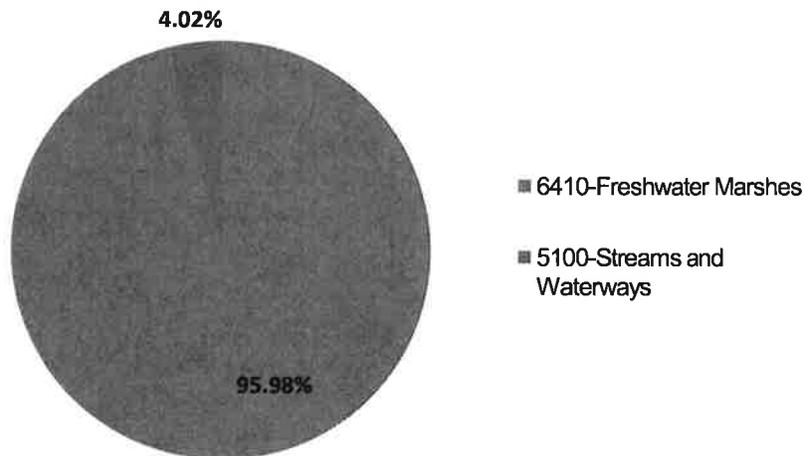
(*Panicum hemitomon*), Virginia chain fern (*Woodwardia virginica*), arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), beaksedges (*Rhynchospora* spp.), bladderworts (*Utricularia* spp.), and royal fern (*Osmunda regalis* var. *spectabilis*). Vines may be present, particularly coral greenbrier (*Smilax walteri*), laurel greenbrier (*Smilax laurifolia*), and eastern poison ivy (*Toxicodendron radicans*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|----------------------------|---------------------|------------------|--------------------------|---|
| 6410-Freshwater Marshes | 102.12 | 10 | 0.960 | 9.598 |
| 5100-Streams and Waterways | 4.28 | 10 | 0.040 | 0.402 |
| TOTAL | 106.40 | 20.00 | 1.00 | 10.00 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.98 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.98 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 70 | 9 |
| Exotic Vegetation | 30 | 4 |
| Vegetative Community Score | | 6.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 30%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

Primrose Willow (Ludwigia peruviana)

ASSESSMENT SCORE

$$(10 + 9.98 + 6.5) / 30 = 0.883$$

Wetland Scrub River Lakes Conservation Area



**Location Map - Wetland Scrub
River Lakes Conservation Area
Brevard County, Florida**

- 6310-Wetland Shrub
- River Lakes Conservation Area

Wetland Scrub

Three Forks Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

LOCATION

Brevard County

Latitude 27.8404694875 N, Longitude -80.7860135026E

COMMUNITY DESCRIPTION

Wetland Scrub is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Wetland Scrub systems are highly variable in size, shape, and species composition. AS a result of the hydrology and fire history, shrubs are common throughout. Common species include coastalplain willow (*Salix caroliniana*), small red maple (*Acer rubrum*), myrtle dahoon (*Ilex cassine* var. *myrtifolia*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*) and common buttonbush (*Cephalanthus occidentalis*). The herbaceous layer is also variable and includes a wide array of species including maidencane



Wetland Scrub

Three Forks Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

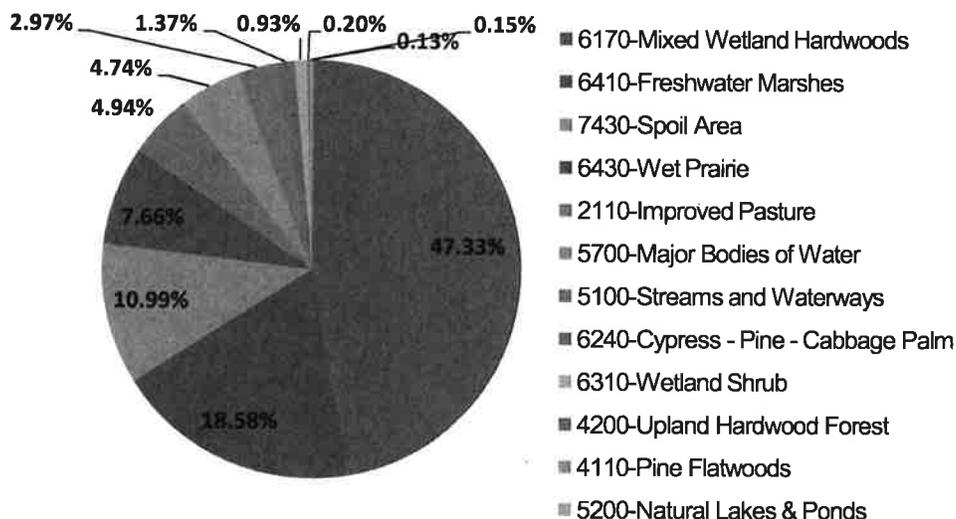
(*Panicum hemitomon*), Virginia chain fern (*Woodwardia virginica*), arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), beaksedges (*Rhynchospora* spp.), bladderworts (*Utricularia* spp.), and royal fern (*Osmunda regalis* var. *spectabilis*). Vines may be present, particularly coral greenbrier (*Smilax walteri*), laurel greenbrier (*Smilax laurifolia*), and eastern poison ivy (*Toxicodendron radicans*).

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
- Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value* Landcover Percent) |
|------------------------------------|---------------|---------------|-------------------|--|
| 6170-Mixed Wetland Hardwoods | 415.62 | 10 | 0.473 | 4.733 |
| 6410-Freshwater Marshes | 163.17 | 10 | 0.186 | 1.858 |
| 7430-Spoil Area | 96.54 | 9.08 | 0.110 | 0.998 |
| 6430-Wet Prairie | 67.23 | 10 | 0.077 | 0.766 |
| 2110-Improved Pasture | 43.35 | 6.96 | 0.049 | 0.344 |
| 5700-Major Bodies of Water | 41.66 | 10 | 0.047 | 0.474 |
| 5100-Streams and Waterways | 26.06 | 10 | 0.030 | 0.297 |
| 6240-Cypress - Pine - Cabbage Palm | 12.07 | 10 | 0.014 | 0.137 |
| 6310-Wetland Shrub | 8.14 | 10 | 0.009 | 0.093 |
| 4200-Upland Hardwood Forest | 1.75 | 10 | 0.002 | 0.020 |
| 4110-Pine Flatwoods | 1.33 | 10 | 0.002 | 0.015 |
| 5200-Natural Lakes & Ponds | 1.14 | 10 | 0.001 | 0.013 |
| TOTAL | 878.06 | 116.04 | 1.00 | 9.75 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 3.99 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 8.99 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 70 | 9 |
| Exotic Vegetation | 30 | 4 |
| Vegetative Community Score | | 6.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 30%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

Primrose Willow (Ludwigia peruviana)

ASSESSMENT SCORE

$$(9.75 + 8.99 + 6.5) / 30 = 0.841$$

Wetland Scrub

Three Forks Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Wetland Scrub
Three Forks Conservation Area
Brevard County, Florida**

- 6310-Wetland Shrub
- Three Forks Conservation Area

Freshwater Marsh Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

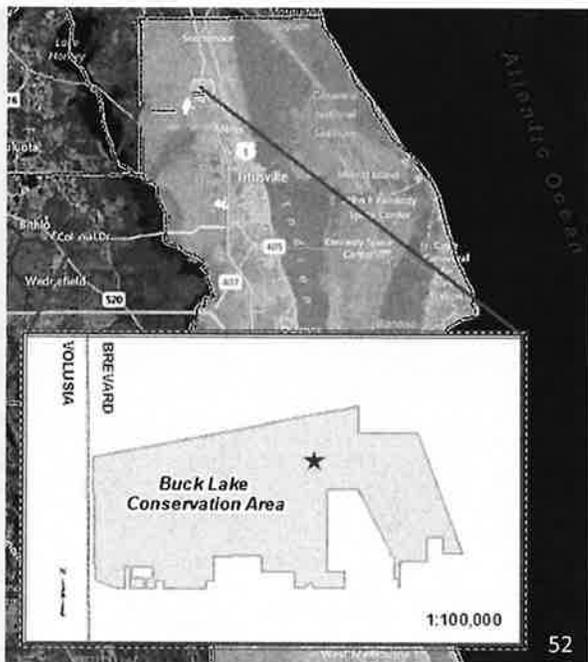
LOCATION

Brevard County

Latitude 28.6910319585 N, Longitude -80.9086244882E

COMMUNITY DESCRIPTION

Freshwater marshes are regularly inundated herbaceous wetlands that may occur in a variety of situations and may be within a fire-maintained matrix community. Species composition is heterogeneous both within and between marshes but can generally be divided into submersed, floating-leaved, emergent, and grassy zones from deepest to shallowest portions; shrub patches may be present within any of these zones. The emergent zone may have pickerelweed (*Pontederia cordata*), bulltongue arrowhead (*Sagittaria lancifolia*), southern cattail (*Typha domingensis*), sawgrass (*Cladium jamaicense*), and softstem bulrush (*Scirpus tabernaemontani*); the grassy zone is typically



