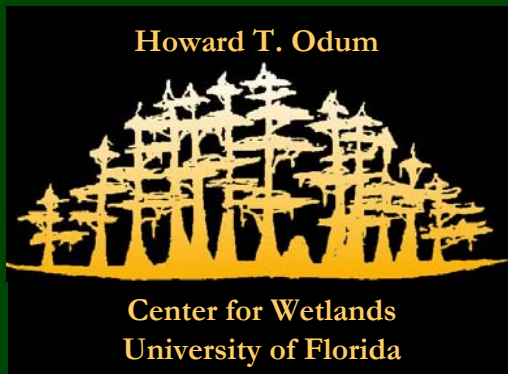


UMAM

Uniform Mitigation Assessment Method

TRAINING MANUAL

Web-based training manual for
Chapter 62-345, FAC for Wetlands Permitting



Eliana Bardi, Mark T. Brown, Kelly C. Reiss, Matthew J. Cohen

Instructions

You can navigate through the manual by either scrolling through the pages or selecting the links within the pages.

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Web-based Training Manual

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This manual was developed to assist in the implementation of Chapter 62-345, Florida Administrative Code, *Uniform Mitigation Assessment Method* (UMAM).

Since 1998, The University of Florida Howard T. Odum Center for Wetlands (UF-CFW), through funding from the Florida Department of Environmental Protection (FDEP) under contract #WM-683, has collected a variety of data, such as data on the community composition of the algal, macrophyte, macroinvertebrate assemblages, as well as water and soil parameters, from over 200 herbaceous and forested wetlands (n=75 and n=142, respectively) throughout Florida. The sample wetlands were exposed to a variety of impacts and embedded in an array of land uses, ranging from reference to silviculture, agriculture, and urban (the latter for forested wetlands only). Using data collected during the past six years, the UF-CFW has developed a number of tools that can assist permitting personnel and consultants in the implementation of the UMAM.

This manual is designed to be used as a guide in completing Parts I and II of the UMAM by providing step-by-step instructions for gathering and compiling the information for Parts I and II, and providing examples of attributes identified in the UMAM rule.

Acknowledgments

This manual is the result of much time, effort and cooperation among many individuals from several agencies. In addition to the principal authors of the manual, Russel Frydenborg, Connie Bersok, Erica Hernandez, and Richard Butgereit of the FDEP assisted in all aspects of manual creation, including coordinating and participating in site visits, tool development, and manual editing. Richard Butgereit was especially valuable in incorporating the manual's information into the Department's ERAtools and ERAonline applications.

Numerous individuals from water management district and FDEP permitting offices were also helpful in selecting sample sites and discussing the project's contents. Glenn Lowe (SJRWMD), Clark Hull and Karen Gruenhagen (SWFWMD), Rob Robbins (SFWMD), and Duncan Cairns (NFWMD) provided feedback on several versions of the manual.

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The manual was prepared by the UF-CFW, under contract to the Florida Department of Environmental Regulation, Mark T. Brown, principal investigator. This project and the preparation of this report were funded in part by a Section 319 Nonpoint Source Management grant from the U.S. Environmental Protection Agency through a contract with the Florida Department of Environmental Protection. Ellen McCarron and Russel Frydenborg were contract managers for FDEP.

Acknowledgments (continued)

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Introduction

The intent of this manual is to aid in the assessment of wetlands and other surface waters, as well as upland mitigation areas, with regards to the use of Chapter 62-345, Florida Administrative Code, *Uniform Mitigation Assessment Method* (UMAM). This manual cannot address every question that may arise in the use of the rule, and thus it is not designed as a substitute.

This training manual provides examples and a standardized procedure for assessing the functions provided by wetlands and other surface waters, the amount that those functions are reduced by a proposed impact, and the amount of mitigation required to offset those losses. This manual does not address questions regarding the appropriateness of the type of mitigation proposed, nor whether the impact or mitigation activities meet other criteria for issuance of a permit. For those questions, please refer to the Environmental Resource Permit or Wetland Resource Permit guidelines.

This manual is to be used in conjunction with, and does not take place of, the rule. For a copy of the complete rule and to download the forms, please visit:

<http://www.dep.state.fl.us/water/wetlands/erp/forms.htm>

Background and Overview of UMAM

In response to a request by the Florida state legislature in 1999 to "study mitigation options...implemented from 1994 to the present and...consider the effectiveness and costs of the current mitigation options in offsetting adverse effects to wetlands and wetland functions" (Section 373.414(18)(b), F.S., 1999), the Office of Program Policy Analysis and Governmental Accountability (OPPAGA) submitted a report in 2000 (Report No. 99-40) highlighting some of the shortcomings of the current mitigation process. In particular, while the State could track the acreage of wetland loss and the acreage of mitigation, the report concluded that this information was not sufficient to ensure the replacement of wetland function resulting from wetland impacts. The recommendation of developing of a state wide wetland assessment method became law in 2000. In the past few years the Florida Department of Environmental Protection (FDEP) and the water management districts (WMDs) have worked closely to developed the Uniform Mitigation Assessment Method (UMAM) rule (Chapter 62-345, F.A.C.), which became effective in February 2004.

The UMAM is designed to assess any type of impact and mitigation, including the preservation, enhancement, restoration, and creation of wetlands, as well as the evaluation and use of mitigation banks, and it provides a framework for statewide standardized wetland assessment across community type and assessor. The assessment area is evaluated based on two main parts, a qualitative description and a quantification of the assessment area. For the latter section, sites are evaluated in three categories, scored numerically on a scale from 0 to 10 (where 10 indicates a minimally impaired system). The first category, Location and Landscape Support, examines the ecological context within which the system operates. The second examines the Water Environment, including rapid inference of hydrologic alteration and water quality impairment, while the third focuses on Community Structure and more specifically Vegetation and Structural Habitat, for areas with plant cover, and Benthic and Sessile Communities, for areas with a submerged benthic community.

Definitions

62-345.200 Definitions. (as of June, 2005 – please refer to the rule for updated versions)

- (1) “Assessment area” means all or part of a wetland or surface water impact site, or a mitigation site, that is sufficiently homogeneous in character, impact, or mitigation benefits to be assessed as a single unit.
- (2) “Reviewing agency” means the Florida Department of Environmental Protection, or any water management district, local government or other governmental agency required by subsection 373.414(18), F.S., to use this methodology.
- (3) “Ecological value” means the value of functions performed by uplands, wetlands, and other surface waters to the abundance, diversity, and habitats of fish, wildlife, and listed species. Included are functions such as providing cover and refuge; breeding, nesting, denning, and nursery areas; corridors for wildlife movement; food chain support; natural water storage, natural flow attenuation, and water quality improvement which enhances fish, wildlife, and listed species utilization.
- (4) “Impact site” means wetlands and other surface waters as delineated pursuant to Chapter 62-340, F.A.C., that would be impacted by the project. Uplands shall not be included as part of the impact site.
- (5) “Indicators” means physical, chemical, or biological indications of wetland or other surface waters function.
- (6) “Invasive Exotic” for purposes of this rule means animal species that are outside of their natural range or zone of dispersal and have or are able to form self-sustaining and expanding populations in communities in which they did not previously occur, and those plant species listed in the Florida Exotic Pest Plant Council’s 2001 List of Invasive Species Category I and II, which is incorporated by reference herein, and may be found on the Internet at www.fleppc.org or by writing to the Bureau of Beaches and Wetland Resources, Department of Environmental Protection, 2600 Blair Stone Road, MS 2500, Tallahassee, FL 32399-2400.
- (7) “Listed species” means those animal species that are endangered, threatened, or of special concern and are listed in Rules 68A-27.003, 68A-27.004, and 68A-27.005, F.A.C., and those plant species listed in 50 Code of Federal Regulations 17.12, when such plants are located in a wetland or other surface water.
- (8) “Mitigation credit” or “credit” means a standard unit of measure which represents the increase in ecological value resulting from restoration, enhancement, preservation, or creation activities.
- (9) “Mitigation site” means wetlands and other surface waters as delineated pursuant to Chapter 62-340, F.A.C., or uplands, that are proposed to be created, restored, enhanced, or preserved by the mitigation project.
- (10) “With impact assessment” means the reasonably anticipated outcome at an assessment area assuming the proposed impact is conducted.
- (11) “With mitigation assessment” means the outcome at an assessment area assuming the proposed mitigation is successfully conducted.
- (12) “Without preservation assessment” means the reasonably anticipated outcome at an assessment area assuming the area is not preserved.

Specific Authority 373.026(7), 373.043, 373.414(9), (18) FS. Law Implemented 373.414(18) FS. History—New 2-2-04.

Definitions (continued)

Additional Definitions specific to the Training Manual

- (1) Reference Standard Wetland: a wetland that is considered good quality and is surrounded by natural land uses, with no external anthropogenic influences.
- (2) Frame of Reference: a frame of reference is used as a benchmark for comparing the historical or expected functions of an assessment area with the current functions

Methodology

The methodology section of this training manual is subdivided into two modules:

1. Office module

In the office module we provide sources and reference materials that may be used to compile information for Part I - Qualitative Characterization (62-345.400, FAC).

2. Field module

The field module provides a description of the site visit protocol and detailed step-by-step instructions and examples for compiling Part II – Assessment and Scoring (62-345.500, FAC) and evaluating each attribute identified in the rule for the three categories:

Location and Landscape Support,
Water Environment, and
Community Structure.

Office Module

The office module describes step by step procedures for completing

Part 1 - Qualitative Characterization

Office Module ~ Part 1: Qualitative Characterization

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)			
Site/Project Name		Application Number	Assessment Area Name or Number
FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e. OFW, AP, other local/state/federal designation of importance)	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands			
Assessment area description			
Significant nearby features		Uniqueness (considering the relative rarity in relation to the regional landscape.)	
Functions		Mitigation for previous permit/other historic use	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors:			
Assessment conducted by:		Assessment date(s):	

Form 62-345.900(1), F.A.C. [effective date 02-04-2004]

An impact or mitigation assessment area must be described with sufficient detail to provide a **frame of reference** for the type of community being evaluated and to identify the functions that will be evaluated. Part I must be completed before scoring the assessment area in Part II, since this frame of reference will be used to determine the degree to which the assessment area provides those functions and the amount of function lost or gained by the project.

Much of the information in Part I can be compiled in the office using ERAtools or ERAonline and aerial photographs, topographic and other maps, scientific literature, technical reports, and similar information. Other portions however, should be completed during the site visit, such as the “Assessment Area Description” and “Observed Evidence of Wildlife Utilization.”

The [wetland field guides](#) contain detailed descriptions and reference information for wetlands classified by FLUCCS code.

Office Module ~ Part 1: Qualitative Characterization (continued)

PART I - Qualitative Description (See Section 62-345.400, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e. OFW, AP, other local/state/federal designation of importance)	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands			
Assessment area description			
Significant nearby features		Uniqueness (considering the relative rarity in relation to the regional landscape.)	
Functions		Mitigation for previous permit/other historic use	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors			
Assessment conducted by:		Assessment date(s):	

Form 62-345.900(1), F.A.C. [effective date 02-04-2004]

Office work with the ERAtools or ERAonline will provide much of the information for the first part of the form. Using aerial photos, land use/land cover maps and other resources, become as familiar with the site as possible noting uniqueness of the site and significant surrounding features. Provide a brief overview description of the assessment area.

The [wetland field guides](#) will be helpful in filling out the anticipated wildlife utilization and utilization by listed species.

The last two sections of UMAM Part I are best filled out in the field during the field visit.

Office Module ~ Part 1: Qualitative Characterization (continued)

Steps for completing Part 1...

1. Review permit application and identify the assessment areas (proposed wetland/surface water impact area(s) and proposed mitigation area(s).
2. Compile information for Part I - Qualitative Characterization, as follows:
 - Use the ERAtools to obtain the following information for the assessment area and surrounding areas :
 - [FLUCCS code \(level 3\) for ecological communities and land cover](#)
 - [Size of Assessment area](#)
 - [Basin/watershed name/number](#)
 - [Water bodies and their classification](#)
 - [Maps and aerial photos of the assessment area and surrounding area](#)
 - [Wetland field guides](#)
 - Print aerial maps (100 meter and 1 mile buffer) of assessment area and locate possible sampling sites based on surrounding landscape and land uses, vegetation signature within sampling area, and size of assessment area.
3. Complete the office portions of Part 1 - Qualitative Characterization for each type of assessment area identified.

Prior to going to the field...

1. [Obtain regionalized weather data](#)

Office Module ~ Part 1: Qualitative Characterization (continued)

In the Field...

The last two sections of Part I, can be completed in the field:

Observed Evidence of Wildlife Utilization Additional Relevant Factors

Observed Evidence of Wildlife Utilization ~ List species directly observed or other signs such as tracks, droppings, casings, nests, burrows, etc.

Additional Relevant Factors ~ Some additional factors may be identified in the office, for instance administrative actions by local governments that affect the site. Others may become evident upon a site visit, i.e., changes in surrounding land use since the most recent aerial photographs.

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)			
Site/Project Name		Application Number	Assessment Area Name or Number
FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e. OFW, AP, other local/state/federal designation of importance)	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands			
Assessment area description			
Significant nearby features		Uniqueness (considering the relative rarity in relation to the regional landscape.)	
Functions		Mitigation for previous permit/other historic use	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found.)		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors:			
Assessment conducted by:		Assessment date(s):	
Form 62-345.900(1), F.A.C. [effective date 02-04-2004]			

Can be filled out in the field...

[Prev](#)

[Next](#)

Field Module

The field module describes step by step procedures for completing

Part II - Quantification of Assessment Area

Part II- Quantification of Assessment Area

Part II of the UMAM procedure must be conducted in the the field at the Assessment Area. In the following sections of this manual we describe a Standardized Field Protocol (SFP) and the scoring of the UMAM Part II functional assessment categories.

- **Description of a Standardized Field Protocol**
Direct and Secondary Impacts
- **Scoring the assessment area**
Part IIa. Location and Landscape Support
Part IIb. Water Environment
Part IIc. Community Structure

Part II- Quantification of Assessment Area

Steps for completing Part II...

Upon reaching the Assessment Area...

1. [Review UMAM Part I](#) - Qualitative Characterization, and make any necessary adjustments to Geographic Relationships/Hydrologic Connections, Description, and Significant Nearby Features.
2. Consult maps and aerial photographs obtained in Part I - Qualitative Characterization to verify the correct Assessment Area.
3. Consult other information obtained in Part I, such as weather data, Field Guides etc. to become familiar with conditions, species, etc. that are likely to be encountered.
4. On aerial photographs, determine locations of wetland/water body edge and tentative locations of walking transects based on Standardized Field Protocol.
5. Conduct the [Standardized Field Protocol](#)
6. Score the three Functional Assessment Categories:
 - Location and Landscape Support
 - Water Environment
 - Community Structure
7. Calculate final overall score with adjustments.

Part II- Quantification of Assessment Area

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)				
Site/Project Name		Application Number		Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:		Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support				
w/o pres or current				
with				
.500(6)(b) Water Environment (n/a for uplands)				
w/o pres or current				
with				
.500(6)(c) Community structure				
1. Vegetation and/or 2. Benthic Community				
w/o pres or current				
with				
Score = sum of above scores (0-30) (if uplands, divide by 20)				
current or w/o pres				
with				
Delta = [with-current]				
If preservation as mitigation:				
Preservation adjustment factor =				
Adjusted mitigation delta =				
If mitigation:				
Time lag (t-factor) =				
Risk factor =				
For impact assessment areas				
PL = delta x acres =				
For mitigation assessment areas				
RFG = delta/(t-factor x risk) =				

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Scoring UMAM Part II...

There are three sections for scoring:

- Location and Landscape Support
- Water Environment
- Community Structure

...and a final section that is the overall score of the assessment area as well as adjustments to scoring based on preservation vs. mitigation, time lag, and risk factors.

Part II- Quantification of Assessment Area

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)												
Site/Project Name		Application Number		Assessment Area Name or Number								
Impact or Mitigation		Assessment conducted by:		Assessment date:								
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Optimal (10)</th> <th style="width: 25%;">Moderate (7)</th> <th style="width: 25%;">Minimal (4)</th> <th style="width: 25%;">Not Present (0)</th> </tr> <tr> <td>Condition is optimal and fully supports wetland/surface water functions</td> <td>Condition is less than optimal, but sufficient to maintain most wetland/surface water functions</td> <td>Minimal level of support of wetland/surface water functions</td> <td>Condition is insufficient to provide wetland/surface water functions</td> </tr> </table>			Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions
Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)									
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions									
.500(6)(a) Location and Landscape Support		<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">w/o pres or current</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">with</div> </div> <div style="width: 50%;"></div> </div>										
.500(6)(b) Water Environment (n/a for uplands)		<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">w/o pres or current</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">with</div> </div> <div style="width: 50%;"></div> </div>										
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community		<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">w/o pres or current</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; text-align: center;">with</div> </div> <div style="width: 50%;"></div> </div>										
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres with		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta = </td> <td style="width: 50%; padding: 5px;"> For impact assessment areas FL = delta x acres = </td> </tr> <tr> <td style="padding: 5px;"> Delta = [with-current] </td> <td style="padding: 5px;"> For mitigation assessment areas RFG = delta/(t-factor x risk) = </td> </tr> </table>			If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =	For impact assessment areas FL = delta x acres =	Delta = [with-current]	For mitigation assessment areas RFG = delta/(t-factor x risk) =				
If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =	For impact assessment areas FL = delta x acres =											
Delta = [with-current]	For mitigation assessment areas RFG = delta/(t-factor x risk) =											

Each impact assessment and each mitigation assessment area must be evaluated under two conditions:

a) Current condition (or without preservation in the case of preservation mitigation)

and

b) “With impact” or “With mitigation” – These assessments are based on the reasonably expected outcome, which may represent an increase, decrease, or no change in value relative to the current condition.