Freshwater Marsh

Buck Lake Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

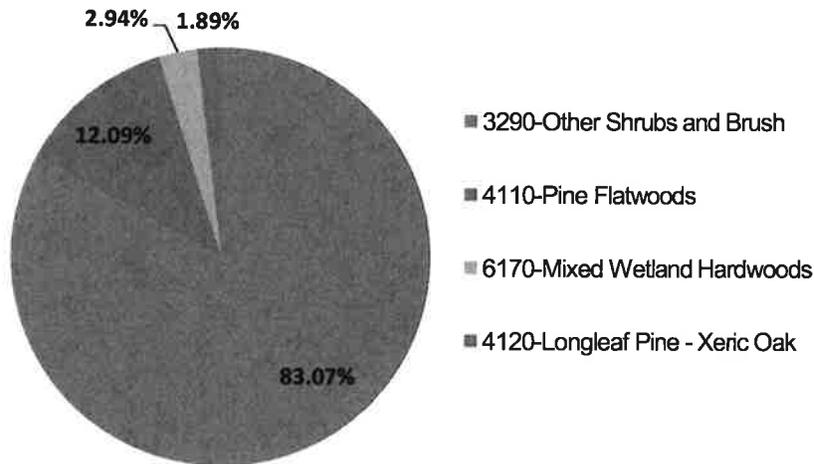
characterized by maidencane (*Panicum hemitomon*), smooth beggarticks (*Bidens laevis*), dotted smartweed (*Polygonum punctatum*), and sand cordgrass (*Spartina bakeri*), accompanied by a diverse mixture forbs such as sweetscent (*Pluchea odorata*), spadeleaf (*Centella asiatica*), and lemon bacopa (*Bacopa caroliniana*). Coastalplain willow (*Salix caroliniana*), common buttonbush (*Cephalanthus occidentalis*), elderberry (*Sambucus nigra* ssp. *canadensis*), and wax myrtle (*Myrica cerifera*) are common shrubby components. Not publically accessible.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
 Landscape Scale Index (LSI)

| <i>FLUCFCS_ legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|--------------------------------|---------------------|------------------|--------------------------|---|
| 3290-Other Shrubs and Brush | 20.318 | 10 | 0.831 | 8.307 |
| 4110-Pine Flatwoods | 2.958 | 10 | 0.121 | 1.209 |
| 6170-Mixed Wetland Hardwoods | 0.719 | 10 | 0.029 | 0.294 |
| 4120-Longleaf Pine - Xeric Oak | 0.463 | 10 | 0.019 | 0.189 |
| TOTAL | 24.46 | 40.00 | 1.00 | 10.00 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 100 | 12 |
| Exotic Vegetation | 0 | 8 |
| Vegetative Community Score | | 10 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are not present

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

None

ASSESSMENT SCORE

$$(10 + 10 + 10) / 30 = 1.000$$

Brevard County Natural Resource Management

Freshwater Marsh Buck Lake Conservation Area



**Location Map - Freshwater Marsh
Buck Lake Conservation Area
Brevard County, Florida**

- 6410-Freshwater Marshes
- Buck Lake Conservation Area

Freshwater Marsh

St. Sebastian River Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

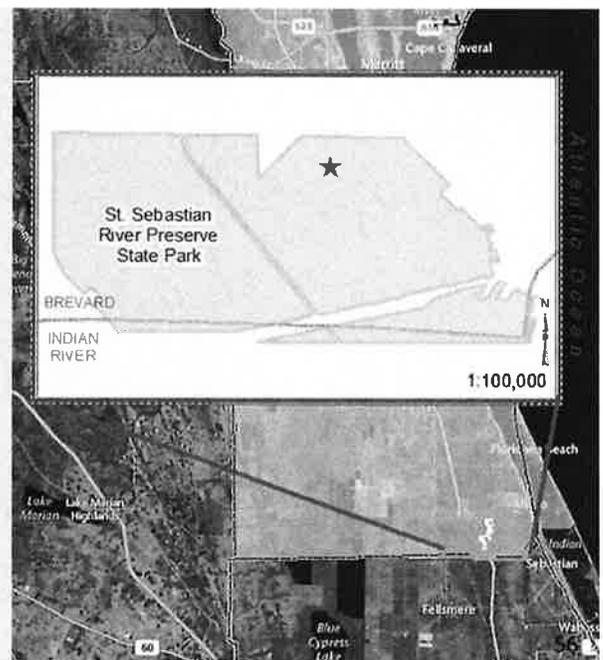
LOCATION

Brevard County

Latitude 27.8513090723 N, Longitude -80.558021893 E

COMMUNITY DESCRIPTION

Freshwater marshes are regularly inundated herbaceous wetlands that may occur in a variety of situations and may be within a fire-maintained matrix community. Species composition is heterogeneous both within and between marshes but can generally be divided into submersed, floating-leaved, emergent, and grassy zones from deepest to shallowest portions; shrub patches may be present within any of these zones. The emergent zone may have pickerelweed (*Pontederia cordata*), bulltongue arrowhead (*Sagittaria lancifolia*), southern cattail (*Typha domingensis*), sawgrass (*Cladium jamaicense*), and softstem bulrush (*Scirpus tabernaemontani*); the grassy zone is typically



Freshwater Marsh

St. Sebastian River Preserve State Park

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

characterized by maidencane (*Panicum hemitomon*), smooth beggarticks (*Bidens laevis*), dotted smartweed (*Polygonum punctatum*), and sand cordgrass (*Spartina bakeri*), accompanied by a diverse mixture forbs such as sweetscent (*Pluchea odorata*), spadeleaf (*Centella asiatica*), and lemon bacopa (*Bacopa caroliniana*). Coastalplain willow (*Salix caroliniana*), common buttonbush (*Cephalanthus occidentalis*), elderberry (*Sambucus nigra ssp. canadensis*), and wax myrtle (*Myrica cerifera*) are common shrubby components.

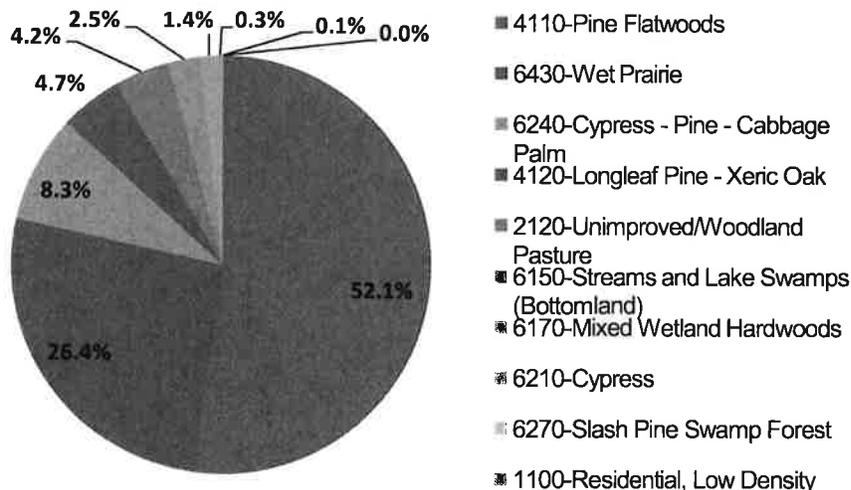
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|---|---------------------|------------------|--------------------------|---|
| 4110-Pine Flatwoods | 199.28 | 10 | 0.521 | 5.213 |
| 6430-Wet Prairie | 100.91 | 10 | 0.264 | 2.639 |
| 6240-Cypress - Pine - Cabbage Palm | 31.83 | 10 | 0.083 | 0.832 |
| 4120-Longleaf Pine - Xeric Oak | 18.11 | 10 | 0.047 | 0.474 |
| 2120-Unimproved/Woodland Pasture | 15.96 | 8.03 | 0.042 | 0.335 |
| 6150-Streams and Lake Swamps (Bottomland) | 9.50 | 10 | 0.025 | 0.248 |
| 6170-Mixed Wetland Hardwoods | 5.25 | 10 | 0.014 | 0.137 |
| 6210-Cypress | 1.06 | 10 | 0.003 | 0.028 |
| 6270-Slash Pine Swamp Forest | 0.41 | 10 | 0.001 | 0.011 |
| 1100-Residential, Low Density | 0.03 | 3.57 | 0.000 | 0.000 |
| TOTAL | 382.31 | 91.60 | 1.00 | 9.92 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.75 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.75 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 5 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics present in less than 5%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(9.917 + 9.75 + 8.5) / 30 = 0.972$$

Freshwater Marsh

St. Sebastian River Preserve State Park

Brevard County Natural Resource Management



Location Map - Freshwater Marsh
St. Sebastian River Preserve State Park
Brevard County, Florida

- 6410-Freshwater Marshes
- St. Sebastian River Preserve State Park

Saltwater Marsh

Merritt Island National Wildlife Refuge

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

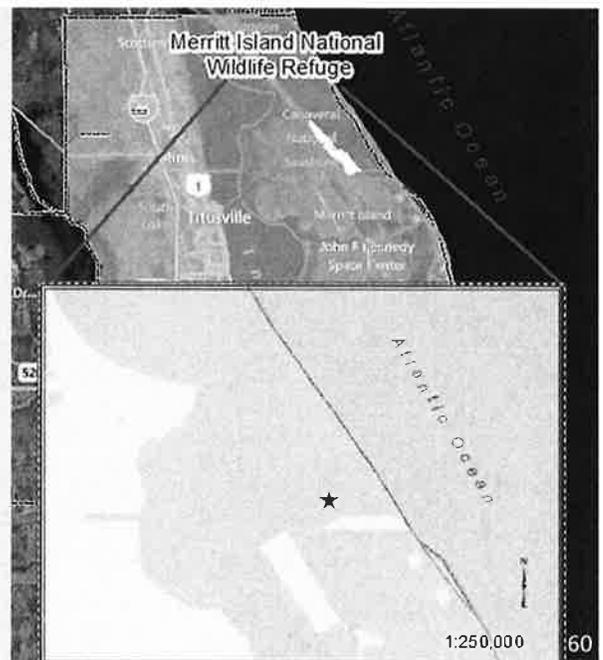
LOCATION

Brevard County

Latitude 28.4542175366 N, Longitude -80.6691745545E

COMMUNITY DESCRIPTION

Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The width of the intertidal zone depends on the slope of the shore and the tidal range. Salt marsh may have distinct zones of vegetation, each dominated by a single species of grass or rush. Saltmarsh cordgrass (*Spartina alterniflora*) dominates the seaward edge and borders of tidal creeks, areas most frequently inundated by the tides.



Saltwater Marsh

Merritt Island National Wildlife Refuge

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

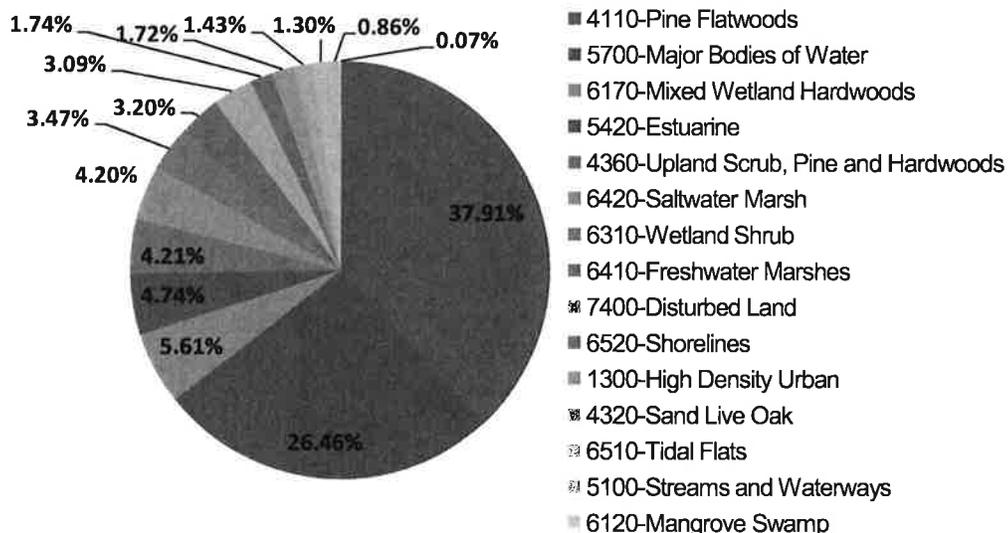
Needle rush (*Juncus roemerianus*) dominates higher, less frequently flooded areas. Other characteristic species include Carolina sea lavender (*Limonium carolinianum*), perennial saltmarsh aster (*Symphyotrichum tenuifolium*), wand loosestrife (*Lythrum lineare*), marsh fimbry (*Fimbristylis spadicea*), and shoreline seapurslane (*Sesuvium portulacastrum*). The landward edge of the marsh is influenced by freshwater influx from the uplands and may be colonized by a mixture of high marsh and inland species, including needle rush, sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), Gulf cordgrass (*Spartina spartinae*), and sand cordgrass (*Spartina bakeri*), among others.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value * Landcover Percent) |
|---------------------------------------|---------------|---------------|-------------------|---|
| 4110-Pine Flatwoods | 290.88 | 10 | 0.379 | 3.791 |
| 5700-Major Bodies of Water | 203.01 | 10 | 0.265 | 2.646 |
| 6170-Mixed Wetland Hardwoods | 43.03 | 10 | 0.056 | 0.561 |
| 5420-Estuarine | 36.36 | 10 | 0.047 | 0.474 |
| 4360-Upland Scrub, Pine and Hardwoods | 32.26 | 10 | 0.042 | 0.421 |
| 6420-Saltwater Marsh | 32.22 | 10 | 0.042 | 0.420 |
| 6310-Wetland Shrub | 26.64 | 10 | 0.035 | 0.347 |
| 6410-Freshwater Marshes | 24.56 | 10 | 0.032 | 0.320 |
| 7400-Disturbed Land | 23.67 | 9.08 | 0.031 | 0.280 |
| 6520-Shorelines | 13.33 | 10 | 0.017 | 0.174 |
| 1300-High Density Urban | 13.22 | 0.91 | 0.017 | 0.016 |
| 4320-Sand Live Oak | 10.95 | 10 | 0.014 | 0.143 |
| 6510-Tidal Flats | 9.97 | 10 | 0.013 | 0.130 |
| 5100-Streams and Waterways | 6.62 | 10 | 0.009 | 0.086 |
| 6120-Mangrove Swamp | 0.51 | 10 | 0.001 | 0.007 |
| TOTAL | 767.24 | 139.99 | 1.00 | 9.81 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.9 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.9 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 5 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 5%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(9.81 + 9.9 + 9.5) / 30 = 0.974$$

Saltwater Marsh

Merritt Island National Wildlife Refuge

Brevard County Natural Resource Management



**Location Map - Saltwater Marshes
Merritt Island National Wildlife Refuge
Brevard County, Florida**

- 6420-Saltwater Marsh
- Merritt Island National Wildlife Refuge

Saltwater Marsh Ulumay Wildlife Sanctuary

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

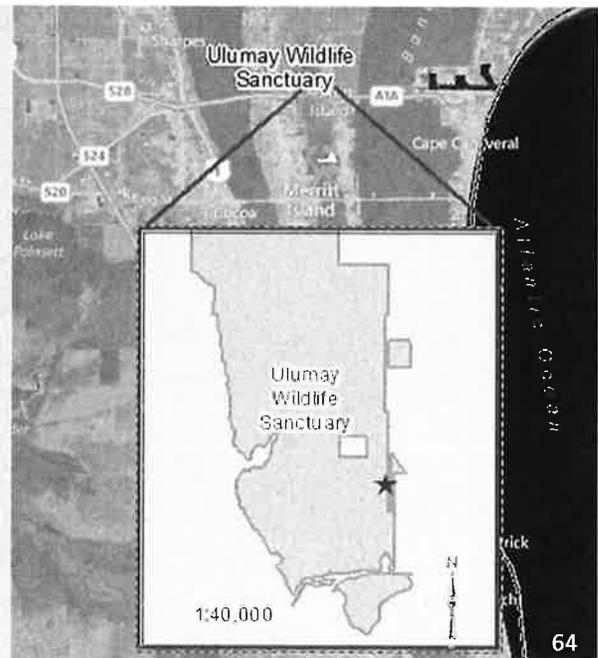
LOCATION

Brevard County

Latitude 28.3764001554 N, Longitude -80.6772860265 E

COMMUNITY DESCRIPTION

Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The width of the intertidal zone depends on the slope of the shore and the tidal range. Salt marsh may have distinct zones of vegetation, each dominated by a single species of grass or rush. Saltmarsh cordgrass (*Spartina alterniflora*) dominates the seaward edge and borders of tidal creeks, areas most frequently inundated by the tides.



Saltwater Marsh Ulumay Wildlife Sanctuary

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

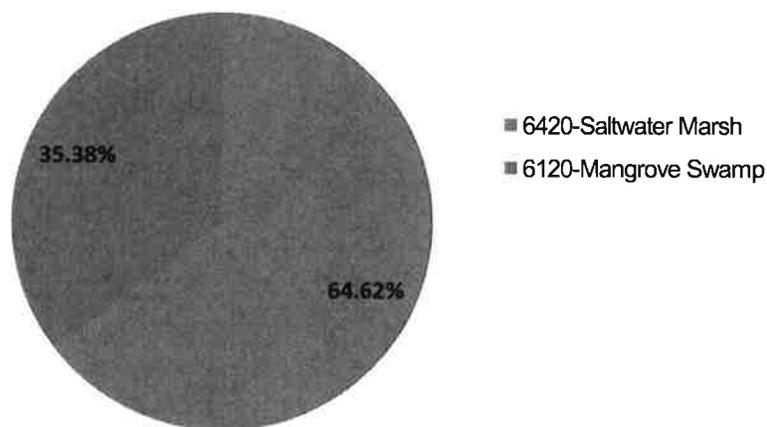
Needle rush (*Juncus roemerianus*) dominates higher, less frequently flooded areas. Other characteristic species include Carolina sea lavender (*Limonium carolinianum*), perennial saltmarsh aster (*Symphyotrichum tenuifolium*), wand loosestrife (*Lythrum lineare*), marsh fimbry (*Fimbristylis spadicea*), and shoreline seapurslane (*Sesuvium portulacastrum*). The landward edge of the marsh is influenced by freshwater influx from the uplands and may be colonized by a mixture of high marsh and inland species, including needle rush, sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), Gulf cordgrass (*Spartina spartinae*), and sand cordgrass (*Spartina bakeri*), among others.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|-----------------------|---------------------|------------------|--------------------------|---|
| 6420-Saltwater Marsh | 45.48 | 10 | 0.646 | 6.462 |
| 6120-Mangrove Swamp | 24.91 | 10 | 0.354 | 3.538 |
| TOTAL | 70.39 | 20.00 | 1.00 | 10.00 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 85 | 10 |
| Exotic Vegetation | 15 | 7 |
| Vegetative Community Score | | 8.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 15%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$(10 + 10 + 8.5) / 30 = 0.950$$

Saltwater Marsh Ulumay Wildlife Sanctuary

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Saltwater Marshes
Ulumay Wildlife Sanctuary
Brevard County, Florida**