[Read More on Assessment and Scoring](#)

Location and Landscape Support - 62-345.500(6)(a), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name	Application Number	Assessment Area Name or Number	
Impact or Mitigation	Assessment conducted by:	Assessment date:	
<div style="border: 1px solid black; padding: 2px;"> Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed </div>	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal (4) Minimal level of support of wetland/surface water functions
<div style="border: 1px solid black; padding: 10px; text-align: center;"> 600(6)(a) Location and Landscape Support <div style="border: 2px solid black; border-radius: 50%; width: 80%; margin: 0 auto; padding: 10px; text-align: center;"> Location and Landscape Support </div> </div>			
.500(6)(b) Water Environment (n/a for uplands)	<div style="display: flex; justify-content: space-between; padding: 5px;"> w/o pres or current with </div>		
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community	<div style="display: flex; justify-content: space-between; padding: 5px;"> w/o pres or current with </div>		
Score = sum of above scores/30 (if uplands, divide by 20) <div style="display: flex; justify-content: space-between; padding: 5px;"> current or w/o pres with </div>	<div style="border: 1px solid black; padding: 2px;">If preservation as mitigation,</div> <div style="border: 1px solid black; padding: 2px;">Preservation adjustment factor =</div> <div style="border: 1px solid black; padding: 2px;">Adjusted mitigation delta =</div>	<div style="border: 1px solid black; padding: 2px;">For impact assessment areas</div> <div style="border: 1px solid black; padding: 2px;">FL = delta x acres =</div>	
<div style="border: 1px solid black; padding: 2px;">Delta = [with-current]</div>	<div style="border: 1px solid black; padding: 2px;">If mitigation</div> <div style="border: 1px solid black; padding: 2px;">Time lag (t-factor) =</div> <div style="border: 1px solid black; padding: 2px;">Risk factor =</div>	<div style="border: 1px solid black; padding: 2px;">For mitigation assessment areas</div> <div style="border: 1px solid black; padding: 2px;">RFG = delta/(t-factor x risk) =</div>	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area and its relationship with surrounding areas. If surrounding habitats are unavailable, poorly connected, or degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. The availability, connectivity, and quality of offsite habitats, and offsite land uses which might adversely impact fish and wildlife utilizing these habitats, are factors to be considered in assessing the location of the assessment area. [Read more on Location and Landscape Support.](#)

Refer to section 62-345.500(6)(a), FAC of [Chapter 62-345 Uniform Mitigation Assessment Method](#) for a complete description of this indicator category.

Location and Landscape Support - 62-345.500(6)(a), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
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Impact or Mitigation		Assessment conducted by:	Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions
Not Present (0) Condition is insufficient to provide wetland/surface water functions			
<div>Eight attributes are considered to generate the score for Location and Landscape Support</div>			
.500(6)(a) Location and Landscape Support			
w/o pres or current		with	
.500(6)(b)Water Environment (n/a for uplands)			
w/o pres or current		with	
.500(6)(c)Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current		with	
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current or w/o pres		Preservation adjustment factor =	
with		Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas	
		FL = delta x acres =	
		If mitigation	
		Time lag (t-factor) =	
		Risk factor =	
		For mitigation assessment areas	
		RFG = delta/(t-factor x risk) =	

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Eight attributes are identified in the UMAM Rule to evaluate this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- [Support to wildlife by outside habitats](#)
- [Invasive exotics or other invasive plant species in proximity of the assessment area](#)
- [Wildlife access to and from outside – distance and barriers](#)
- [Functions that benefit fish and wildlife downstream – distance or barriers](#)
- [Impacts of land uses outside assessment area to fish and wildlife](#)
- [Benefits to downstream or other hydrologically connected areas](#)
- [Benefits to downstream habitats from discharges](#)
- [Protection of wetland functions by upland mitigation assessment areas](#)

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others.

Location and Landscape Support - 62-345.500(6)(a), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
		Assessment date:	
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal (4) Minimal level of support of wetland/surface water functions
			Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
<div><div>w/o pres or current</div><div>with</div></div>			
.500(6)(b) Water Environment (n/a for uplands)			
<div><div>w/o pres or current</div><div>with</div></div>			
.500(6)(c) Community structure			
1. Vegetation and/or 2. Benthic Community			
<div><div>w/o pres or current</div><div>with</div></div>			
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current or w/o pres		Preservation adjustment factor =	
with		Adjusted mitigation delta =	
		For impact assessment areas	
		FL = delta x acres =	
Delta = [with-current]		If mitigation	
		Time lag (t-factor) =	
		Risk factor =	
		For mitigation assessment areas	
		RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

The final score for the Location and Landscape Support category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means the assessment area is ideally located and the surrounding landscape provides full opportunity for the assessment area to perform beneficial functions at an optimal level.
- A score of (7) means that, compared to the ideal location, the location of the assessment area limits its opportunity to perform beneficial functions to 70% of the optimal ecological value.
- A score of (4) means that, compared to the ideal location, the assessment area location limits its opportunity to perform beneficial functions to 40% of the optimal ecological value.
- A score of (0) means that the location of the assessment area provides no habitat support for wildlife utilizing the assessment area and no opportunity for the assessment area to provide benefits to fish and wildlife outside the assessment area.

A [Summary Worksheet](#) for **Location and Landscape Support** is included to help in the field assessment scoring.

Water Environment - 62-345.500(6)(b), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)				
Site/Project Name		Application Number		Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:		Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>	<div style="border: 2px solid black; border-radius: 50%; width: 80%; margin: 0 auto; padding: 20px;"> <h2 style="margin: 0;">Water Environment</h2> </div>			
.500(6)(b) Water Environment (n/a for uplands) <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>				
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>				
Score = sum of above scores/30 (if uplands, divide by 20) <div style="display: flex; justify-content: space-between;"> current or w/o pres with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>	If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =		For impact assessment areas FL = delta x acres =	
Delta = [with-current] <input style="width: 100%; height: 20px;" type="text"/>	If mitigation Time lag (t-factor) = Risk factor =		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

The quantity of water in an assessment area, including the timing, frequency, depth and duration of inundation or saturation, flow characteristics, and the quality of that water, may facilitate or preclude its ability to perform certain functions and may benefit or adversely impact its capacity to support certain wildlife. If the water environment is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced.

[Read more on the Water Environment.](#)

Refer to section 62-345.500(6)(b), FAC of [Chapter 62-345 Uniform Mitigation Assessment Method](#) for a complete description of this indicator category.

Water Environment - 62-345.500(6)(b), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
		Assessment date:	
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions
		Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
w/o pres or current		with	
.500(6)(b)Water Environment (n/a for uplands)			
w/o pres or current		with	
.500(6)(c)Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current		with	
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres		with	
Delta = [with-current]			
If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =		For impact assessment areas FL = delta x acres =	
If mitigation Time lag (t-factor) = Risk factor =		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

Twelve attributes are identified in the UMAM Rule to evaluate this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- [Water levels and flows](#)
- [Water level indicators](#)
- [Soil moisture](#)
- [Soil erosion or deposition](#)
- [Evidence of fire history](#)
- [Vegetation - community zonation](#)
- [Vegetation – hydrologic stress](#)
- [Use by animal species with specific hydrological requirements](#)
- [Plant community composition – species tolerant of and associated with water quality degradation or flow alteration](#)
- [Direct observation of standing water](#)
- [Existing water quality data](#)
- [Water depth, wave energy, currents and light penetration](#)

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others.

Water Environment - 62-345.500(6)(b), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
		Assessment date:	
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions
		Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(b) Water Environment (n/a for uplands)			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(c) Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current or w/o pres <input type="checkbox"/> with <input type="checkbox"/>		Preservation adjustment factor =	
		Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas	
		FL = delta x acres =	
		For mitigation assessment areas	
		RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

The final score for the Water Environment category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the hydrology and water quality fully supports the functions and provides benefits to fish and wildlife at optimal capacity for the assessment area.
- A score of (7) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 70% of the optimal capacity for the assessment area.
- A score of (4) means that the hydrology and water quality supports the functions and provides benefits to fish and wildlife at 40% of the optimal capacity for the assessment area.
- A score of (0) means that the hydrology and water quality does not support the functions and provides no benefits to fish and wildlife.

A [Summary Worksheet](#) for the **Water Environment** is included to help in the field assessment scoring.

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:	Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions
Not Present (0) Condition is insufficient to provide wetland/surface water functions			
.500(6)(a) Location and Landscape Support w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(b)Water Environment (n/a for uplands) w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>		Community Structure	
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres <input type="checkbox"/> with <input type="checkbox"/>		If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas FL = delta x acres =	
		If mitigation Time lag (t-factor) = Risk factor =	
		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

Each impact and mitigation assessment area is evaluated with regard to its characteristic community structure. In general, a wetland or other surface water is characterized either by plant cover or by open water with a submerged benthic community.

When a plant cover is present, the area is assessed using the “Vegetation and Structural Habitat” section (62-345.500(6)(c)1). Benthic communities are assessed using the “Benthic Communities” section (62-345.500(6)(c)2). If the assessment area includes both plant cover and submerged benthic communities, then both of these indicators are scored and the resulting scores will be averaged to obtain a single community score.

Refer to section 62-345.500(6)(c), FAC of [Chapter 62-345 Uniform Mitigation Assessment Method](#) for a complete description of this indicator category.

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:	Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions
Not Present (0) Condition is insufficient to provide wetland/surface water functions			
.500(6)(a) Location and Landscape Support			
w/o pres or current	with		
.500(6)(b)Water Environment (n/a for uplands)			
w/o pres or current	with		
.500(6)(c)Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current	with		
Ten attributes are considered to generate the score for “Vegetation and Structural Habitat”			
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current		Preservation adjustment factor =	
or w/o pres		Adjusted mitigation delta =	
with			
Delta = [with-current]		For impact assessment areas	
		FL = delta x acres =	
If mitigation		For mitigation assessment areas	
Time lag (t-factor) =		RFG = delta/(t-factor x risk) =	
Risk factor =			

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1. Vegetation and Structural Habitat

The presence, abundance, health, condition, appropriateness, and distribution of plant communities in surface waters, wetlands, and uplands can be used as indicators to determine the degree to which the functions of the community type are provided. Human activities such as groundwater withdrawal, ditching, and diking or the construction of conveyance canals, or other permanent structures such as seawalls in an aquatic system can permanently damage vegetation and structural habitat. Environmental factors such as excessive rainfall, drought, and fire can have temporary short-term impacts on vegetation. If the community structure is degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. [*Read more on Vegetation and Structural Habitat.*](#)

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
		Assessment date:	
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions
		Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
w/o pres or current		with	
.500(6)(b)Water Environment (n/a for uplands)			
w/o pres or current		with	
.500(6)(c)Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current		with	
<div>Ten attributes are considered to generate the score for “Vegetation and Structural Habitat”</div>			
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres		If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas FL = delta x acres =	
		If mitigation Time lag (t-factor) = Risk factor =	
		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

1. Vegetation and Structural Habitat (continued)

Ten attributes are identified in the UMAM Rule to evaluate the “Vegetation and Structural Habitat” section of this category. To provide guidance, examples are given that depict variation in conditions for each of the attributes.

- [Plant species in the canopy, shrub, or ground stratum](#)
- [Invasive exotics or other invasive plant species](#)
- [Regeneration & recruitment](#)
- [Age & size distribution](#)
- [Density and quality of coarse woody debris, snag, den, and cavity](#)
- [Plant condition](#)
- [Land management practices](#)
- [Topographic features such as refugia ponds, creek channels, flats or hummocks](#)
- [Siltation or algal growth in submerged aquatic plant communities](#)
- [Upland mitigation area - level of habitat and support for fish and wildlife in the associated wetlands or surface waters](#)

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others.

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
Assessment date:			
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal (4) Minimal level of support of wetland/surface water functions
	Not Present (0) Condition is insufficient to provide wetland/surface water functions		
.500(6)(a) Location and Landscape Support			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(b) Water Environment (n/a for uplands)			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
.500(6)(c) Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>			
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current or w/o pres <input type="checkbox"/> with <input type="checkbox"/>		Preservation adjustment factor =	
		Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas	
		FL = delta x acres =	
		For mitigation assessment areas	
		RFG = delta/(t-factor x risk) =	

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1. Vegetation and Structural Habitat (continued)

The final score for the Community Structure – Vegetation and Structural Habitat category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the vegetation community and physical structure provide conditions which support an optimal level of function to benefit fish and wildlife utilizing the assessment area as listed in Part I.
- A score of (7) means that the level of function provided by plant community and physical structure is limited to 70% of the optimal level.
- A score of (4) means that the level of function provided by the plant community and physical structure is limited to 40% of the optimal level.
- A score of (0) means that the vegetation communities and structural habitat do not provide functions to benefit fish and wildlife.

A [Summary Worksheet](#) for **Vegetation and Structural Habitat** is included to help in the field assessment scoring.

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:	Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions
		Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
w/o pres or current		with	
.500(6)(b) Water Environment (n/a for uplands)			
w/o pres or current		with	
.500(6)(c) Community Structure			
1. Vegetation and 2. Benthic Communities			
w/o pres or current		with	
Seven attributes are considered to generate the score for “Benthic and Sessile Communities”			
Score = sum of above scores/30 (if uplands, divide by 20)		If preservation as mitigation,	
current or w/o pres		Preservation adjustment factor =	
with		Adjusted mitigation delta =	
Delta = [with-current]		For impact assessment areas	
		FL = delta x acres =	
		For mitigation assessment areas	
		RFG = delta/(t-factor x risk) =	

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2. Benthic and Sessile Communities

This indicator is intended to be used in marine or freshwater aquatic systems that are not characterized by a terrestrial or emergent plant community. These systems include live hardbottom communities, such as oyster bars and beds, reefs, and soft-bottom systems such as riverine systems.

Oyster bars and beds in nearshore habitats and estuaries filter large amounts of particulate matter and provide food and habitat for a variety of species, such as boring sponges, mollusks, and polychaete worms.

The distribution and quality of coral reefs reflect a balance of water temperature, salinity, nutrients, water quality, and presence of nearby productive mangrove and seagrass communities.

Benthic infauna of soft-bottom systems stabilize the substrate, provide a food source, and serve as useful indicators of water quality.

All of these communities are susceptible to human disturbance through direct physical damage, such as dredging, filling, or boating impacts, and indirect damage through changes in water quality, currents, and sedimentation.

[Read more on Benthic and Sessile Communities.](#)

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)				
Site/Project Name		Application Number		Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:		Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support				
w/o pres or current		with		
.500(6)(b) Water Environment (n/a for uplands)				
w/o pres or current		with		
.500(6)(c) Community structure				
1. Vegetation and/or 2. Benthic Communities				
w/o pres or current		with		
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres		with		
Delta = [with-current]				
If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =		For impact assessment areas FL = delta x acres =		
If mitigation Time lag (t-factor) = Risk factor =		For mitigation assessment areas RFG = delta/(t-factor x risk) =		

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

2. Benthic and Sessile Communities (continued)

Seven attributes are identified in the UMAM Rule to evaluate the “Benthic and Sessile Communities” section of this category. To provide guidance, examples that depict variation in conditions for each of the attributes are included.

- [Species number and diversity of benthic organisms](#)
- [Non-native or inappropriate species](#)
- [Regeneration, recruitment and age distribution](#)
- [Condition of appropriate species](#)
- [Structural features](#)
- [Topographic features such as relief, stability, and interstitial spaces \(hardbottom and reef communities\) or snags and coarse woody debris \(riverine systems\)](#)
- [Spawning or nesting habitats](#)

Be aware that not all attributes are applicable to all assessment areas and in some cases, some attributes may be more relevant than others.