- 6420-Saltwater Marsh
- Ulumay Wildlife Sanctuary

Saltwater Marsh

Thousand Island Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

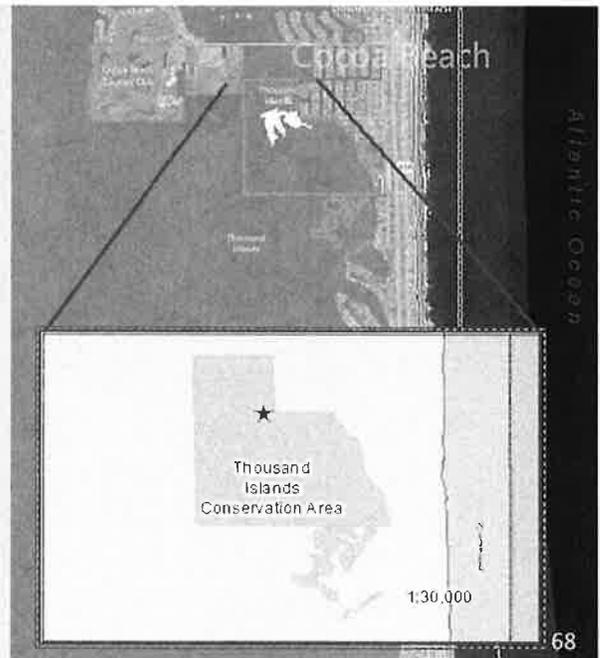
LOCATION

Brevard County

Latitude 28.3108118851 N, Longitude -80.6888681754E

COMMUNITY DESCRIPTION

Saltwater marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The width of the intertidal zone depends on the slope of the shore and the tidal range. Salt marsh may have distinct zones of vegetation, each dominated by a single species of grass or rush. Saltmarsh cordgrass (*Spartina alterniflora*) dominates the seaward edge and borders of tidal creeks, areas most frequently inundated by the tides.



Saltwater Marsh

Thousand Island Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community

COMMUNITY DESCRIPTION (cont)

Needle rush (*Juncus roemerianus*) dominates higher, less frequently flooded areas. Other characteristic species include Carolina sea lavender (*Limonium carolinianum*), perennial saltmarsh aster (*Symphyotrichum tenuifolium*), wand loosestrife (*Lythrum lineare*), marsh fimbry (*Fimbristylis spaldicea*), and shoreline seapurslane (*Sesuvium portulacastrum*). The landward edge of the marsh is influenced by freshwater influx from the uplands and may be colonized by a mixture of high marsh and inland species, including needle rush, sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), Gulf cordgrass (*Spartina spartinae*), and sand cordgrass (*Spartina bakeri*), among others.

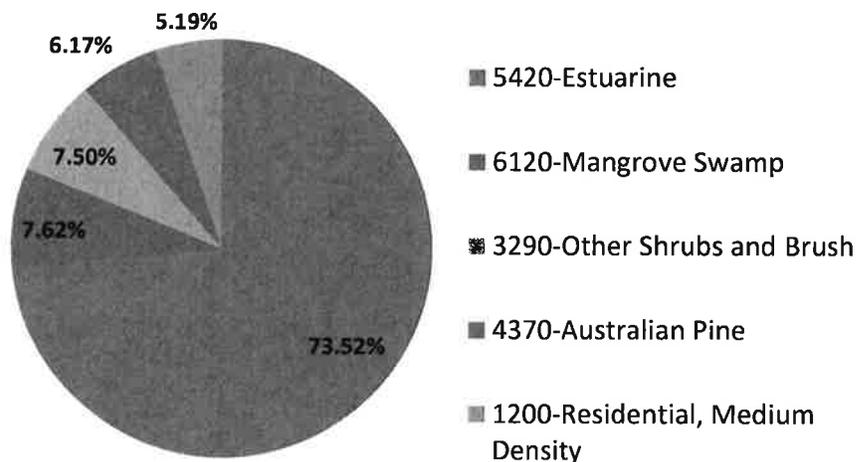
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| <i>FLUCFCS_legend</i> | <i>Sum of Acres</i> | <i>LSI_Value</i> | <i>Landcover Percent</i> | <i>Landscape Location Score (=LSI_Value* Landcover Percent)</i> |
|----------------------------------|---------------------|------------------|--------------------------|---|
| 5420-Estuarine | 38.26 | 10 | 0.735 | 7.352 |
| 6120-Mangrove Swamp | 3.97 | 10 | 0.076 | 0.762 |
| 3290-Other Shrubs and Brush | 3.90 | 10 | 0.075 | 0.750 |
| 4370-Australian Pine | 3.21 | 8.87 | 0.062 | 0.547 |
| 1200-Residential, Medium Density | 2.70 | 2.81 | 0.052 | 0.146 |
| TOTAL | 52.05 | 41.68 | 1.00 | 9.56 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.92 |
| Hydrologic Indicator Score | 3.3 |
| Water Environment Score | 8.22 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 95 | 11 |
| Exotic Vegetation | 5 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 5%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$\begin{aligned}
 & \text{(Landscape Location + Water Environment + Vegetative Community)} / 30 = \\
 & \quad (9.56 \quad + \quad 8.22 \quad + \quad 9.5) \quad / \quad 30 = 0.909
 \end{aligned}$$

Saltwater Marsh

Thousand Island Conservation Area

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Saltwater Marsh
Thousand Island Conservation Area
Brevard County, Florida**

6420-Saltwater Marsh
□ Thousand Islands Conservation Area

Wet Prairie

Merritt Island National Wildlife Refuge

Brevard County Natural Resource Management
Reference Wetland Community



OVERVIEW

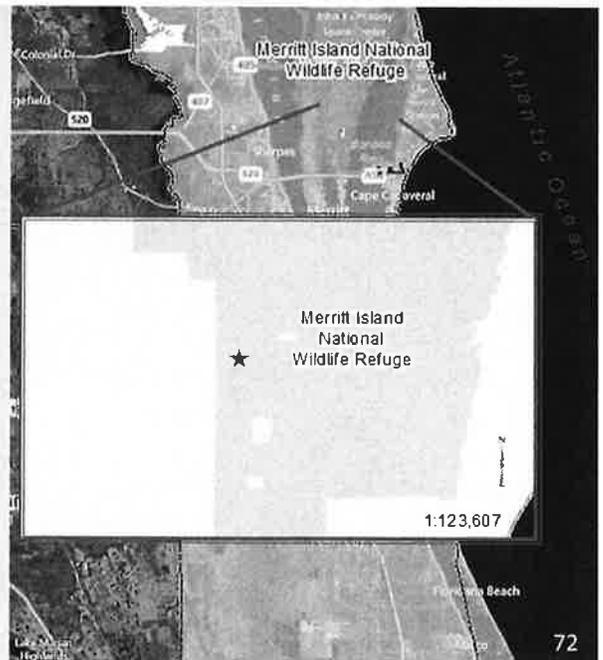
LOCATION

Brevard County

Latitude 28.4542175366 N, Longitude -80.6691745545 E

COMMUNITY DESCRIPTION

Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and slightly higher wet or mesic flatwoods, or dry prairie. It is typically dominated by dense wiregrass (*Aristida stricta* var. *beyrichiana*) in the drier portions, along with foxtail club-moss (*Lycopodiella alopecuroides*), cutover muhly (*Muhlenbergia expansa*), yellow butterwort (*Pinguicula lutea*), and savannah meadowbeauty (*Rhexia alifanus*). In the wetter portions, wiregrass may occur with, or be replaced by, species in the sedge family, such as plumed



COMMUNITY DESCRIPTION (cont)

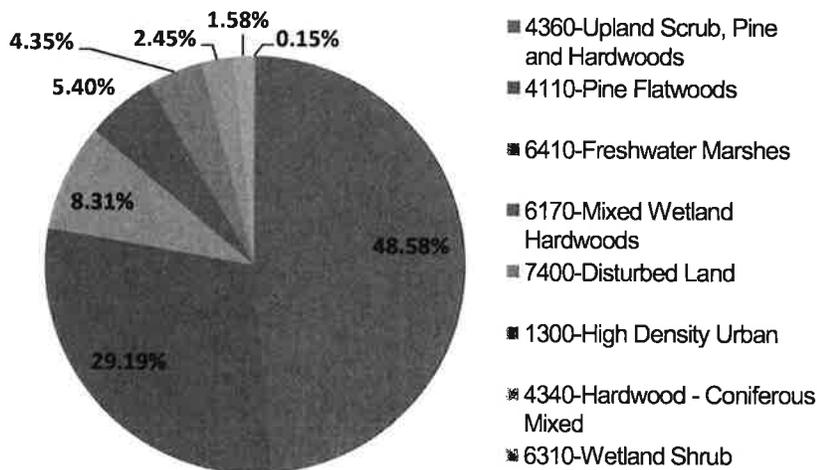
beaksedge (*Rhynchospora plumosa*), featherbristle beaksedge (*R. oligantha*), Baldwin's nutrush (*Scleria baldwinii*), or slenderfruit nutrush (*S. georgiana*), plus longleaved threeawn (*Aristida palustris*). Also common in wetter areas are carnivorous species, such as pitcher plants (*Sarracenia* spp.), sundews (*Drosera* spp.), butterworts (*Pinguicula* spp), and bladderworts (*Utricularia* spp.). Other characteristic species in this community include toothache grass (*Ctenium aromaticum*), pineland rayless goldenrod (*Bigelovia nudata*), flattened pipewort (*Eriocaulon compressum*), water cowbane (*Oxypolis filifolia*), and coastalplain yellow-eyed grass (*Xyris ambigua*). Not publically accessible.

FUNCTIONAL WETLAND ASSESSMENT

- Landscape Location Score
Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of | | Landscape Location Score (=LSI_Value* Landcover Percent) | |
|---------------------------------------|--------------|--------------|--|-------------------|
| | Acres | LSI_Value | Landcover Percent | Landcover Percent |
| 4360-Upland Scrub, Pine and Hardwoods | 30.48 | 10 | 0.486 | 4.858 |
| 4110-Pine Flatwoods | 18.31 | 10 | 0.292 | 2.919 |
| 6410-Freshwater Marshes | 5.21 | 10 | 0.083 | 0.831 |
| 6170-Mixed Wetland Hardwoods | 3.39 | 10 | 0.054 | 0.540 |
| 7400-Disturbed Land | 2.73 | 9.08 | 0.043 | 0.395 |
| 1300-High Density Urban | 1.53 | 0.91 | 0.024 | 0.022 |
| 4340-Hardwood - Coniferous Mixed | 0.99 | 10 | 0.016 | 0.158 |
| 6310-Wetland Shrub | 0.10 | 10 | 0.002 | 0.015 |
| TOTAL | 62.74 | 69.99 | 1.00 | 9.74 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| <i>Water Environment</i> | <i>Score¹</i> |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 5 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 10 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| <i>Vegetative Community</i> | <i>Percentage</i> | <i>Score²</i> |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 98 | 11 |
| Exotic Vegetation | 0 | 8 |
| Vegetative Community Score | | 9.5 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are not present

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

none

ASSESSMENT SCORE

$$(9.74 + 10 + 9.5) / 30 = 0.975$$

Wet Prairie

Merritt Island National Wildlife Refuge

Brevard County Natural Resource Management
Reference Wetland Community



**Location Map - Wet Prairies
Merritt Island National Wildlife Refuge
Brevard County, Florida**

- 6430-Wet Prairie
- Merritt Island National Wildlife Refuge



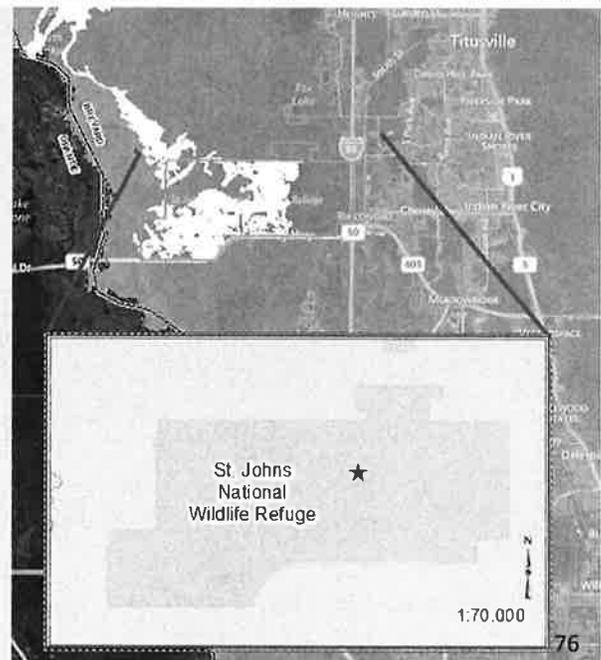
OVERVIEW

LOCATION

Brevard County
Latitude 28.5582465392 N, Longitude -80.8944214826E

COMMUNITY DESCRIPTION

Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and slightly higher wet or mesic flatwoods, or dry prairie. It is typically dominated by dense wiregrass (*Aristida stricta* var. *beyrichiana*) in the drier portions, along with foxtail club-moss (*Lycopodiella alopecuroides*), cutover muhly (*Muhlenbergia expansa*), yellow butterwort (*Pinguicula lutea*), and savannah meadowbeauty (*Rhexia alifanus*). In the wetter portions, wiregrass may occur with, or be replaced by, species in the sedge family, such as plumed



COMMUNITY DESCRIPTION (cont)

beaksedge (*Rhynchospora plumosa*), featherbristle beaksedge (*R. oligantha*), Baldwin's nutrush (*Scleria baldwinii*), or slenderfruit nutrush (*S. georgiana*), plus longleaved threeawn (*Aristida palustris*). Also common in wetter areas are carnivorous species, such as pitcher plants (*Sarracenia* spp.), sundews (*Drosera* spp.), butterworts (*Pinguicula* spp), and bladderworts (*Utricularia* spp.). Other characteristic species in this community include toothache grass (*Ctenium aromaticum*), pineland rayless goldenrod (*Bigelovia nudata*), flattened pipewort (*Eriocaulon compressum*), water cowbane (*Oxypolis filifolia*), and coastalplain yellow-eyed grass (*Xyris ambigua*). Not publically accessible.

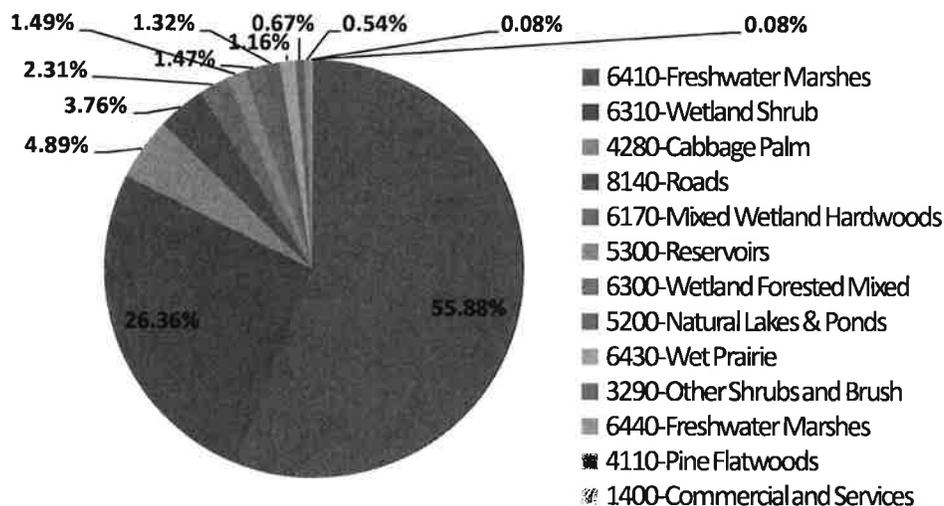
FUNCTIONAL WETLAND ASSESSMENT

➤ Landscape Location Score

Landscape Scale Index (LSI)

| FLUCFCS_legend | Sum of Acres | LSI_Value | Landcover Percent | Landscape Location Score (=LSI_Value* Landcover Percent) |
|------------------------------|----------------|---------------|-------------------|--|
| 6410-Freshwater Marshes | 597.91 | 10 | 0.559 | 5.588 |
| 6310-Wetland Shrub | 282.06 | 10 | 0.264 | 2.636 |
| 4280-Cabbage Palm | 52.34 | 10 | 0.049 | 0.489 |
| 8140-Roads | 40.19 | 1.91 | 0.038 | 0.072 |
| 6170-Mixed Wetland Hardwoods | 24.67 | 10 | 0.023 | 0.231 |
| 5300-Reservoirs | 15.98 | 10 | 0.015 | 0.149 |
| 6300-Wetland Forested Mixed | 15.77 | 10 | 0.015 | 0.147 |
| 5200-Natural Lakes & Ponds | 14.08 | 10 | 0.013 | 0.132 |
| 6430-Wet Prairie | 12.38 | 10 | 0.012 | 0.116 |
| 3290-Other Shrubs and Brush | 7.15 | 10 | 0.007 | 0.067 |
| 6440-Freshwater Marshes | 5.77 | 10 | 0.005 | 0.054 |
| 4110-Pine Flatwoods | 0.85 | 10 | 0.001 | 0.008 |
| 1400-Commercial and Services | 0.85 | 0.91 | 0.001 | 0.001 |
| TOTAL | 1070.00 | 112.82 | 1.00 | 9.69 |

Landcover Percent within 100 m buffer



FUNCTIONAL WETLAND ASSESSMENT (cont)

➤ Water Environment

| Water Environment | Score¹ |
|--------------------------------|--------------------------|
| Water Quality Treatment Score | 4.63 |
| Hydrologic Indicator Score | 5 |
| Water Environment Score | 9.63 |

¹ The Water Environment Score is a sum of the Water Quality Treatment and the Hydrologic Indicator Score.

➤ Vegetative Community

| Vegetative Community | Percentage | Score² |
|-----------------------------------|-------------------|--------------------------|
| Wetland Vegetation | 75 | 9 |
| Exotic Vegetation | 25 | 5 |
| Vegetative Community Score | | 7.0 |

² The Vegetative Community Score is calculated as the average of the wetland vegetation and the exotic vegetation score unless; 1) the wetland vegetation is < 30% or 2) the percent of exotic vegetation is greater than the percent of wetland vegetation. If either of these two conditions exist the Vegetative Community Score equals zero (0).

Invasive exotics are present in less than 25%

Florida Exotic Pest Plant Council (FLEPPC) Category I Species

Brazilian pepper (Schinus terebinthifolius)

ASSESSMENT SCORE

$$\begin{aligned}
 & (\text{Landscape Location} + \text{Water Environment} + \text{Vegetative Community}) / 30 = \\
 & \quad (9.69 \quad + \quad 9.63 \quad + \quad 7.0) \quad / \quad 30 = 0.877
 \end{aligned}$$

Wet Prairie

St. Johns National Wildlife Refuge

Brevard County Natural Resource Management
Reference Wetland Community



Location Map - Wet Prairie
St. John's National Wildlife Refuge
Brevard County, Florida

6430-Wet Prairie

 St. Johns National Wildlife Refuge

ATTACHMENT II.A-4

Brevard County – Wetland Study

Landscape-Level Polygon Development (12/27/13):

Landscape-Level Wetlands are defined as wetlands that are **EITHER** 1) five (5) acres or larger; **OR** 2) located within the Landscape-Level polygon **AND** the Army Corps of Engineers (ACOE) determines the wetland is hydrologically connected to the St. Johns River or Indian River Lagoon System.