Community Structure - 62-345.500(6)(c), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
Impact or Mitigation		Assessment conducted by:	
		Assessment date:	
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate (7) Condition is less than optimal, but sufficient to maintain most wetland/surface water functions
		Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support			
w/o pres or current		with	
.500(6)(b) Water Environment (n/a for uplands)			
w/o pres or current		with	
.500(6)(c) Community structure			
1. Vegetation and/or 2. Benthic Community			
w/o pres or current		with	
Score = sum of above scores/30 (if uplands, divide by 20) current or w/o pres		with	
Delta = [with-current]			
If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =		For impact assessment areas FL = delta x acres =	
If mitigation Time lag (t-factor) = Risk factor =		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

2. Benthic and Sessile Communities (continued)

The final score for the Community Structure – Benthic and Sessile Communities category is a reflection of the overall condition of an assessment area, taking into consideration all applicable attributes (do not score each attribute and average them in the end, but rather think of this in terms of what final score best fits the overall conditions of the assessment area). Any whole number score between 0-10 may be used that best represents the level of function of the assessment area.

The rule lists descriptors of attributes for 4 categories of scores as guidance:

- A score of (10) means that the benthic communities are indicative of conditions that provide optimal support for all of the functions typical of the assessment area and provide optimal benefit to fish and wildlife.
- A score of (7) means that, relative to ideal habitat, the benthic communities of the assessment area provide functions at 70% of the optimal level.
- A score of (4) means that, relative to ideal habitat, the benthic communities of the assessment area provide functions to 40% of the optimal level.
- A score of (0) means that the benthic communities do not support the functions identified and do not provide benefits to fish and wildlife.

A [Summary Worksheet](#) for Benthic and Sessile Communities is included to help in the field assessment scoring.

Mitigation Determination

This section describes step by step procedures for incorporating the Preservation Adjustment Factor, Time Lag, and Risk to determine the amount of mitigation required

Part II Score - 62-345.500(7), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)				
Site/Project Name		Application Number		Assessment Area Name or Number
Impact or Mitigation		Assessment conducted by:		Assessment date:
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Optimal (10) Condition is optimal and fully supports wetland/surface water functions	Moderate(7) Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal (4) Minimal level of support of wetland/surface water functions	Not Present (0) Condition is insufficient to provide wetland/surface water functions
.500(6)(a) Location and Landscape Support				
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>				
.500(6)(b) Water Environment (n/a for uplands)				
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>				
.500(6)(c) Community structure				
1. Vegetation and/or 2. Benthic Community				
w/o pres or current <input type="checkbox"/> with <input type="checkbox"/>				
Score = sum of above scores/30 (if uplands, divide by 20)				
If preservation as mitigation, Preservation adjustment factor = Adjusted mitigation delta =				
For impact assessment areas FL = delta x acres =				
For mitigation assessment areas RFG = delta/(t-factor x risk) =				
Delta = [with-current] - [current or w/o pres]				

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

The Part II score for an impact, wetland, or surface water mitigation assessment area is determined by summing the scores for each of the indicators and dividing that value by 30 to yield a number between 0 and 1. For upland mitigation assessment areas, the Part II score is determined by summing the scores for the location and community structure indicators and dividing that value by 20 to yield a number between 0 and 1. [Read more on scoring.](#)

The mathematical difference between the current condition and with-impact condition assessment, and between the current condition or without preservation and the with mitigation condition assessments is termed the “delta.” [Read more on “delta.”](#)

Preservation Adjustment Factor - 62-345.500 (3), FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)											
Site/Project Name		Application Number									
Impact or Mitigation		Assessment Area Name or Number									
		Assessment conducted by:									
		Assessment date:									
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Optimal (10)</th> <th style="width: 25%;">Moderate (7)</th> <th style="width: 25%;">Minimal (4)</th> <th style="width: 25%;">Not Present (0)</th> </tr> <tr> <td>Condition is optimal and fully supports wetland/surface water functions</td> <td>Condition is less than optimal, but sufficient to maintain most wetland/surface water functions</td> <td>Minimal level of support of wetland/surface water functions</td> <td>Condition is insufficient to provide wetland/surface water functions</td> </tr> </table>		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions
Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)								
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions								
.500(6)(a) Location and Landscape Support <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>											
.500(6)(b) Water Environment (n/a for uplands) <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>											
.500(6)(c) Community structure 1. Vegetation and/or 2. Benthic Community <div style="display: flex; justify-content: space-between;"> w/o pres or current with </div> <div style="display: flex; justify-content: space-between;"> <input style="width: 40px; height: 20px;" type="text"/> <input style="width: 40px; height: 20px;" type="text"/> </div>											
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Delta = [with-current] <div style="border: 1px solid black; height: 20px; width: 100%;"></div>		<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> If mitigation Time lag (t-factor) = Risk factor = </div> <div style="border: 1px solid black; padding: 5px;"> For mitigation assessment areas RFG = delta/(t-factor x risk) = </div>									

When assessing preservation, the gain in ecological value is determined by multiplying the delta by a preservation adjustment factor. The preservation adjustment factor is scored on a scale from 0 (no preservation value) to 1 (optimal preservation value), on one-tenth increments. The score is based on:

1. The extent the preserved area will promote natural ecological conditions such as fire patterns or the exclusion of invasive exotic species.
2. The ecological and hydrological relationship between wetlands, other surface waters, and uplands to be preserved.
3. The scarcity of the habitat provided by the proposed preservation area and the level of use by listed species.
4. The proximity of the preserved area to areas of national, state, or regional ecological significance, and whether the areas to be preserved include corridors between these habitats.
5. The extent and likelihood of potential adverse impacts if the assessment area were not preserved.

[Read more on Preservation Adjustment Factor](#)

Time Lag, Risk, and Mitigation Determination - 62-345.600, FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)											
Site/Project Name		Application Number									
Impact or Mitigation		Assessment Area Name or Number									
		Assessment conducted by:									
		Assessment date:									
Scoring Guidance The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Optimal (10)</th> <th style="width: 25%;">Moderate (7)</th> <th style="width: 25%;">Minimal (4)</th> <th style="width: 25%;">Not Present (0)</th> </tr> <tr> <td>Condition is optimal and fully supports wetland/surface water functions</td> <td>Condition is less than optimal, but sufficient to maintain most wetland/surface water functions</td> <td>Minimal level of support of wetland/surface water functions</td> <td>Condition is insufficient to provide wetland/surface water functions</td> </tr> </table>		Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions
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Time lag (t-factor) =											
Risk factor =											

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

Time Lag

The time lag associated with mitigation means the period of time between when the functions are lost at an impact site and when those functions are replaced by the mitigation. The time lag, in years, is related to a factor (T-factor) as established in Table 1 below, to reflect the additional mitigation needed to account for the deferred replacement of wetland or surface water functions. [Read more on time lag](#)

TABLE 1.

Year	T-factor
< or = 1	1
2	1.03
3	1.07
4	1.10
5	1.14
6 – 10	1.25
11 – 15	1.46
16 – 20	1.68
21 – 25	1.92
26 – 30	2.18
31 – 35	2.45
36 – 40	2.73
41 – 45	3.03
46 – 50	3.34
51 – 55	3.65
>55	3.91

Time Lag, Risk, and Mitigation Determination - 62-345.600, FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
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If mitigation Time lag (t-factor) = Risk factor =		For mitigation assessment areas RFG = delta/(t-factor x risk) =	

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

Risk

For mitigation assessment areas, mitigation **risk** shall be evaluated to account for the degree of uncertainty that the proposed conditions will be achieved, resulting in a reduction in the ecological value of the mitigation assessment area. The assessment area shall be scored on a scale from 1 (for no or *de minimus* risk) to 3 (high risk), on quarter-point (0.25) increments. A score of one would most often be applied to mitigation conducted in an ecologically viable landscape and deemed successful or clearly trending towards success prior to impacts, whereas a score of three would indicate an extremely low likelihood of success based on a number of ecological factors.

[Read more on risk.](#)

Time Lag, Risk, and Mitigation Determination - 62-345.600, FAC

PART II – Quantification of Assessment Area (impact or mitigation) (See Sections 62-345.500 and .600, F.A.C.)			
Site/Project Name		Application Number	
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Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

Functional Loss (FL)

The loss of functions provided by impact assessment areas is determined using the following formula: Functional loss (FL) = Impact Delta x Impact Acres.

[Read more on Functional Loss](#)

Relative Functional Gain (RFG)

The relative gain of functions provided by a mitigation assessment area must be adjusted for time lag and risk using the following formula:

Relative functional gain (RFG) = Mitigation Delta (or adjusted mitigation delta for preservation) / (risk x t-factor).

[Read more on Relative Functional Gain](#)

Mitigation Determination Formulas - 62-345.600 (3), FAC

Mitigation Determination Formulas (See Section 62-345.600(3), F.A.C.)

For each impact assessment area:

(FL) Functional Loss = Impact Delta X Impact acres

For each mitigation assessment area:

(RFG) Relative Functional Gain = Mitigation Delta (adjusted for preservation, if applicable)/((t-factor)(risk))

(a) Mitigation Bank Credit Determination

The total potential credits for a mitigation bank is the sum of the credits for each assessment area where assessment area credits equal the RFG times the acres of the assessment area scored

Bank Assessment Area	RFG	X	Acres	= Credits
example				
a.a.1				
a.a.2				
total				

(b) Mitigation needed to offset impacts, when using a mitigation bank

The number of mitigation bank credits needed, when the bank or regional offsite mitigation area is assessed in accordance with this rule, is equal to the summation of the calculated functional loss for each impact assessment area.

Impact Assessment Area	FL	=	Credits needed
example			
a.a.1			
a.a.2			
total			

(c) Mitigation needed to offset impacts, when not using a bank

To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there are more than one impact assessment area or more than one mitigation assessment area, the total functional loss and total relative functional gain is determined by summation of the functional loss (FL) and relative functional gain (RFG) for each assessment area.

	FL	/	RFG	= Acres of Mitigation
example				
a.a.1				
a.a.2				
total				

After calculating the FL and RFL, you can use the Mitigation Determination Formulas on the left to determine:

1. Total Potential credits for a mitigation bank
2. Mitigation needed to offset impacts when using a bank
3. Mitigation needed to offset impacts, when not using a bank

Section Divider

Tools

This section introduces a tool developed by the UF-CFW to help in the assessment of the Location and Landscape Support section of UMAM

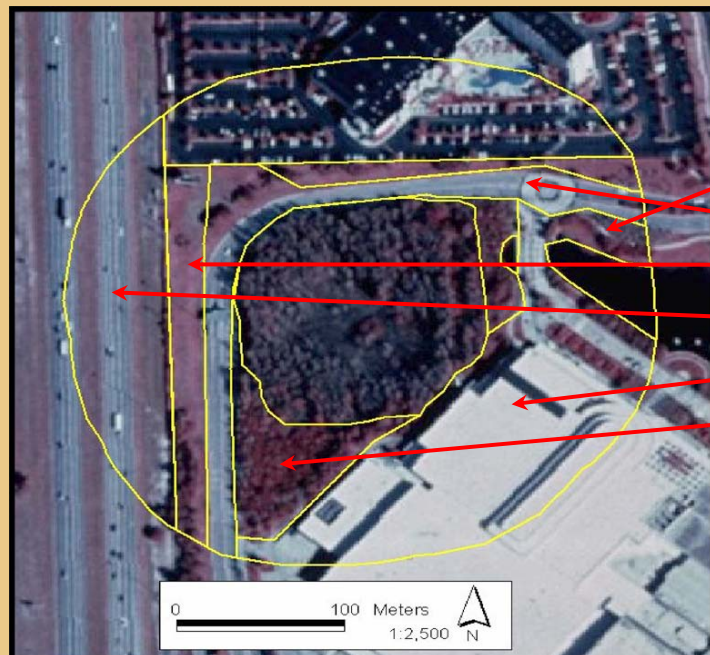
Landscape Support Index (LSI)*

Location and Landscape Support – The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area, its relationship with surrounding areas, and the conditions in those surrounding areas.

Since many species that nest, feed or find cover in a specific habitat type are also dependent to varying degrees upon other habitats that are present in the surrounding landscape, the LSI provides a “numeric score” of landscape support which is based on the intensity of human use of the surrounding landscape. The ERAtools contains a calculator for calculating the LSI.

The LSI is based on detailed studies of wetlands throughout Florida that were conducted by the Center for Wetlands at the University of Florida. [Scientific reports](#) for these studies are available from the Center for Wetlands or Florida Department of Environmental Protection.

* The LSI is *not* part of Ch 62-345, but it is presented here as a tool that may be used to assist in both the qualitative characterization and subsequent quantitative assessment of the project area.



Land Use	Area (m2)	Area Contribution	LSI Coefficient	LSI Contribution
LI-Open Space	7893.2	09	9.05	0.85
LI-Transportation	10029.3	12	2.43	0.29
MI-Open Space	10725.3	13	6.57	0.84
HI-Transportation	12884.6	15	1.91	0.29
HI-Commercial	42042.5	50	0.91	0.46
Wetland	20332.1			
	=sum of area (m2)			= sum for LSI Value
	83574.9			2.74

The LSI is a number between 0 and 10, with the higher score signifying a high level of Location and Landscape Support. This number is based on a 100 meter (~300 feet) buffer around the entire wetland, and it takes into account the intensity of development and resulting practices in the surrounding land uses.

The ERAtools application will automatically calculate the LSI for any site included in the National Wetlands Inventory (NWI) coverage. If a site is not included in the NWI, the boundary of the site must be digitized before performing the operation.

Section Divider

Office Module ~ Part 1: Qualitative Characterization (continued)

- **FLUCCS code for ecological communities and land cover**

Guidance - generally applicants will use the FLUCCS code for delineation of land cover and land uses in the assessment area. If they do not use the FLUCCS classification system it may be possible to use the [FLUCCS classification cross-reference table](#) to cross reference land cover classes. The FLUCCS classification system for certain wetlands and waters is given below.

Florida Land Use Cover and Forms Classification System (FLUCCS, January 1999)

610 Wetland Hardwood Forests

- 611 Bay Swamps
- 612 Mangrove Swamps
- 613 Gum Swamps
- 614 Titi Swamps
- 615 Stream and Lake Swamps (Bottomland)
- 616 Inland Ponds and Sloughs
- 617 Mixed Wetland Hardwoods
- 618 Willow and Elderberry
- 619 Exotic Wetland Hardwoods

640 Vegetated Non-Forested Wetlands

- 641 Freshwater Marshes
- 642 Saltwater Marshes
- 643 Wet Prairies
- 644 Emergent Aquatic Vegetation
- 645 Submergent Aquatic Vegetation
- 646 Treeless Hydric Savanna

620 Wetland Coniferous Forests

- 621 Cypress Forests
- 622 Pond Pine
- 623 Atlantic White Cedar
- 624 Cypress-Pine-Cabbage Palm
- 625 Hydric Pine Flatwoods
- 626 Hydric Pine Savanna
- 627 Slash Pine Swamp Forest

630 Wetland Forested Mixed

- 631 Wetland Scrub

650 Non-Vegetated

- 651 Tidal Flats
- 652 Shorelines
- 653 Intermittent Ponds
- 654 Oyster Bars

- **Size of assessment area**

Guidance - *The assessment area should include all of the wetland or surface water impact site, or mitigation site. The assessment area may be divided into sub units that are sufficiently homogeneous in character, impact, or mitigation benefits to be assessed as single units. The area of each assessment area or sub area should be determined separately.*

The size of the assessment area can be found in the permit application (ie, wetland/surface water area proposed for impact or for mitigation). If you require further confirmation, you can:

- Consult the National Wetlands Inventory (NWI) GIS data layer. If the assessment area is an entire wetland that has been delineated in the NWI, the size of the wetland can be obtained with the information tool.
- Alternatively, the assessment area boundary may need to be digitized using the most recent aerial photography available (www.labins.org), and the area can then be derived from the on-screen delineation .

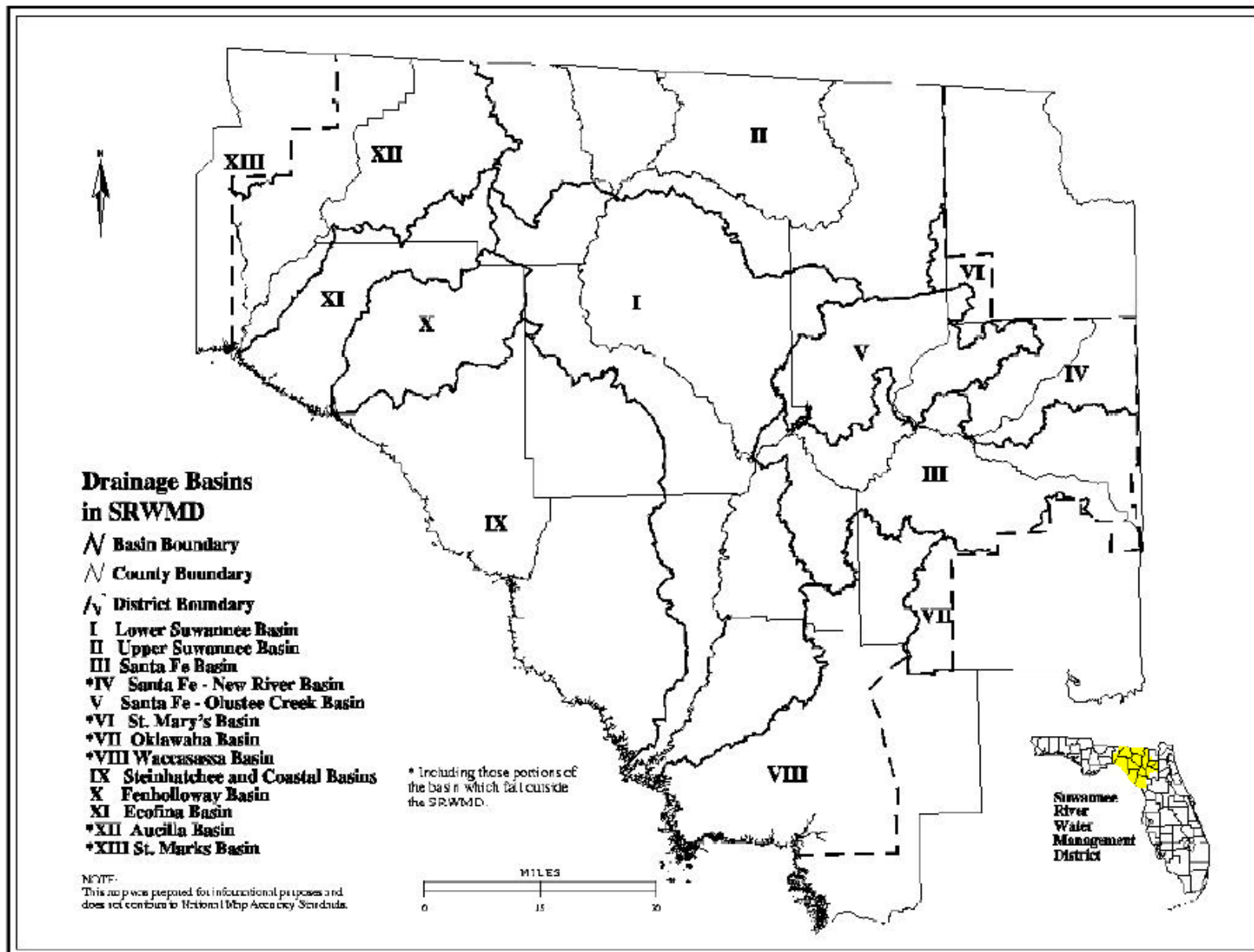
- **Basin/watershed name/number**

Guidance - This information should be included in the permit application. Each water management district (except NWFWMDC) has adopted their own drainage basins for cumulative impact review and their own regional watersheds for mitigation bank regulatory purposes. Consult the following maps and links for additional information.

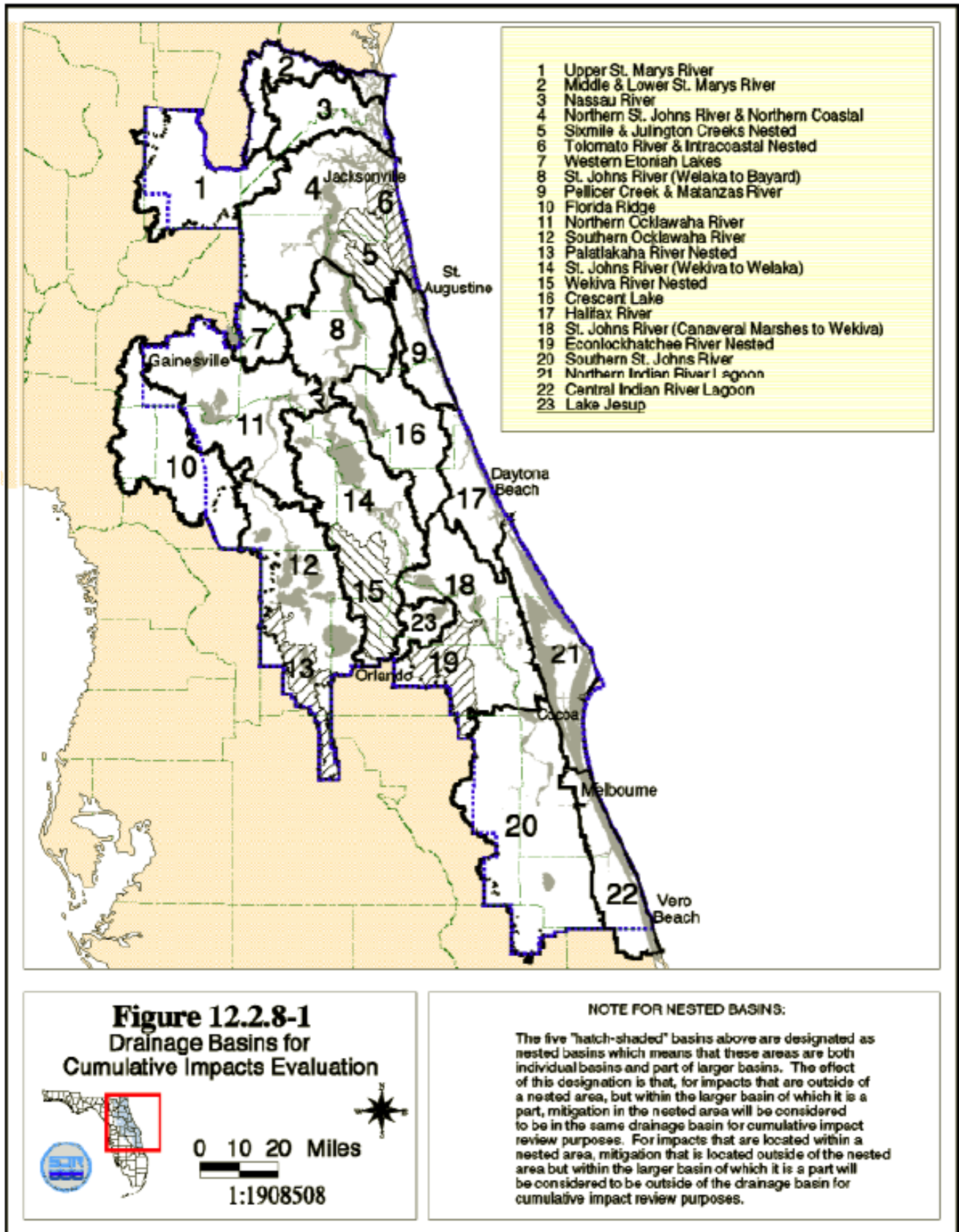
Basin and Watershed data can be obtained from the following web locations:

<http://www.dep.state.fl.us/legal/Rules/rulelistpro.htm#wmd>

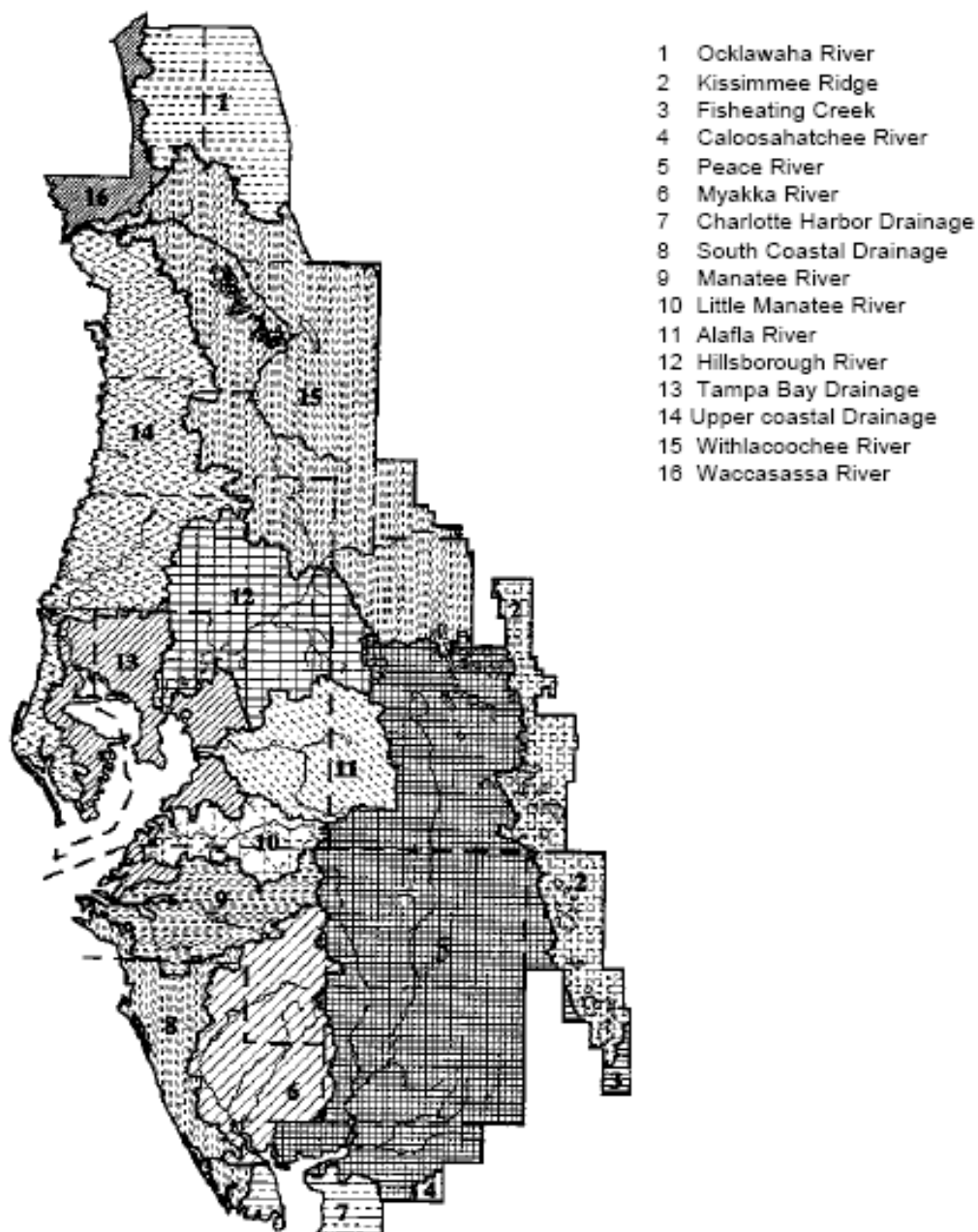
<http://www.dep.state.fl.us/legal/Rules/rulelistpro.htm#saw>

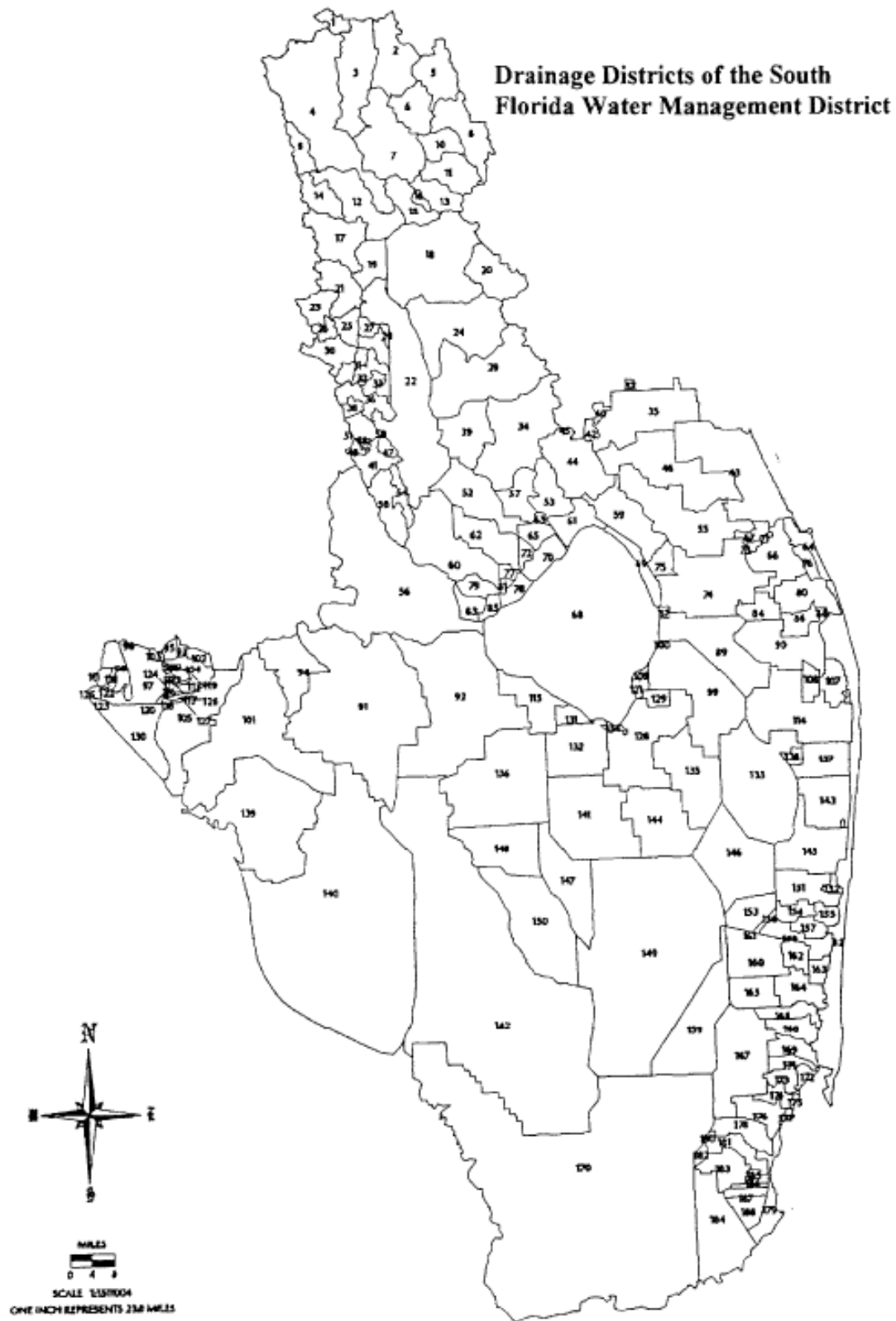


St. Johns River Water Management District



Watersheds and Drainage Basins
in the Southwest Florida Water Management District





SOUTH FLORIDA BASIN TITLES, BY NUMBER

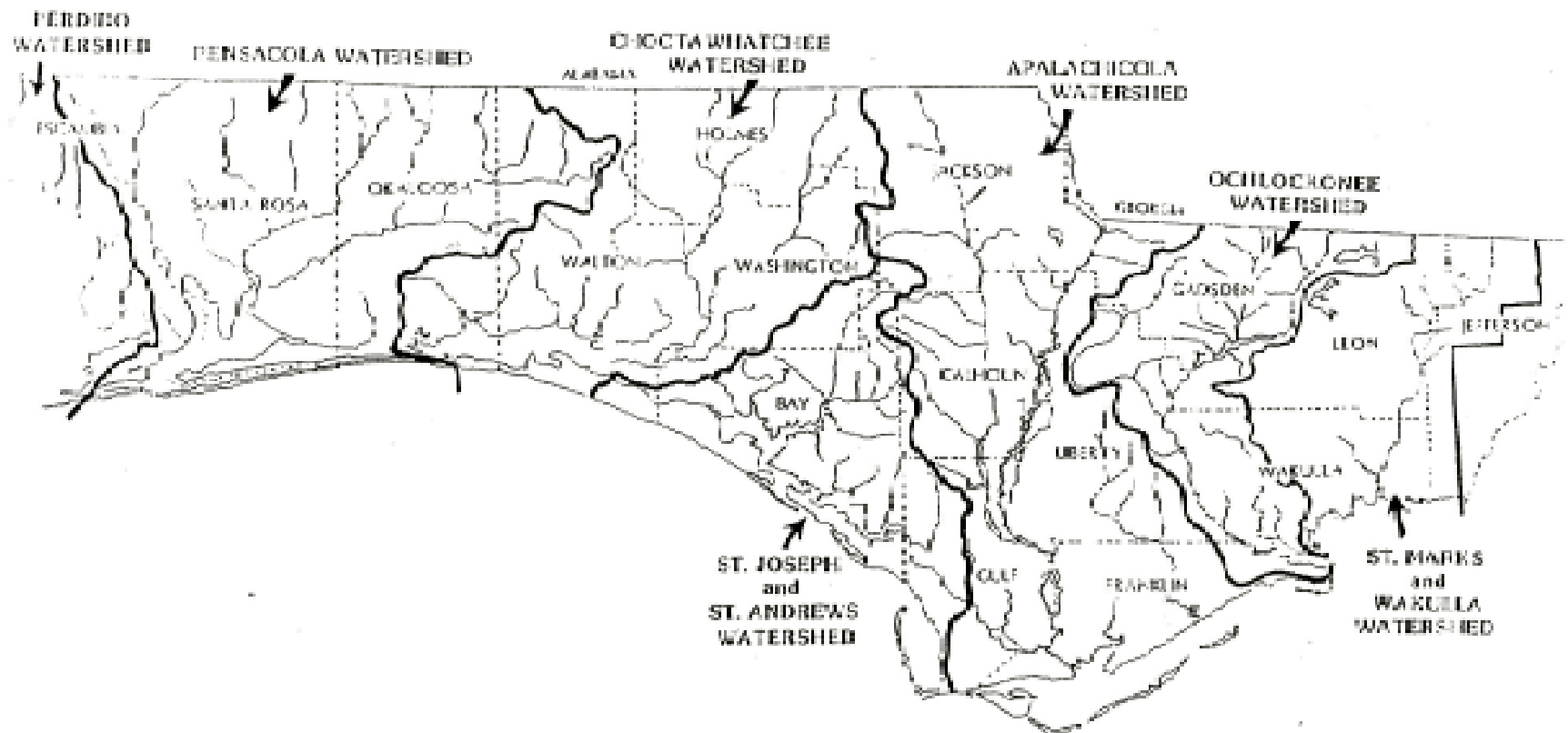
	BASIN NAME	FEATURE
1	Unnamed Lake District	
2	Boggy Creek	
3	Shingle Creek	
4	Reedy Creek	
5	Lake Hart	
6	East Lake Tohopekaliga	
7	Lake Tohopekaliga	
8	Lake Hart	
9	Horse Creek	
10	Alligator Lake	
11	Lake Gentry	
12	Snell Creek	Stream
13	Lake Gentry	
14	Lake Marion Outlet	Outlet
15	Lake Cypress	
16	Canoe Creek	
17	Lake Pierce	
18	Lake Kissimmee	
19	Weohyakapka Creek	Stream
20	Lake marian	
21	Lake Weohyakapka	
22	Arbuckle Creek	Stream
23	Crooked Lake Outlet	Outlet
24	S-85A	
25	Reedy Creek	Stream
26	Clinch-Reedy Canal	Canal
27	Blue Jordan Swamp	Stream
28	Unnamed Run	Stream
29	S-85B	
30	Livingston Creek	Stream
31	Grassy Creek	Stream
32	Bonnet Creek	Stream
33	Palmetto Creek	Stream
34	S-85D	
35	C-25	
36	Carter Creek	Stream
37		Pumped
38	Little Red Water Lk OL	Outlet
39	S-85C	
40		
41	Josephine Creek	Stream
42	Joe Gore Slough	Stream
43	North St. Lucie	
44	Taylor Creek	
45	Fort Drum Creek	Stream
46	C-24	
47	Yellow Bluff Creek	Stream
48	Huckleberry Lake Outlet	Outlet
49	Unnamed	
50	Lake Charlotte Outlet	Outlet