The polygon developed to be used to identify the potential presence of land-scape level wetlands was created by assimilating information from several data sources. The initial map utilized was the current FEMA map. Zones A, AE, AO, FW, and VE were utilized to identify wetlands that interact with adjacent wetlands that are connected to floodplains of the St. Johns River and the Indian River Lagoon.

Additional data was utilized to further refine the flood plains. Modeled water elevations were used for the St. Johns River. New draft FEMA maps were assessed and an additional data set from Brevard County was included that identifies depressional areas that undergo flooding problems in large-scale rain events.

The inclusion of these data sources results in a polygon that likely approximates the locations of land-scape level wetland systems that are influenced by large-scale flooding events within the county.

The table below indicates where the additional data sources modified (Data_Modifier shape file) the FEMA flood zones that were utilized as the initial map.

| Township, Range | Rationale | Activity |
|-----------------|-------------------------------------|--|
| 20 S, 35 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 21 S, 36 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 23 S, 35 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 23 S, 36 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 23 S, 37 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 24 S, 36 | Brevard Depressional, FEMA revision | Merger Brevard layer, review FEMA |
| 25 S, 36 | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| 25 S, 36 | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| 29 S, 36 | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| 29 S, 37 | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| 30 S, 37 | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| Delespine | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |
| Delespine | SJRWMD data, elevation data | Incorporate flood elevation into FEMA poly |

The activities utilized to incorporate additional data, included revising line work to incorporate areas where additional data was available and merging polygons that were not included in the initial FEMA maps. The wetland community map (CLCV polygon) was also used to include wetland systems that are connected to the floodplain polygon. These contiguous systems were included in the developed floodplain polygon. It is anticipated that the resulting polygon reflects the areas that the SJR floodplain and increased precipitation have an effect on the wetland systems that are contained within them. The

resulting land-scape level polygon approximates a five to ten year floodplain for the St. Johns River system.

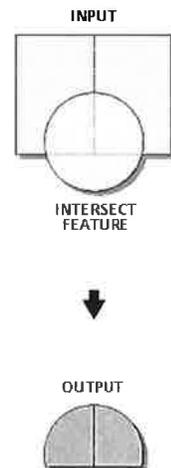
GIS Procedure:

Spatial data layer of Cooperative Land Cover (CLCV) was clipped with Brevard County Boundary layer.

- The *CLCV_Brevard* layer was reselected based on field *LC_name* = wetland land cover types producing *CLC_wetlands* layer.
- A wetland field was added to *CLC_wetlands* layer and was calculated equal to 100.
- Overlapping boundaries of wetlands were dissolved (dissolve item = wetlands).
- A spatial intersection was performed with FEMA flood zones A, AE, AO, FW and VE where the input feature was *CLC_wetlands* and the intersect feature was FEMA_Floodzones with zones A, AE, AO, FW, and VE selected.
- The resulting polygon was then edited to move the polygon edge to correspond with St. Johns River floodplain water elevations and the available LIDAR land elevation data.
- A layer of the Federally managed lands and an additional layer of the municipalities are overlaid on the Land-scape level polygon to identify areas that are not under the jurisdiction of the County.

Intersect

Computes a geometric intersection of the input features. Features or portions of features which overlap in all layers and/or feature classes will be written to the output feature class.



Data Sources:

Brevard County

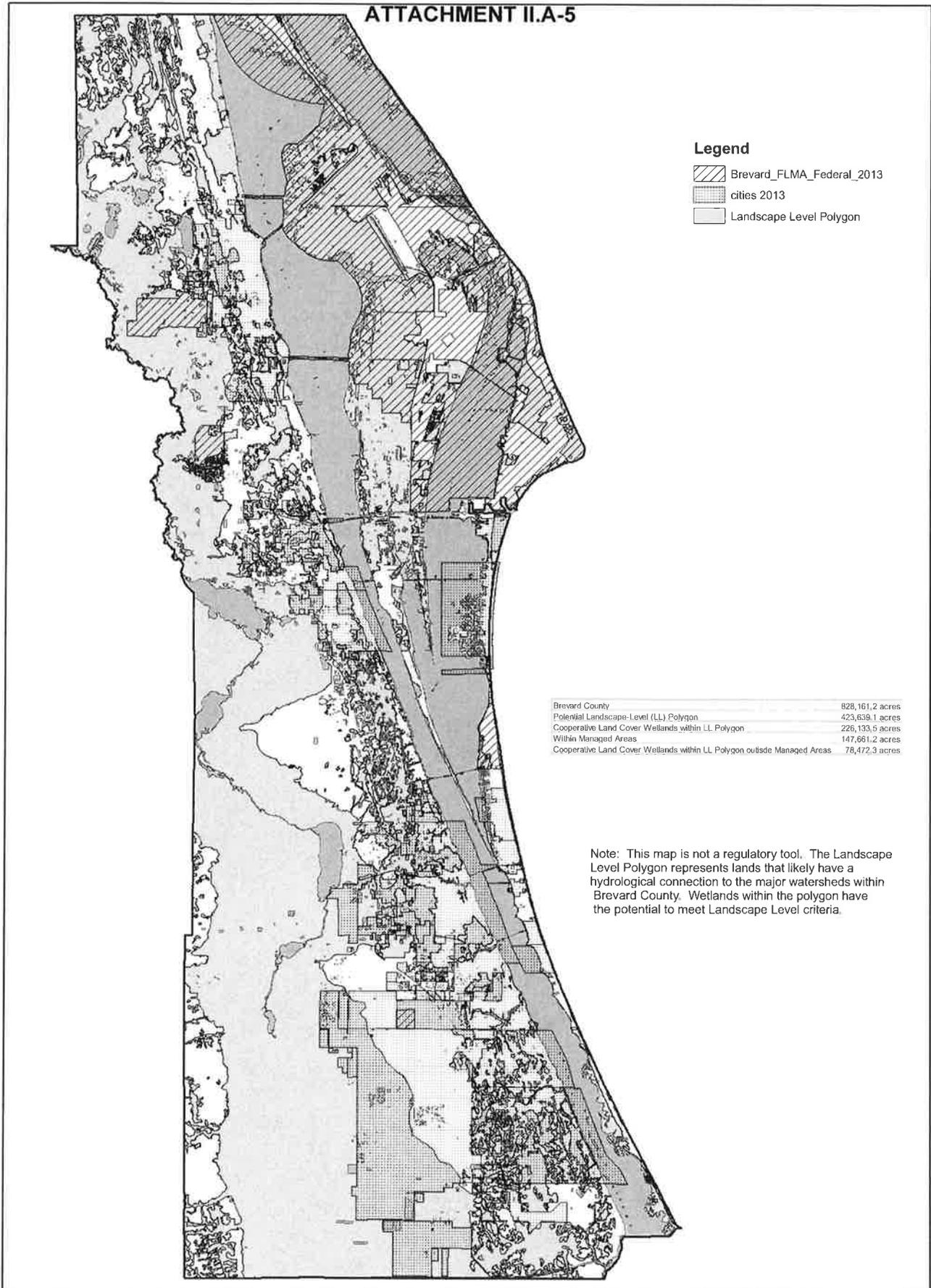
Florida Geographic Data Library (www.fgdl.org)

Florida Natural Areas Inventory (<http://www.fnai.org/LandCover.cfm>)

St. Johns River Water Management District

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Effective dates from 1987-1997. (Draft FIRM data also utilized).

ATTACHMENT II.A-5



Landscape-Level Wetlands are defined as wetlands that are EITHER 1) five (5) acres or larger; OR 2) located within the Landscape-Level polygon AND the Army Corps of Engineers (ACOE) determines the wetland is hydrologically connected to the St. Johns River or Indian River Lagoon System.

BKI, Inc.
 Consulting Ecologists
 225 Fifth Avenue, Suite 2
 Indianalantic, Florida 32903
 321-951-7964



Wetland Assessment Toolbox

Developed by

B.K.I., Inc. and Ecospatial Analysts

For

Brevard County
Natural Resource Management Office

September 30, 2013

Brevard County - Wetland Assessment Method Toolbox

The toolbox has been developed in order to help end-users utilize the wetland assessment tool. The toolbox follows the assessment of a wetland throughout the process.

Wetlands are assessed on two criteria. The two criteria are whether the wetlands are "landscape level" or they are considered "high-functioning."

First determine if the wetland is or part of a landscape level wetland system. This is done by analyzing a combination of parameters that include location, hydrologic connectivity and size of the wetland system. If the wetland system is located within the landscape level polygon **AND** is defined as hydrologically connected to the St. Johns River or the Indian River watersheds **OR** five (5) acres or greater in size than the system is determined to be a landscape level system. Potential impacts to the wetland will have to be evaluated by the County Commission.

Then the wetland will be assessed to determine if it is a high-functioning wetland system. If the system is determined to be high-functioning, impacts to the system will have to be evaluated by the County Commission.

The high-functioning wetland assessment method is composed of three components: landscape, water environment, and vegetative community.

The steps of high-functioning wetland assessment are as follows::

1. Calculate the acreage of the surrounding land uses within a 100m buffer.
2. Start landscape component, input the acreage of each land use, the tool calculates LSI.
3. Estimate the water quality treatment category score – estimate the percentage of each category.
4. Determine the hydrologic indicator score based on the indicators observed within the wetland.
5. Determine the percentage of appropriate wetland vegetation coverage.
6. Determine the percentage of exotic or invasive plant species coverage.
7. Determine the final score.
8. If the score is 0.70 or greater the wetland is considered High-Functioning.

A spreadsheet has been developed to facilitate the calculations. The toolbox will utilize the spreadsheet for the calculations.