	BASIN NAME	FEATURE
51	Lake Ruth Outlet	Outlet
52	C-41A	
53	C-154	
54	Grassy Creek	Stream
55	C-23	
56	Fisheating Creek	
57	C-85E	
58	Lake Francis Outlet	Outlet
59	Nubbin Slough	
60	C-41	
61	S-133	
62	C-40	
63	S-154C	
64	South Coastal	
65	L-59E	
66	Tidal St. Lucie	
67	Basin 4	
68	Lake Okeechobee	
69	S-135	
70	L-48	
71	Basin 6	
72	L-59W	
73	Basin 5	
74	C-44	
75	C-153	
76	Basin 2	
77	L-80E	
78	L-49	
79	L-81E	
80	Jonathan Dickinson	
81	L-80W	
82	Intercoastal	
83	L-81W	
84	Pal Mar	
85	S-131	
86	South Indian River	
87	Basin 8	
88	Loxahatchee River	
89	L-8	
90	C-18	
91	West Caloosahatchee	
92	East Caloosahatchee	
93	North Fork Alligator Creek	Stream
94	Telegraph Swamp	
95	North Fork Alligator Creek	Stream
96	Direct Runoff to Bay	Runoff
97	Charlotte Harbor	Bay
98	Direct Runoff to Bay	Runoff
99	S-5A	
100	Pelican Lake DD	

SOUTH FLORIDA BASIN TITLES, BY NUMBER

	BASIN NAME	FEATURE
101	Tidal Caloosahatchee	
102	North Prong Alligator Cr	Stream
103	Mangrove Point Canal	Canal
104	Alligator Creek	Stream
105	North Coastal	
106	Direct Runoff to Bay	Runoff
107	C-17	
108	W.P.B. Water	
109	East Beach	
110	Whidden Creek	Bayou
111	Catfish Creek Bayou	Bayou
112	Alligator Creek	Stream
113	Pirate Canal	Canal
114	C-51	
115	C-21	
116	Direct Runoff to Bay	Runoff
117	Mound Creek	Stream
118	Direct Runoff to Bay	Runoff
119	Winegourd Creek	Stream
120	Direct Runoff to Bay	Runoff
121	715 Farms	
122	Bogges Hole Outflow	Stream
123	Direct Runoff to Bay	Runoff
124	Direct Runoff to Bay	Runoff
125	Direct Runoff to Bay	Runoff
126	Direct Runoff to Bay	Runoff
127	Bear Branch	Drain
128	S-2	
129	East Shore	
130	Charlotte Harbor	
131	S-236	
132	S-3	
133	Conservation Area 1	
134	South	
135	S-8	
136	C-139	
137	C-16	
138	C-16N	
139	Estero Bay	
140	West Collier	
141	S-8	
142	East Collier	
143	C-15	
144	S-7	

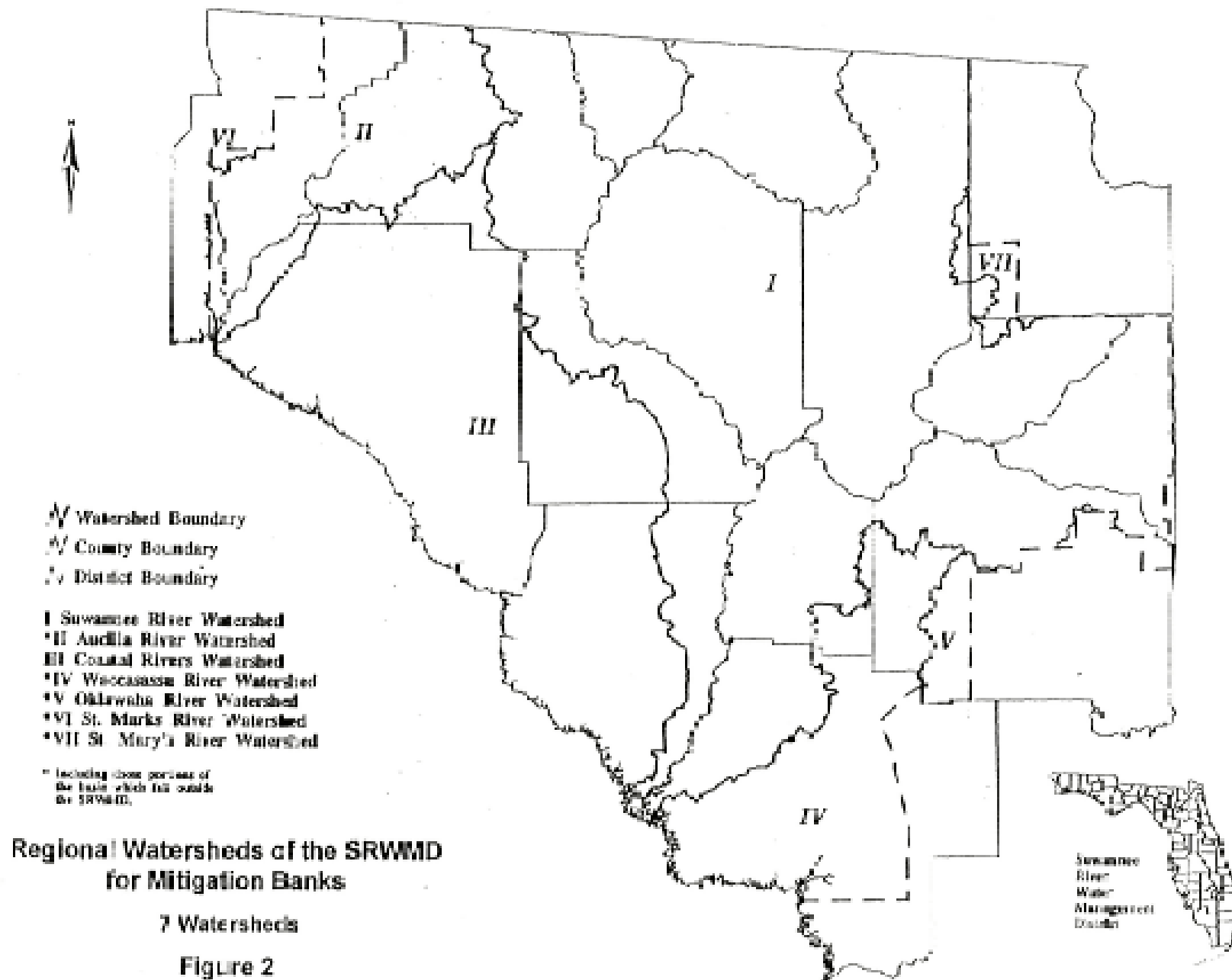
	BASIN NAME	FEATURE
145	Hillsboro Canal	
146	Conservation Area 2A	
147	L-28 Interceptor	
148	Feeder Canal	
149	Conservation Area 3A	
150	L-28 Gap	
151	C-14	
152	Pompano Canal	
153	Conservation Area 2B	
154	C-13 West	
155	C-13 East	
156	L-35A Borrow	
157	C-12	
158	North New River	
159	Conservation Area 3B	
160	C-11 East	
161	North New River	
162	C-11 East	
163	C-10	
164	C-9 East	
165	C-9 West	
166	C-8	
167	Area B	
168	C-7	
169	C-6	
170	Everglades National Park	
171	Tamiami East	
172	DA-1	
173	Coral Gables	
174	C-2	
175	DA-2	
176	C-100	
177	DA-3	
178	C-1	
179	DA-4	
180	C-111	
181	C-102	
182	C-111	
183	C-103	
184	C-111	
185	Homestead	
186	North Canal	
187	Florida City	
188	Model Land	



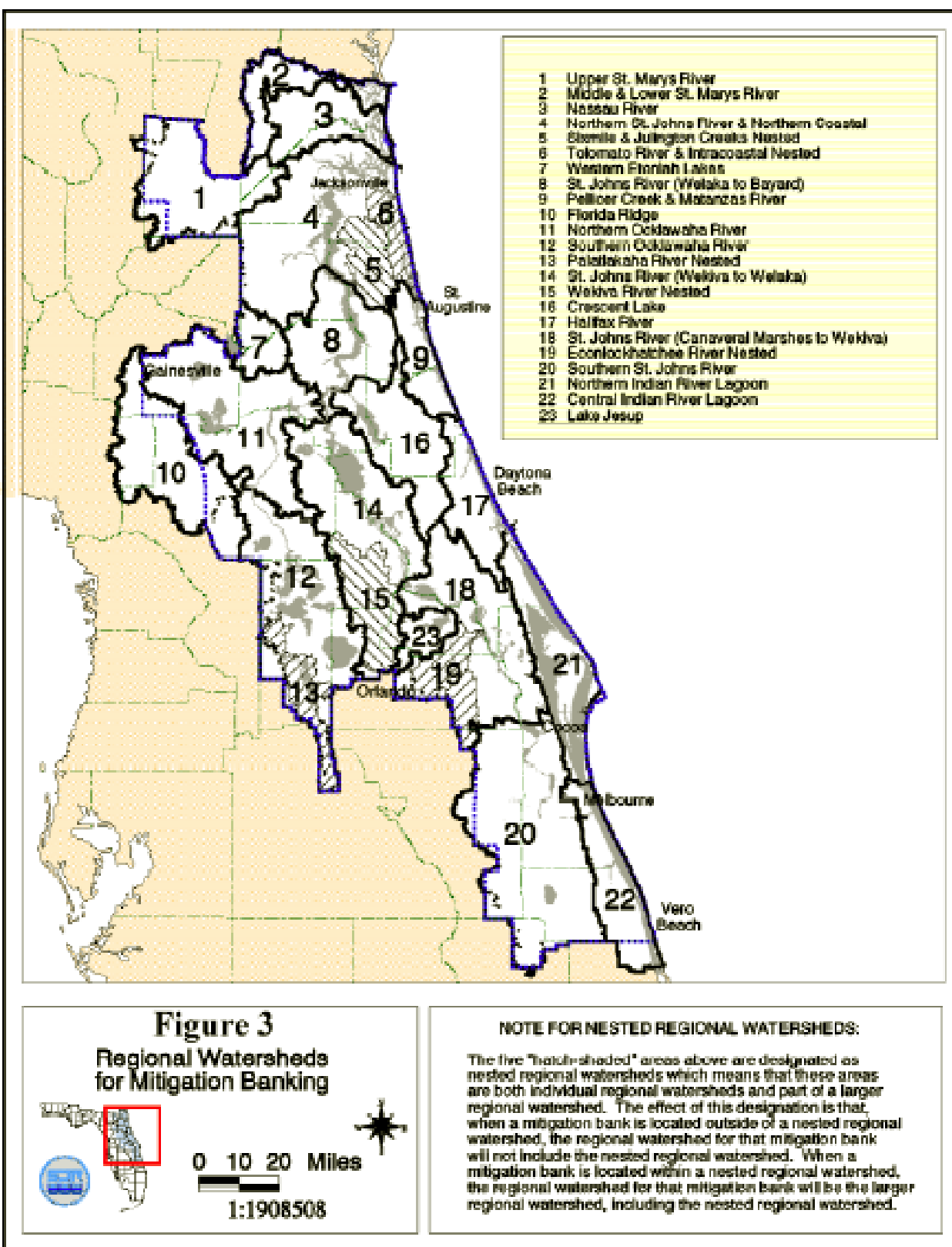
**Regional Watersheds of the NFWMD
for Mitigation Banks**

7 Watersheds

Figure 1



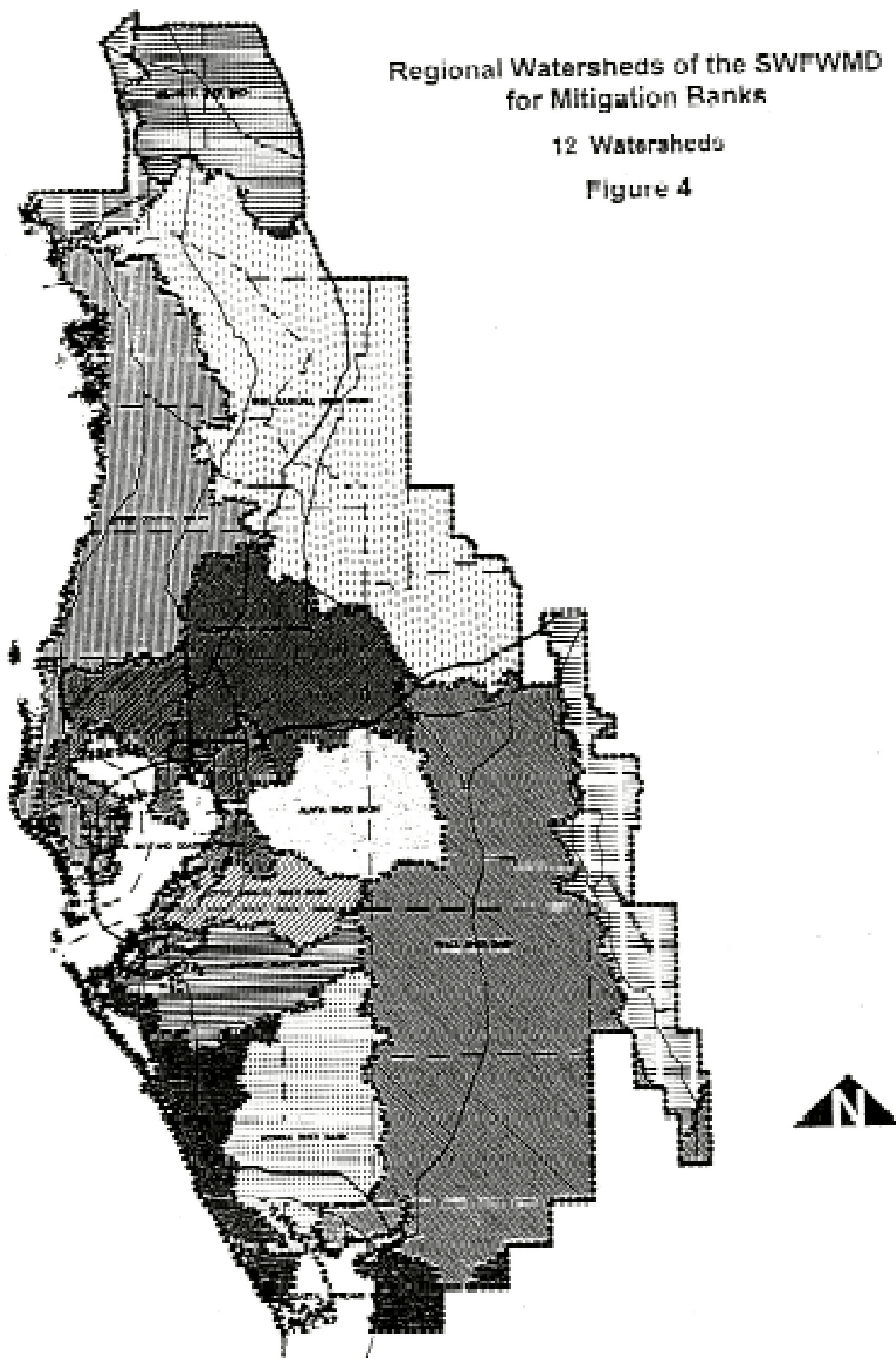
St. Johns River Water Management District

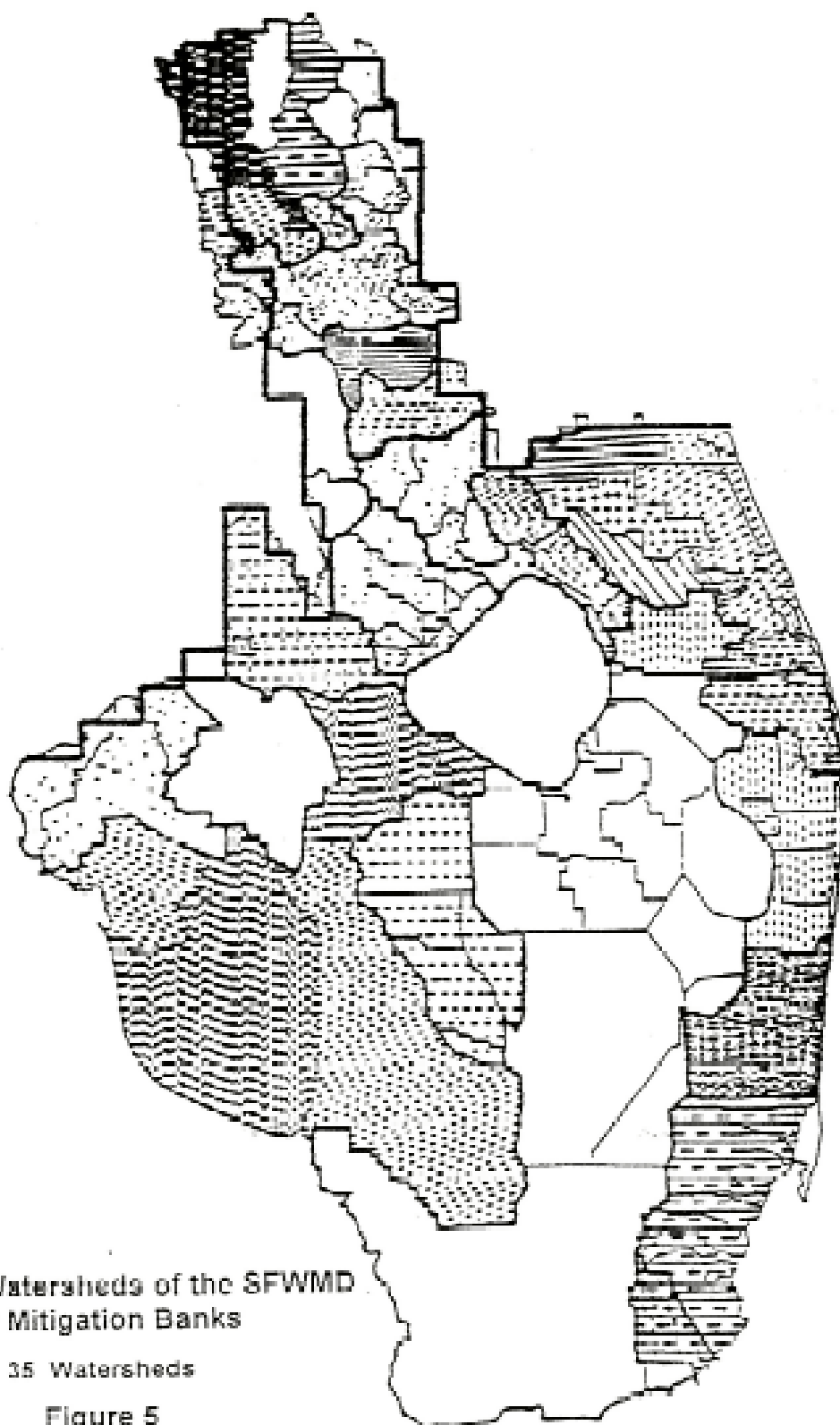


Regional Watersheds of the SWFWMD for Mitigation Banks

12 Watersheds

Figure 4





Regional Watersheds of the SFWMD
for Mitigation Banks

35 Watersheds

Figure 5

Office Module ~ Part 1: Qualitative Characterization (continued)

- **Water bodies and their classification**

Guidance - *Affected water bodies are surface water bodies that are within or immediately adjacent to the assessment area, or that will otherwise be affected by activities within the assessment area. Class means Water Quality Class, and can be obtained from ERAonline. Florida has 5 surface water quality classes as follows:*

Class I - Potable Water Supplies. Fourteen general areas throughout the state including: impoundments and associated tributaries, certain lakes, rivers, or portions of rivers, used as a drinking water supply.

Class II - Shellfish Propagation or Harvesting. Generally coastal waters where shellfish harvesting occurs.

Class III - Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife. The surface waters of the state are Class III unless described in rule [62-302.400 F.A.C.](#)

Class IV - Agricultural Water Supplies. Generally located in agriculture areas around Lake Okeechobee.

Class V - Navigation, Utility and Industrial Use. Currently, there are not any designated Class V bodies of water.

Office Module ~ Part 1: Qualitative Characterization (continued)

- **Maps and aerial photos of the assessment area and surrounding area**

Guidance - *The ERAtools contains a wealth of information that can be accessed to develop responses to the questions pertaining to:*

Geographic relationship and hydrologic connections - are there significant geographic relationships to other ecological communities, sink holes, etc. that need to be noted, or hydrologic connections to uplands, wetlands or surface water bodies?

Description of the assessment area - briefly describe the landscape position and surrounding land uses and land cover.

Significant nearby features - Are there significant nearby features like wildlife nesting areas, known occurrences of endangered species, land uses that may enhance or degrade the assessment area?

Uniqueness - The relative rarity of the wetland or other surface water and floral and faunal components on the assessment area in relation to the surrounding regional landscape;

Use maps and aerial photos of the assessment area, the 100 meter buffer around the assessment area, and a 1 mile buffer around the assessment area. Note and document geographic relationships and hydrologic connections, significant nearby features, and the uniqueness of the ecological communities of the assessment areas. Develop a general description of the assessment area and its surrounding area.

*The Standard Resources at Risk (RAR) Report also provides information on a number of GIS data layers including Jurisdictional Boundaries, Landuse/Landcover, Cultural Resources and Historic & Geological Sites, Permitted Activities , Fish & Wildlife Resources, Water Resources, and Water Quality

Office Module ~ Part 1: Qualitative Characterization (continued)

- [Wetland field guides](#)

Guidance - *The Wetland Field Guides contain a wealth of information about wetland communities. Use the field guides to develop information to address the following:*

Functions performed by the assessment area - does the assessment area provide cover, substrate, and refuge for wildlife; is it a breeding, nesting, denning, or nursery area; does it function as a corridor for wildlife movement; does it provide food chain support? Further, does the assessment area provide natural water storage, natural flow attenuation, or water quality improvement, which would enhance fish, wildlife, and listed species utilization?

Anticipated wildlife utilization - What is the type of use (feeding, breeding, nesting, resting, or denning)? Does the assessment area provide these uses for listed species (threatened, endangered, or species of special concern as defined by Rules 68A-27.003, 68A-27.004, and 68A-27.005, F.A.C.)?

The field guides provide detailed information about structure and function of major wetland community types identified in level 3 FLUCCS codes. In addition, the ERAtools contains maps of listed and endangered species and the following information regarding Fish and Wildlife Resources :

- Florida Natural Areas Inventory (FNAI) Rare/Endangered Plants & Animals, Bird Rookeries, and Rare Habitats;
- Florida Marine Research Institute (FMRI) Mangrove, Saltmarsh, Seagrass, Seagrass Scarring, and Tidal Flats;
- Areas of Critical State Concern;
- Conservation and Recreation Lands (CARL) Projects;
- Conservation Lands
- Manatee Aggregation Areas and Protection Zones; and
- Sea Turtle Nesting Areas.

In addition to the Wetland Field Guides, [general scientific literature](#) may be helpful.

General Scientific Literature

Scientific literature that may be helpful in determining anticipated wildlife utilization and hydrologic functions of assessment areas

- Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>
- Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. February [http://www.fnai.org/PDF/Natural Communities Guide.pdf](http://www.fnai.org/PDF/Natural_Communities_Guide.pdf)
- Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, Florida, USA.
- Soil Conservation Service. 1984. 26 Ecological Communities of Florida.

Additional Literature

The following literature list includes reports and publications written by the UF-CFW:

- Brown, M.T. and M.B. Vivas. 2005. Landscape Development Intensity Index. Environmental Monitoring and Assessment 101: 289-309.
- Cohen, M.J., S.M. Carstenn, and C.R. Lane. 2004. Floristic quality indices for biotic assessment of depressional marsh condition in Florida. Ecological Applications 14(3): 784-794. 14(3): 784-794.
- Cohen, M.J., C.R. Lane, K.C. Reiss, J.A. Surdick, and E. Bardi. 2005. Vegetation based classification trees for rapid assessment of isolated wetland condition. Ecological Indicators 5 (2005) 189-206.
- Doherty, S.J., C.R. Lane, and M.T. Brown. 2000. Proposed classification for biological assessment of Florida inland freshwater Wetlands. Report to the U.S. Environmental Protection Agency. Center for Wetlands, University of Florida, Gainesville, Florida.
- Doherty, S., M. Cohen, C. Lane, L. Line, and J. Surdick. 2000. Biological criteria for inland freshwater wetlands in Florida: a review of technical & scientific literature (1990-1999). Report to the U.S. Environmental Protection Agency. Center for Wetlands, University of Florida, Gainesville, Florida.
- Lane, C.R. 2000. Proposed wetland regions for Florida freshwater wetlands. Report to the Florida Department of Environmental Protection. Howard T. Odum Center for Wetlands, University of Florida, Gainesville, Florida.
- Lane, C.R., M.T. Brown, M. Murray-Hudson, and M.B. Vivas. 2003. The Wetland Condition Index (WCI): biological indicators of wetland condition for isolated depressional herbaceous wetlands in Florida. Report to the Florida Department of Environmental Protection. Howard T. Odum Center for Wetlands, University of Florida, Gainesville, Florida.
- Reiss, K.C. and M.T. Brown. 2005, in review. An evaluation of Florida depressional wetlands: application of USEPA levels 1, 2, and 3 assessment methods. EcoHealth.
- Reiss, K.C. and M.T. Brown. 2005. The Florida Wetland Condition Index (FWCI): developing biological indicators for isolated depressional forested wetlands. Report to the Florida Department of Environmental Protection. Howard T. Odum Center for Wetlands, University of Florida, Gainesville, Florida.
- Reiss, K.C. and M.T. Brown. 2005. Pilot Study - The Florida Wetland Condition Index (FWCI): preliminary development of biological indicators for forested strand and floodplain wetlands. Report to the Florida Department of Environmental Protection. Howard T. Odum Center for Wetlands, University of Florida, Gainesville, Florida.
- Reiss, K.C. 2005, in press. Florida Wetland Condition Index for depressional forested wetlands. Ecological Indicators.
- Lane, C.R. 2005, in review. More bang for the buck: diatom assessment of wetland condition at genus, species, and subspecies taxonomic resolution. EcoHealth.

Office Module ~ Part 1: Qualitative Characterization (continued)

- Regionalized weather data

Guidance: consult regional weather data to better understand seasonal rainfall patterns as background information to assess expected degree of flooding on the site. During dryer times of the year, one can expect lower water levels in wetlands and water bodies, while the converse is true during the wet season.

The following websites provide regionalized historical weather data, including mean precipitation, by nearest city:

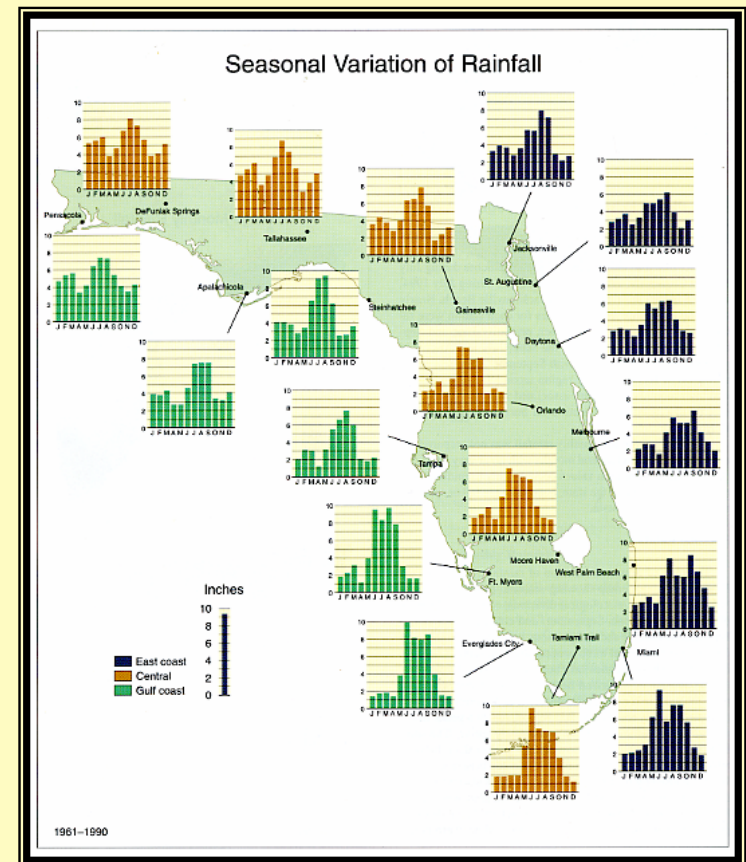
http://www.dnr.state.sc.us/climate/sercc/climateinfo/historical/historical_fl.html

<http://weathercenter.com/almanacs/index.htm>

For current data, visit:

<http://www.weather.com>

Enter your zipcode and click on “monthly” to see current monthly precipitation as well as the previous month compared to the historical averages



From: Fernald, E.A. and E.D. Purdum (eds). 1998. Water Resources Atlas of Florida.

Observed Evidence of Wildlife Utilization...

Guidance: *Become familiar with listed species* and their habitat requirements. Upon arriving at the site and during the site survey pay particular attention to signs of wildlife use. What animals did you flush? Are there signs of animal nesting, feeding or resting? Based on the expected wildlife species, do you encounter any listed species?*

After reviewing the Wetland Field Guides determine the likelihood that the site is used by listed species, consider site characteristics and the range and habitat needs of such species, and whether the proposed system will impact that use;

Look for:

- Flushed animals, animal nests, burrows, etc.
- Remains of animals that may have been preyed upon
- Feathers, tree rubbings, etc. that document animal use
- Scat (animal feces)

* defined by Rules 68A-27.003, 68A-27.004, and 68A-27.005, F.A.C.

Additional Relevant Factors...

Guidance: *After reviewing the application and all information regarding the site, determine if there are additional factors that may influence the assessment. For instance, are there local buffer requirements that should be taken into account? Is the site within the drainage basin of an OFW? Is the site adjacent to significant ecological or archeological resources? Are there plans for further development within the immediate area that might affect this site? Are there historical factors (site History) that may have an impact on the site today?*

Some review for relevant factors can be done in the office. In the field, pay particular attention to surrounding uses, and site conditions that were not evident from the office portion of the site analysis, such as changes in land use subsequent to the date of the latest aerial photography.

Section Divider

Standardized Field Protocol (SFP)*

Review of UMAM Part I - Qualitative Characterization....

PART I – Qualitative Description (See Section 62-345.400, F.A.C.)			
Site/Project Name		Application Number	
Assessment Area Name or Number			
FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e. OFW, AP, other local/state/federal designation of importance)	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands			
Assessment area description			
Should be checked and updated as needed during the field survey...			
Significant nearby features			
Functions		Mitigation for previous permit/other historic use	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Should be filled out in the field during the field survey...			
Additional relevant factors:			
Should be checked and updated in the field during the field survey...			
Assessment conducted by:		Assessment date(s):	
Form 62-345.900(1), F.A.C. [effective date 02-04-2004]			

The Geographic Relationships/Hydrologic Connections, Description, and Significant Nearby Features of **Part I – Qualitative Characterization** should be evaluated in light of the information obtained during the field survey, and

During the field assessment, observations of wildlife use or signs of use as well as listed species should be documented in the section related to wildlife utilization in **Part I – Qualitative Characterization**

Finally, the last section of Part I should be updated based on observation of the assessment area and its immediately surrounding area.