Landscape Level Analysis

IS the wetland five (5) acres or larger?

YES the wetland is considered
Landscape Level

NO Continue to location analysis

IS the wetland located within the
Landscape Level Polygon and
determined to be hydrologically
connected to the St. Johns River or
Indian River Lagoon watershed?

YES the wetland is considered
Landscape Level

NO Continue to evaluate if the
wetland is High-Functioning

Landscape Assessment

The table calculates the percentage and multiplies the coefficient and percentage, then all the products of the calculations are summed, resulting in a score from 1-10.

If an exact FLUCFCS code is not included, the next closest code should be used for the calculations.

| Enter FLUCFCS Legend | Sum of Area | LSI Value | Adjusted Price | Location Score (LSI Value * Land Area) |
|--|-------------|-----------|----------------|--|
| 100 Low Density Urban | 2.21 | 0.000 | 0.000 | 0.000 |
| 100 Residential, Low Density | 2.8 | 0.145 | 0.000 | 0.000 |
| 100 Residential, Medium Density | 0.36 | 0.000 | 0.000 | 0.000 |
| 100 High Density Urban | 0.36 | 0.000 | 0.000 | 0.000 |
| 1300 Residential, High Density | 3.3 | 0.184 | 0.000 | 0.000 |
| 1400 Commercial and Services | 0.36 | 0.000 | 0.000 | 0.000 |
| 1500 Industrial | 0.00 | 0.000 | 0.000 | 0.000 |
| 1640 Holding Ponds | 0.00 | 0.000 | 0.000 | 0.000 |
| 1700 Institutional | 2.14 | 0.000 | 0.000 | 0.000 |
| 1800 Golf courses | 3.42 | 0.000 | 0.000 | 0.000 |
| 1850 Parks and Zoos | 3.42 | 0.000 | 0.000 | 0.000 |
| 1900 Open Land | 3.42 | 0.000 | 0.000 | 0.000 |
| 2100 Improved Pasture | 8.58 | 0.000 | 0.000 | 0.000 |
| 2120 Unimproved/Woodland Pasture | 8.65 | 0.000 | 0.000 | 0.000 |
| 2130 Woodland Pastures | 8.87 | 0.000 | 0.000 | 0.000 |
| 2200 Cistus | 7.02 | 0.000 | 0.000 | 0.000 |
| 2240 Abandoned Groves & Orchards | 8.87 | 0.000 | 0.000 | 0.000 |
| 2500 Specialty Farms | 3.13 | 0.000 | 0.000 | 0.000 |
| 2120 Open Shrub and Bush | 3.1 | 0.175 | 0.000 | 0.000 |
| 22 Pine Flatwoods | 0.00 | 0.000 | 0.000 | 0.000 |
| 23 Longleaf Pine - Live Oak | 0.00 | 0.000 | 0.000 | 0.000 |
| 24 Upland Hardwood Forest | 0.00 | 0.000 | 0.000 | 0.000 |
| 25 Cabbage Palm | 0.00 | 0.000 | 0.000 | 0.000 |
| 26 Wet and Low Oak | 0.00 | 0.000 | 0.000 | 0.000 |
| 27 Hardwood - Coniferous Mix | 2.8 | 0.145 | 0.000 | 0.000 |
| 28 Upland Scrub, Pine and Hardwoods | 0.00 | 0.000 | 0.000 | 0.000 |
| 29 Australian Pine | 8.87 | 0.000 | 0.000 | 0.000 |
| 30 Coniferous Plantations | 3.14 | 0.000 | 0.000 | 0.000 |
| 31 Swamps and Waterways | 0.00 | 0.000 | 0.000 | 0.000 |
| 32 Natural Lakes & Ponds | 0.00 | 0.000 | 0.000 | 0.000 |
| 33 Pastures | 4 | 0.215 | 0.000 | 0.000 |
| 34 Estuarine | 0.00 | 0.000 | 0.000 | 0.000 |
| 35 Major Bodies of Water | 0.00 | 0.000 | 0.000 | 0.000 |
| 36 Bay Swamps | 0.00 | 0.000 | 0.000 | 0.000 |
| 37 Mangrove Swamp | 0.00 | 0.000 | 0.000 | 0.000 |
| 38 Swamps and Lake Swamps (Bottomland) | 0.00 | 0.000 | 0.000 | 0.000 |
| 39 Mixed Wetland/Hardwoods | 0.00 | 0.000 | 0.000 | 0.000 |
| 40 Cypress | 0.00 | 0.000 | 0.000 | 0.000 |
| 41 Cypress - Pine - Cabbage Palm | 0.00 | 0.000 | 0.000 | 0.000 |
| 42 Slash Pine Flatwoods | 0.00 | 0.000 | 0.000 | 0.000 |
| 43 Slash Pine Swamp Forest | 0.00 | 0.000 | 0.000 | 0.000 |
| 44 Wet Coniferous Plantations | 0.00 | 0.000 | 0.000 | 0.000 |
| 45 Wetland Forested Mound | 0.00 | 0.000 | 0.000 | 0.000 |
| 46 Wetland Shrub | 0.00 | 0.000 | 0.000 | 0.000 |
| 47 Freshwater Marshes | 2.3 | 0.125 | 12.85 | 0.000 |
| 48 Submerged Marsh | 0.00 | 0.000 | 0.000 | 0.000 |
| 49 Wet Prairie | 0.00 | 0.000 | 0.000 | 0.000 |
| 50 Freshwater Marshes | 0.00 | 0.000 | 0.000 | 0.000 |
| 51 Non-Vegetated | 0.00 | 0.000 | 0.000 | 0.000 |
| 52 Tidal Flats | 0.00 | 0.000 | 0.000 | 0.000 |
| 53 Shoreline | 0.00 | 0.000 | 0.000 | 0.000 |
| 54 Disturbed Land | 0.00 | 0.000 | 0.000 | 0.000 |
| 55 Spoil Area | 0.00 | 0.000 | 0.000 | 0.000 |
| 56 Flats | 2.43 | 0.000 | 0.000 | 0.000 |
| 57 Roads | 1.00 | 0.000 | 0.000 | 0.000 |
| 58 Lakes | 2.43 | 0.000 | 0.000 | 0.000 |
| TOTAL | 0.91 | 0.000 | 18.000 | 7.724 |

This score is forwarded to the Wetland Score tab.

Brevard County - Wetland Assessment Method Toolbox

Water Environment

The water quality and timing is assessed using observational data in two parts.

Part 1:

The water quality is assessed by evaluating the water quality treatment that the contributing basin is providing. The percentage of each treatment type is estimated.

The value equals 0 – 5

1. Enter the percentage of each water quality treatment.

Note: If the contributing basin is entirely closed and rain fed a value of 100% is entered for the “Only Rainfall Dependent - no contributing basin” – Water Quality Treatment Score of 4.6

| Enter Percentage of surrounding landcover that contributes to the Water Quality Treatment | Category | Coefficient | Water Quality Treatment Score |
|---|---|-------------|-------------------------------|
| 45 | Natural | 5 | 2.25 |
| | Only rainfall - no contributing basin | 4.6 | 0 |
| 30 | Wet detention with swales | 4.2 | 1.26 |
| | Wet detention with dry detention | 4.2 | 0 |
| 25 | Combination grass swales with dry detention | 3.3 | 0.825 |
| | Grass swales only / vegetative buffer strip | 1.7 | 0 |
| | Dry Detention only | 1.7 | 0 |
| | No treatment | 0 | 0 |
| 100 | Correct | | 4.335 |

Hydrologic Indicator

Indicators

- Severely altered with strong evidence of transitional/uptand or open water plants
- Inadequate to maintain a viable wetland
- Adequate to maintain a viable wetland features may affect wetland hydrology
- Maintaining a viable, high functioning wetland

Indicator Descriptions

- Severely altered with strong evidence of
 - Wetland hydrology severely hydroperiod will not support
 - Substantial evidence that wetland plants dying-off because of
 - substantial soil subsidence
- Inadequate to maintain a viable wetland
 - hydroperiod not adequate

The table indicates if the input equals 100% by displaying the red Correct.

Brevard County - Wetland Assessment Method Toolbox

Water Environment

Part 2:

The hydrology is evaluated by hydrologic indicators in the wetland, ie. adventitious rooting, lichen lines, staining, upland vegetation encroachment, etc.

The values are 0, 1.7, 3.3 or 5

1. Enter the value for the hydrologic indicator score

The screenshot shows an Excel spreadsheet with two main tables. The first table, titled "Hydrological Indicator", lists indicators and their coefficients. The second table, titled "Water Environment", summarizes scores for different categories.

| Indicators | Coefficient |
|--|-------------|
| Severely altered with strong evidence of succession to transitional/upland or open water plant community | 0 |
| Inadequate to maintain a viable wetland system | 1.7 |
| Adequate to maintain a viable wetland system, external features may affect wetland hydrology | 3.3 |
| Maintaining a viable, high functioning wetland system | 5 |

| Water Environment | Score | Thresholds |
|-------------------------|-------|--|
| Water Quality Treatment | 4.335 | a perfect water environment would have a maximum score of 10 |
| Hydrologic Indicator | 5 | |
| Sum | 9.335 | |

The spreadsheet will sum the water environment scores and forward the summed value to the Wetland Score tab.