* The SFP is **not** part of Ch 62-345, but it is presented here as a tool that may be used to assist in field assessments of the project area.

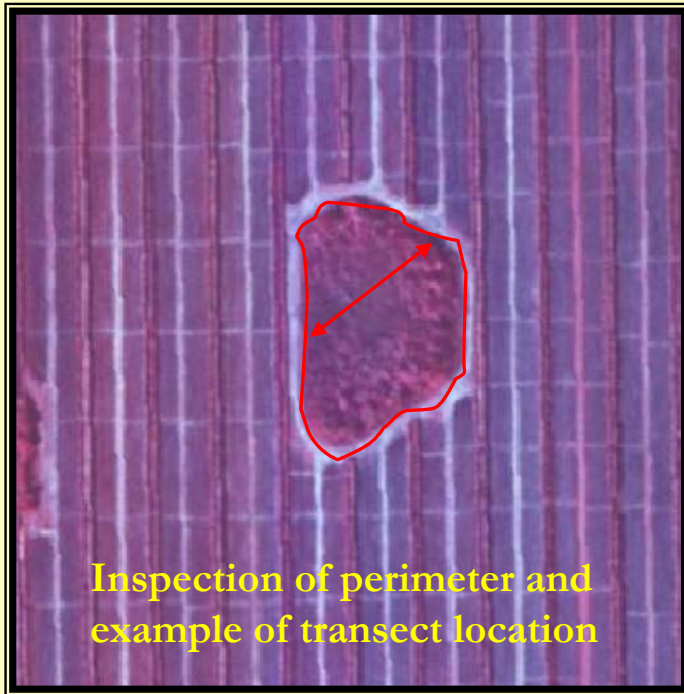
Guidance: *To fill out Part II, it is necessary to conduct a field survey of the assessment area and the areas immediately adjacent to the assessment area. A standardized protocol is necessary to insure reproducibility of results as well as defensibility should the assessment be challenged. The following SFP is the **minimum** necessary to adequately assess an area. If time allows, a more detailed field evaluation should be employed.*

A SFP is part of a Quality Assurance/Quality Control program which results in assessments that are conducted in such a way as to insure that they are comprehensive, repeatable, and defensible.

In addition to a SFP, training and standard scientific precautions are necessary to insure that staff are capable of producing unbiased sampling of the assessment area. The field methods should be calibrated on sites whose ecological functions are known, and duplications conducted where members of the field team assess the same areas and achieve the same results.

* The SFP is **not** part of Ch 62-345, but it is presented here as a tool that may be used to assist in field assessments of the project area.

Description of Standardized Field Protocol (SFP)* (continued)



Freshwater marsh surrounded by citrus groves in Martin County.

Field Surveys

Field surveys should include an inspection of the entire perimeter of the assessment area (i.e. the area that receives **direct impacts** from the proposed activity; the inspection can be done in conjunction with the examination of the wetland delineation line). In addition to the perimeter, an examination of the wetland interior to the fullest extent possible should be conducted, based on time availability and site requirements

These guidelines can be adjusted to account for site accessibility, (both physical and legal), and depending on the homogeneity and size of the site.

* The SFP is **not** part of Ch 62-345, but it is presented here as a tool that may be used to assist in field assessments of the project area.

Following are suggested *minimum* guidelines that can be used to standardize field surveys across all agencies involved in the review process, **if time constraints prohibit a thorough walk-over of the assessment area:**

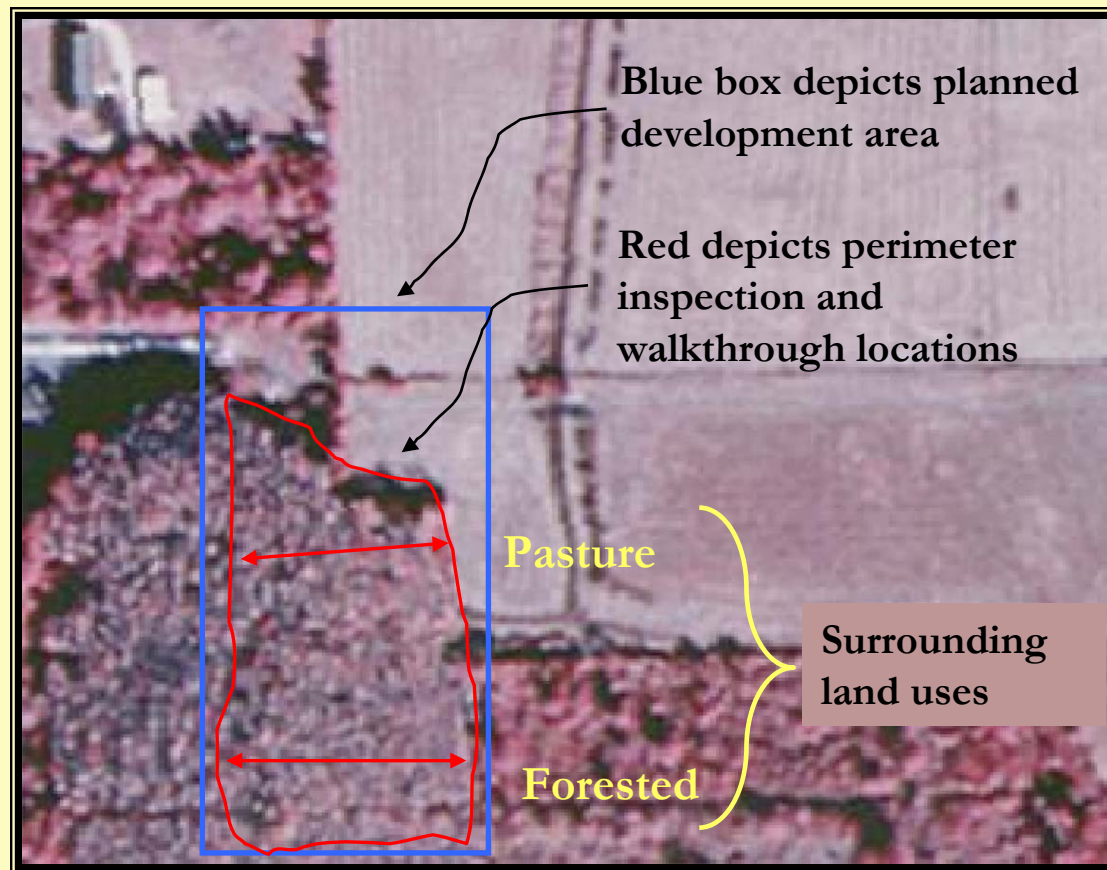
Area	Sampling Effort
1-2 acres	100% of perimeter and minimum of two 30 m transects, depending on homogeneity of site*
>2 to <5 acres	100% of perimeter and minimum of four 30 m transects, depending on homogeneity of site*
>5 to <20 acres	100% of perimeter and minimum of six 30 m transect, depending on homogeneity of site*
>20 acres	100% of perimeter and minimum of ten 30 m transects, depending on homogeneity of site*

* The transects are located from the wetland or water body edge towards the interior of the assessment area, perpendicular to the edge, for a distance of 30 meters or until the limit of the proposed activity, whichever is greater. Depending on the homogeneity of the site, these minimum requirements can be adjusted. For instance, when sampling a *Juncus* spp. marsh where there is ample visibility of the entire site, it may not be necessary to repeat the transects.

* The SFP is *not* part of Ch 62-345, but it is presented here as a tool that may be used to assist in field assessments of the project area.

Description of Standardized Field Protocol (SFP)* (continued)

When assessing an area that is surrounded by different land uses, make sure to divide your efforts equally among the portions of the assessment area that are surrounded by different land uses, so that they can be equally represented. For instance, in the image below, complete a walkthrough of each portion of the site, as depicted below.



Forested wetland in Orange County.

* The SFP is **not** part of Ch 62-345, but it is presented here as a tool that may be used to assist in field assessments of the project area.

Description of Standardized Field Protocol (SFP)* (continued)

Secondary Impacts

Regulatory agencies may have different buffer requirements for wetlands. For instance, the SJRWMD buffer requirement is 25 feet (~7.5 m), while Alachua county requires 35 feet (~11 m). When this requirement is met, the wetland is assumed to receive no secondary impacts. However, when an upland buffer requirement cannot be provided, as in the case of a road or a driveway that bisects a wetland, potential secondary impacts must be assessed. In this case, the area of anticipated secondary impacts needs to be defined, based on the proposed activity, before being scored as a separate assessment area.

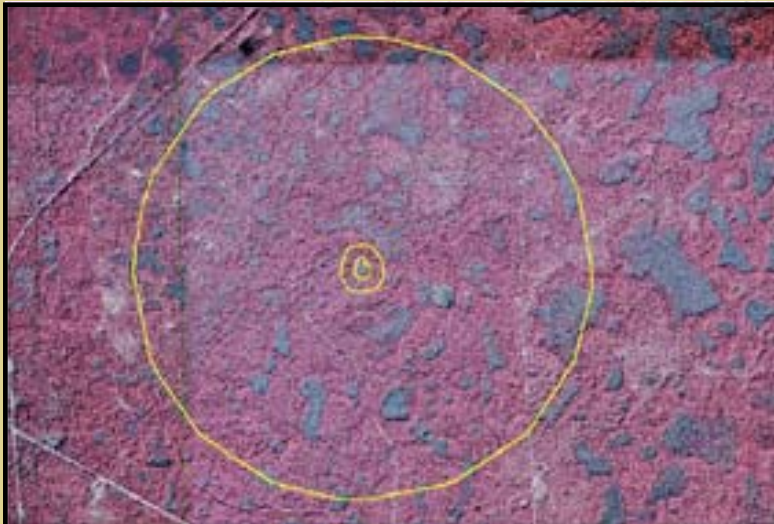
Section Divider

Location and Landscape Support - 62-345.500(6)(a), FAC

a. Support to wildlife by outside habitats

Guidance: *This attribute assesses the extent to which habitats outside the assessment area represent the full range of habitats needed to fulfill the life history requirements of all wildlife listed in Part I, and the extent to which these habitats are available in sufficient quantity to provide optimal support for wildlife. Evaluate an area surrounding the assessment area that is appropriate for the species listed in Part 1.*

Many species that nest, feed, or find cover in a specific habitat or habitat type are also dependent in varying degrees upon other habitats, including upland, wetland, and surface waters, that are present in the regional landscape. Depending on the wildlife species listed in Part I, an area of outside habitats up to 1 mile in radius may be appropriate. [Read more on support to wildlife by outside habitats.](#)



Outside habitat providing full range of habitats needed to support wildlife species of the assessment area (Goethe State Forest).



Outside habitat (fields of row crops) fails to provide support for some, or provides minimal support for many wildlife species (Collier County).

Location and Landscape Support - 62-345.500(6)(a), FAC

b. Invasive exotics or other invasive plant species in proximity to the assessment area

Guidance: *The value of functions provided by an assessment area to fish and wildlife are influenced by the condition of surrounding areas. If surrounding habitats are degraded due to the presence, and especially dominance, of invasive or exotic plant species, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. [Read more on invasive exotics or invasive plant species.](#)*



Wetland in Lee County with wall of melaleuca forming the outside perimeter. (SC)



Wetland in Walton County with no invasive exotics in proximity of the assessment area. (JS)

Location and Landscape Support - 62-345.500(6)(a), FAC

c. Wildlife access to and from outside – distance and barriers

Guidance: The value of functions provided by an assessment area to fish and wildlife are influenced by wildlife access (both to and from outside areas). Access may be influenced by distance to other natural habitats, or by landscape barriers such as roads, walls, canals, and other man made structures. Avian fauna are probably least affected by distance and barriers. Mammals are more affected, but can obviously cover greater distances than can herpetofauna. The degree of influence is highly dependent on type and amount of cover in the intervening area and the types of barriers. Fauna traversing open fields are more susceptible to predators than if traveling through dense shrubs. Well traveled roads offer greater hazards to ground dwelling fauna than seldom traveled “two-track” dirt roads.



Wetland in Osceola County where wildlife access is severely limited due to distance and barriers.



Wetland in Collier County within an agricultural landscape (plowed field, post harvest) that partially limits some wildlife access to and from outside, for example due to exposure to predators or heat. (CRL)

Location and Landscape Support - 62-345.500(6)(a), FAC

c. Wildlife access to and from outside – distance and barriers (continued)



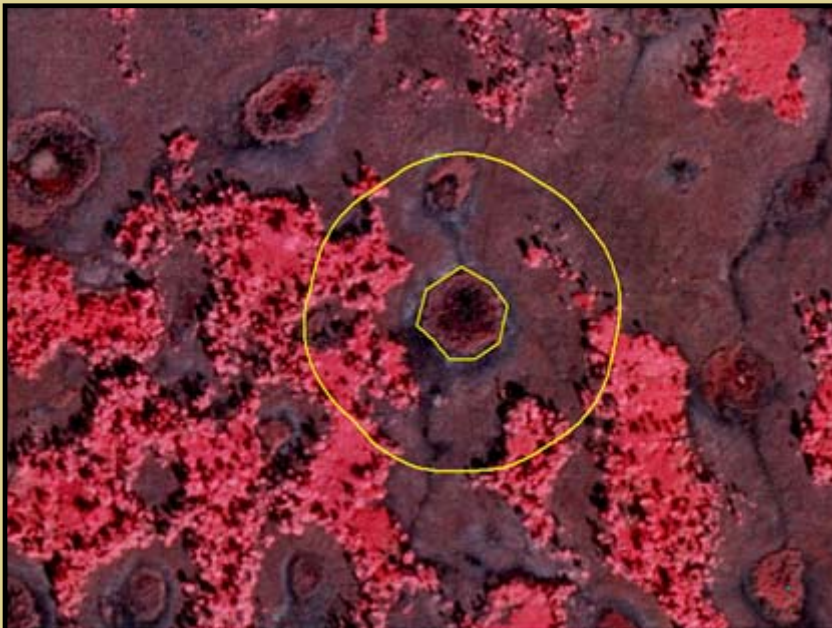
Wetland in Hernando County with no landscape barriers such that wildlife access is not limited. (LS)



Wetland in Palm Beach County where wildlife access is severely limited due to distance and barriers including roads, a parking lot, and single family residential.. (KCR)

Location and Landscape Support - 62-345.500(6)(a), FAC

c. Wildlife access to and from outside – distance and barriers (continued)



Wetland with no landscape barriers such that wildlife access is not limited. (KCR)



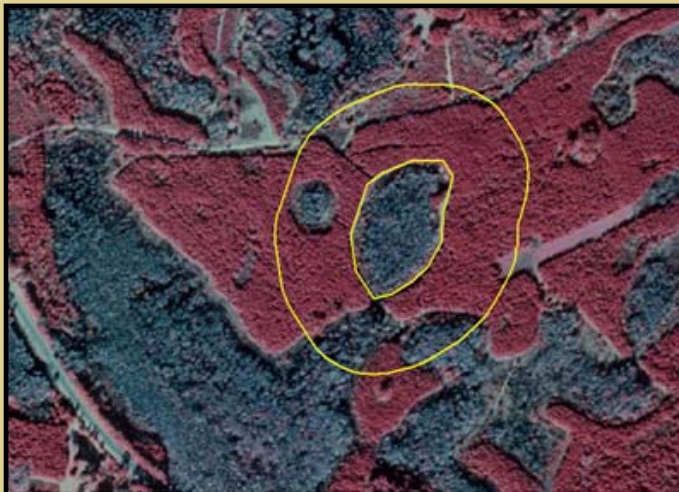
Wetland in Alachua County with landscape barriers (privacy fence) that substantially limits some wildlife access to and from outside. The fence delineates a high density residential area to the N and E of the wetland. (KCR)

Location and Landscape Support- 62-345.500(6)(a), FAC

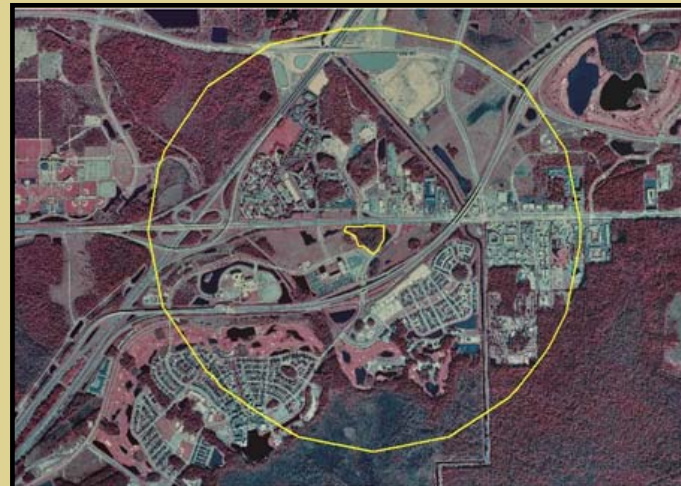
d. Functions that benefit fish and wildlife downstream – distance or barriers

Guidance: *The functions provided by an assessment area to fish and wildlife in “downstream locations” are influenced by distance or barriers that reduce the opportunity for the assessment area to provide these benefits. Are there physical barriers to hydrologic connections? Is the distance so great that little influence to downstream fish and wildlife populations is possible? Are there intervening conditions that make a connection with downstream habitats unlikely (for instance waters with zero oxygen, or highly contaminated)? If the assessment area were to serve as a nursery or breeding area for a species, can the young disperse to downstream habitats?*

Scoring this attribute for isolated wetlands. It is recognized that isolated wetlands **generally** lack surface water connections to downstream waters *except in seasonally high waters*, and as a result, this attribute should be evaluated in light of potential connections rather than existing connections.