Water Environment

Indicator Descriptions:

Severely altered with strong evidence of succession to transitional/upland or open water plant community

- Wetland hydrology severely modified
- Hydroperiod will not support wetland plant species associated with the particular community type
- Substantial evidence that upland plant species are encroaching into the wetland because of decreased hydroperiod
- Wetland plants dying-off because of increased hydroperiod
- Substantial soil subsidence of organic soil substrates

Inadequate to maintain a viable wetland system

- Hydroperiod not adequate to maintain the type of wetland system that is being assessed
- Appropriate vegetation stressed or dying from too much or too little water; encroachment of transitional/upland plant species into wetland
- Evidence of soil subsidence of organic soil substrates

Adequate to maintain a viable wetland system, external features may affect wetland hydrology

- Hydroperiod appears adequate, but conditions (canals, ditches, swales, berms, reduced drainage area, culverts, pumps, control elevations, or wellfields) are possibly influencing the hydroperiod of the wetland being assessed
- Plants appear healthy, but some signs of improper hydrology are present
- Little evidence of soil subsidence of organic soil substrates

Maintaining a viable, high functioning wetland system

- Plants appear healthy, no signs of stress from improper hydrology are present
- Wetland has natural hydroperiod
- Not adjacent to features (canals, ditches, swales, berms, reduced drainage area, culverts, pumps, control elevations, or wellfields) that could negatively impact the wetland
- No sign of soil subsidence of organic soil substrates

The spreadsheet will sum the water environment scores and forward the summed value to the Wetland Score tab.

Examples of Water Quality Treatment Categories

Natural



Grass swales with dry detention / vegetative buffer strips



Examples of Hydrologic Indicators

Inadequate to maintain a viable wetland system – Note the pine and facultative broomsedge encroachment



Adequate to maintain a viable wetland system, external features may affect wetland hydrology



Vegetative Community

Vegetative Community is evaluated in two parts

Part 1

1. Estimate what percentage of vegetation is considered appropriate for the wetland type (ie. Facultative Wet or Obligate).
2. Enter the percentage in the spreadsheet

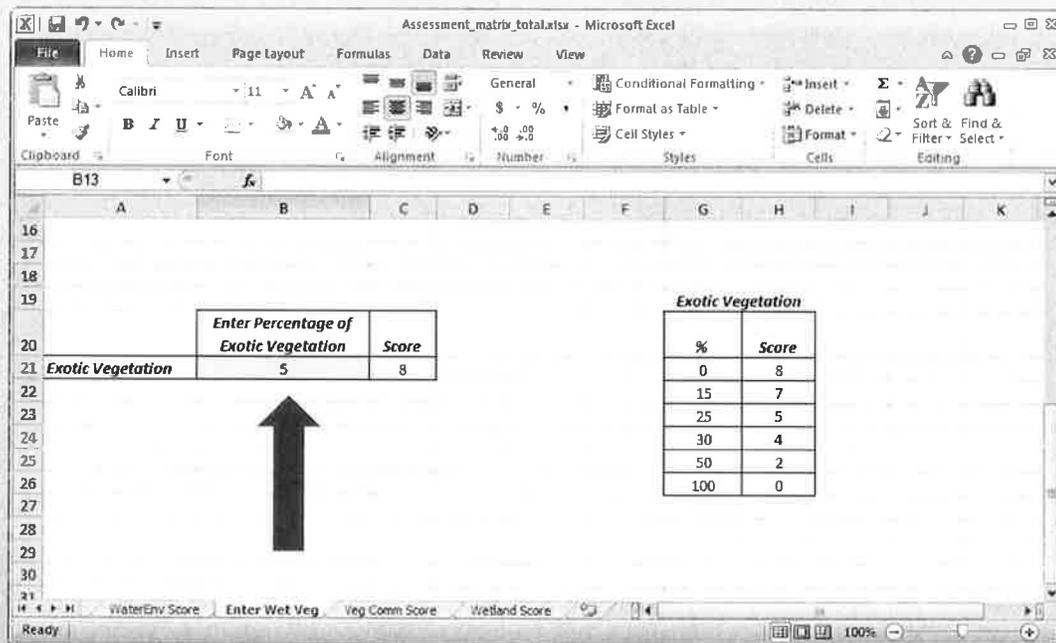
The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

| | A | B | C | D | E | F | G | H | I |
|----|---------------------------|---|--------------|---|---|---------------------------|--------------|---|---|
| 1 | | | | | | Wetland Vegetation | | | |
| 2 | | Enter Percentage of Wetland Vegetation | Score | | | % | score | | |
| 3 | Wetland Vegetation | 95 | 11 | | | 0 | 0 | | |
| 4 | | | | | | 10 | 0 | | |
| 5 | | | | | | 20 | 0 | | |
| 6 | | | | | | 30 | 2 | | |
| 7 | | | | | | 40 | 3 | | |
| 8 | | | | | | 50 | 6 | | |
| 9 | | | | | | 60 | 8 | | |
| 10 | | | | | | 70 | 9 | | |
| 11 | | | | | | 80 | 10 | | |
| 12 | | | | | | 90 | 11 | | |
| 13 | | | | | | 100 | 12 | | |

Vegetative Community

Part 2

1. Estimate what percentage of vegetation is considered exotic or invasive species
2. Enter the percentage in the spreadsheet
3. The spreadsheet will calculate the score as the average of the appropriateness score and exotic score



The table will average the vegetative scores, unless the exotic value exceeds the wetland value at which point the score will be zero.

The spreadsheet forwards the vegetative score to the Wetland Score tab.

Vegetative Community

Observation of percentage of appropriateness of wetland vegetation – Notice encroachment of pines and facultative broomsedge

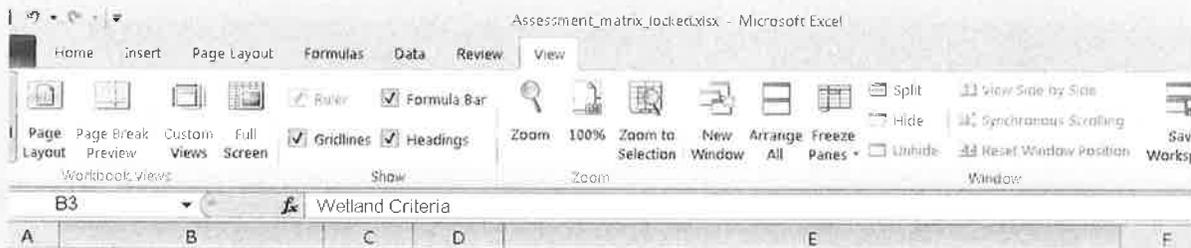


Observation of percentage of exotics or invasive vegetation – Notice density of Brazilian pepper versus no exotic vegetation



Wetland Score

- The overall wetland assessment score is calculated by summing all three section scores and dividing by 30
- Highest functioning wetlands will have a score near 1.0



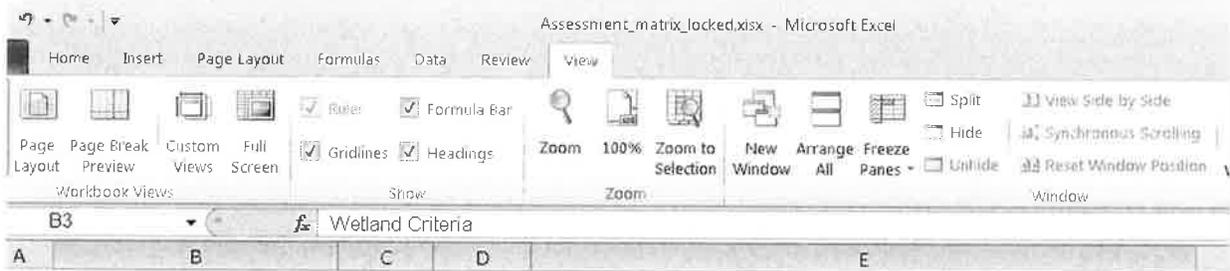
This example wetland ended with a calculated score of 0.885, which would indicate it is a High-Functioning wetland system. This system would require Commission **approval** to allow any impact.

The threshold for assessing if a wetland is considered “High-Functioning” has been determined to be **0.70** or higher.

Brevard County - Wetland Assessment Method Toolbox

Wetland Score

- In this example, the wetland is in poor condition
- The score depicts that the wetland has impacted surroundings, degraded water quality, and a vegetative community composed of 20% exotic plants.



| <i>Wetland Criteria</i> | <i>Score</i> | <i>Thresholds</i> |
|-------------------------|--------------|---|
| Landscape | 5.16 | a perfect landscape would have a maximum score of 10 |
| Water Environment | 4.96 | a perfect water environment would have a maximum score of 10 |
| Vegetative Community | 6.5 | a perfect vegetative community would have a maximum score of 10 |
| Assessment Score | 0.554 | a perfect wetland would have a score of 1.0 |



This example wetland ended with a calculated score of 0.554, which would indicate it is not a High-Functioning wetland system and could be impacted **without** Commission approval.



Tammy Etheridge, Clerk to the Board, 400 South Street • P.O. Box 999, Titusville, Florida 32781-0999

Telephone: (321) 637-2001
Fax: (321) 264-6972

January 17, 2014

MEMORANDUM

TO: Ernie Brown, Natural Resources Management Department

RE: Item II.A., Countywide Wetlands Study Presentation by BKI, Inc. Consulting Ecologists

The Board of County Commissioners, in special session on January 16, 2014, accepted the Wetlands Study completed by BKI, Inc. Consulting Ecologists to include the high-function wetlands assessment method with a score of 0.66 or greater is to be considered high-functioning; and accepted the high-function assessment matrix, the landscape level polygon map, reference wetland document, and the wetlands assessment toolbox.

Your continued cooperation is always appreciated.

Sincerely yours,

BOARD OF COUNTY COMMISSIONERS
SCOTT ELLIS, CLERK

for Donna Scott
Tammy Etheridge, Deputy Clerk

/ds

cc: County Attorney
Assistant County Manager Scott
Finance
Budget