Wetlands partially limited by distance and barriers (pine plantation to W and inflow ditch to NW) to provide benefits to downstream habitats (100 m radius around the wetland).

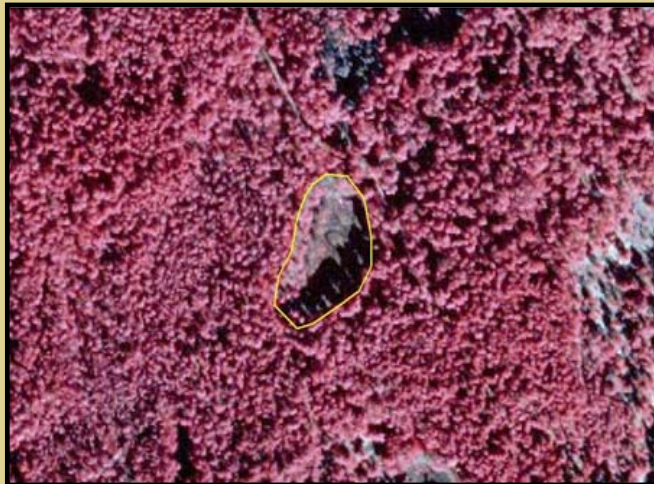


Wetland in Osceola county with distance and barriers that substantially reduce opportunity to provide benefits to downstream habitats (1 mile radius around the wetland).

Location and Landscape Support - 62-345.500(6)(a), FAC

e. Impacts of land uses outside assessment area to fish and wildlife

Guidance: *The functions provided by an assessment area to fish and wildlife are influenced by the intensity and types of land uses in the surrounding areas. Some land uses, by the presence of associated attributes like noise, people, domesticated animals, and runoff of pollutants, can have deleterious effects on habitat quality. Do surrounding land uses have noise levels that might reduce habitat quality? Are there other disturbances such as potential for humans or domesticated animals to affect habitat quality? Is the assessment area situated in such a way as to receive direct runoff from parking lots, roads, or buildings? Are there adjacent land uses that may adversely affect habitat quality because of night lighting, or activity?*



Reference wetland in Levy County, where land uses have no adverse impacts on wildlife (right), while the high density residential landscape in Flagler County (left) may have significant adverse impacts on wildlife.

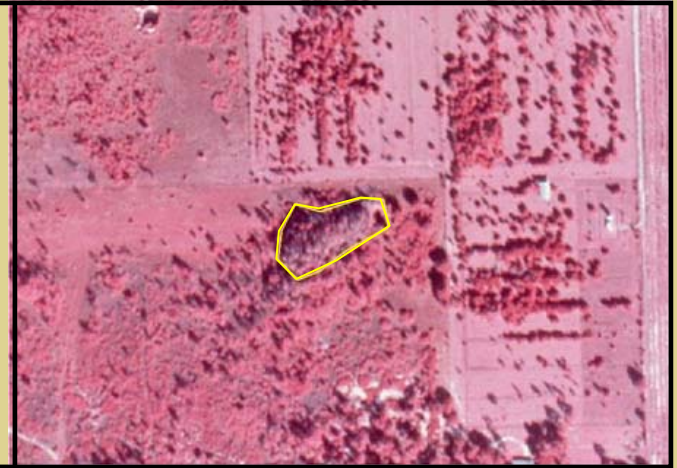


Location and Landscape Support - 62-345.500(6)(a), FAC

e. Impacts of land uses outside assessment area to fish and wildlife (continued)



Low density residential in Collier County (left), and improved and unimproved pasture in Lee County (right), may both provide moderate adverse impacts to wildlife.



Wetland in Hardee county surrounded by mining operations that may have significant adverse impacts to wildlife.

Location and Landscape Support - 62-345.500(6)(a), FAC

f. Benefits to downstream or other hydrologically connected areas

Guidance: *The assessment area may provide water quantity and quality benefits to downstream habitats based on the degree of hydrologic connectivity, which in turn can be impaired by roads, ditches, channels, and other water barriers. Are there hydrologic impediments or flow restrictions that may limit the opportunity of the assessment area to provide benefits to downstream or other hydrologically connected areas?*

Scoring this attribute for isolated wetlands. It is recognized that isolated wetlands **generally** lack surface water connections to downstream waters **except in seasonally high waters**, and as a result, this attribute should be evaluated in light of potential connections during the wet season rather than existing connections.

Wetland in Osceola County, looking downstream. This wetland has limited impediments to downstream connectivity due to ditching. (CV)



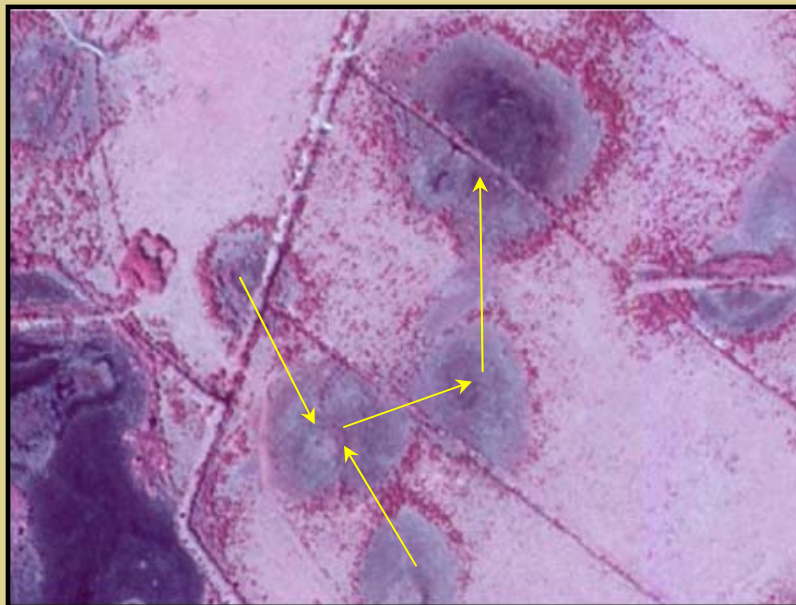
Wetland in Osceola County severely limited by hydrologic impediments such as the highway to the south.

Location and Landscape Support - 62-345.500(6)(a), FAC

g. Benefits to downstream habitats from discharges

Guidance: *This attribute evaluates the extent to which downstream habitats are affected by discharges from the assessment areas. If a downstream system is critically or solely dependent on discharges from the assessment area, then the benefits to downstream habitats would be very high.*

Scoring this attribute for isolated wetlands. It is recognized that isolated wetlands **generally** lack surface water connections to downstream waters **except in seasonally high waters**, and as a result, this attribute should be evaluated in light of potential connections during the wet season rather than existing connections.

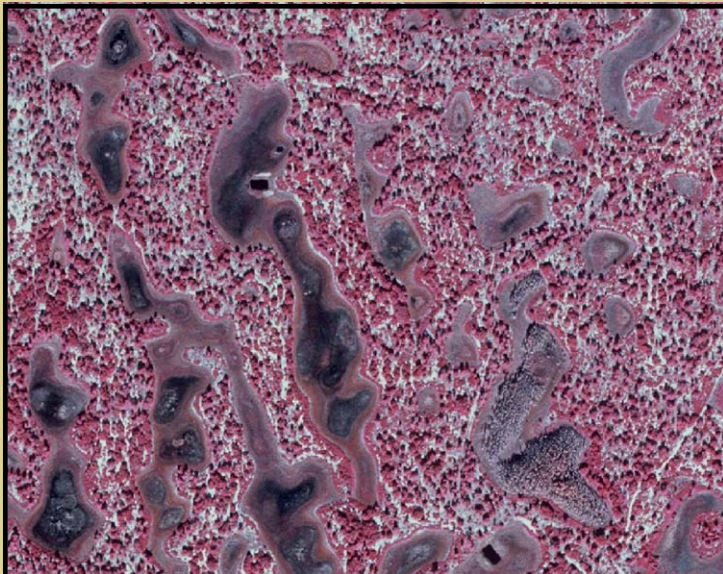


False color image showing a series of herbaceous wetlands in Palm Beach County connected to each other, where each is progressively dependent on the upstream marshes for hydrologic discharges. Even though some channelization has occurred, the wetlands downstream continue to derive significant benefits from discharges from upstream.

Location and Landscape Support - 62-345.500(6)(a), FAC

h. Protection of wetland functions by upland mitigation assessment areas

Guidance: *This factor applies to upland mitigation areas only. It assesses the level of protection of wetland functions by the upland mitigation areas. Does the proposed upland mitigation area adequately protect wetland functions through adjacency? Is it connected? Does it provide some measure of water quality improvement or sediment control? Does it act as a buffer to surrounding land uses or other adverse activities? Does the upland mitigation area provide some measure of habitat enhancement through interconnection with wetland areas?*



Aerial false color image of upland buffer (sand hills in Polk County) that provides hydrologic and habitat support for adjacent wetlands.



Aerial false color image of upland pine community in Marion County with no direct connection to surface water and wetlands.

Section Divider

Support to wildlife by outside habitats

Relevant Literature for assessing the appropriate area for outside habitats

Environmental Law Institute. 2003. **Conservation Thresholds for Land Use Planners.** Environmental Law Institute, Washington D.C., 64 pp. www.elistore.org (Last accessed June 2005)

Conservation Thresholds for Land-Use Planners provides a review and synthesis of information from the most up-to-date scientific literature to provide basic thresholds to land use planners to rely upon when making decisions affecting biodiversity. With more than 1,400 papers and abstracts reviewed for the project and a total of 160 papers selected for inclusion in the review, the report covers conservation thresholds on habitat patch area, percent suitable habitat, edge effects, riparian buffers, and corridors. The report summarizes what is known within the scientific community about potential land use planning and design thresholds.

Semlitsch, R.D. And J. R. Bodie. 2003. **Biological Criteria for Buffer Zones Around Wetlands and Riparian Habitats for Amphibians and Reptiles.** Conservation Biology (17) 5: 1219–1228

The authors provide an estimate of the biologically relevant size of core habitats surrounding wetlands for amphibians and reptiles and summarize data from the literature on the use of terrestrial habitats by amphibians and reptiles associated with wetlands (19 frog and 13 salamander species representing 1363 individuals; 5 snake and 28 turtle species representing more than 2245 individuals). Core terrestrial habitat ranged from 159 to 290 m for amphibians and from 127 to 289 m for reptiles from the edge of the aquatic site.

JEA et al., 1999. **Calculating Buffer Zone Widths for Protection of Wetlands and Other Environmentally Sensitive Lands in St. Johns County** (JEA PROJECT NO.: 19270-485-01). JONES, EDMUNDS & ASSOCIATES, INC. 730 N.E. Waldo Road, Building A Gainesville, Florida 32641)

This report provides a basis for determining appropriate buffer width(s) that will protect environmentally sensitive lands in St. Johns County, Florida, based on results published in the scientific literature. Methodologies based on scientific studies were assembled calculating appropriate buffer widths that will protect aquatic resources in environmentally sensitive lands. Much of the methodology was adopted from previous buffer zone studies conducted in Florida, (referenced throughout the text). Three goals were identified that were used to determine buffer sizes for wetland protection: protection of wildlife habitat; minimization of sediment transport into wetlands; and minimization of groundwater drawdown in wetlands. The report provides methodologies for calculating buffer sizes necessary to achieve these three goals. Volume 1 of the report summarizes information that was reviewed and assessed for developing buffer zone widths for the county, including identification and classification of ecological habitats in the county, review of other county ordinances, review of other wetland regulations, review of related reports and studies, and review of legal implications.

Support to wildlife by outside habitats

Partial List of Spatial Requirements of Wetland-Dependent Native Wildlife Species FROM: JEA et al. 1999				
Species ^A	Scientific Name	Habitat ^E	Spatial Requirements Notes	Spatial Req (ft)
AMPHIBIANS				
Oak Toad ^{B,G}	<i>Bufo quercicus</i>	FL, SH, CY	Similar to gopher frog	6,336
Southern Toad ^G	<i>Bufo terrestris</i>	FL, FM, HK, SH, HS	Similar to green treefrog	180
Florida Cricket Frog ^B	<i>Acris gryllus dorsalis</i>	CY, FL, HS, FM, HK,	Similar to green treefrog	180
Green Treefrog ^{B,G}	<i>Hyla cinerea</i>	FL, FM, HK, SH, CY	Maximum distance found from closest water	180
Pinewoods Treefrog ^{B,G}	<i>Hyla femoralis</i>	FL, HK, HS, SH	Similar to spring peeper	4,000
Barking Treefrog ^{B,G}	<i>Hyla gratiosa</i>	FM, SH, HS	Similar to spring peeper	4,000
Squirrel Treefrog ^{B,G}	<i>Hyla squirella</i>	HS, CY, FL, HK, SH	Similar to green treefrog	180
Little Grass Frog ^{B,G}	<i>Pseudacris ocularis</i>	CY, FL, HK	Similar to green treefrog	180
Southern Spring Peeper ^{B,G}	<i>Pseudacris crucifer bartramiana</i>	CY, HK, HS	Maximum distance from breeding pond	4,000
Ornate Chorus Frog ^B	<i>Pseudacris ornata</i>	CY, FL, HK, HS	Similar to green treefrog	180
Southern Chorus Frog ^C	<i>Pseudacris nigrita</i>	CY, HK	Similar to green treefrog	180
Eastern Narrowmouth Toad ^G	<i>Gastrophryne carolinensis</i>	HS, FL, HK, SH, CY	Similar to spring peeper	4,000
Eastern Spadefoot Toad ^G	<i>Saphiopus holbrookii holbrookii</i>	SH	Similar to spring peeper	4,000
Florida Gopher Frog ^{B,G} (SSC)	<i>Rana capito aesopus</i>	FL, SH, CY	Distance between captures of same individuals	6,336
Bullfrog ^{B,G}	<i>Rana catesbeiana</i>	CY, FL, HK, HS, SH	Maximum distance found from permanent water	350
Pig Frog ^{B,G}	<i>Rana grylio</i>	FL, FM, HK HS, SH	Similar to bullfrog	350
River Frog ^B	<i>Rana heckscheri</i>	CY, FL, FM, HK HS, SH	Similar to bullfrog	350
Bronze Frog ^C	<i>Rana clamitans clamitans</i>	FL, FM, HK HS, SH	Similar to bullfrog	350
Southern Leopard Frog ^G	<i>Rana utricularia</i>	CY, FL,	Similar to bullfrog	350

		FM, HK HS, SH		
Dwarf Salamander ^B	<i>Eurycea quadridigitata</i>	HS, CY, FL, FM, HK	Similar to green treefrog	180
Mole Salamander ^C	<i>Ambystoma talpoideum</i>	FM, CY, FL, HK, HS	Similar to green treefrog	180
Striped Newt ^B	<i>Notophthalmus perstriatus</i>	CY, FL HK, SH	Similar to green treefrog	180
Central Newt ^C	<i>Notophthalmus viridescens louisianensis</i>	SH, CY, FL	Similar to green treefrog	180
Greater Siren ^G	<i>Siren lacertina</i>	HS, HK, FL, CY	Very aquatic habits, needs enough adjacent land to provide good water quality	50
REPTILES				
American Alligator ^G (SSC) (T S/A)	<i>Alligator mississippiensis</i>	HS, CY, FL, HK, SM, SH, FM	Needs land for sunning and nesting	50
Florida Snapping Turtle ^B	<i>Chelydra serpentina osceola</i>	CY, FL, HK, HS, SH, FM	Home range diameter	497
Chicken Turtle ^{B,G}	<i>Deirochelys reticularia</i>	CY, FL, FM, HK, HS, SH	Similar to striped mud turtle	1,350
Carolina Diamondback Terrapin ^B	<i>Malaclemys terrapin centrata</i>	CY, FL, FM, HK, HS, SH, SM,	Similar to Florida snapping turtle	497
Peninsula Cooter ^{B,G}	<i>Pseudemys floridana peninsularis</i>	CY, FL, FM, HK, HS, SH	Similar to striped mud turtle	1,350
Florida Redbelly Turtle ^{B,G}	<i>Pseudemys nelsoni</i>	FM, CY, FL, HK, HS, SH, SM	Similar to striped mud turtle	1,350
Striped Mud Turtle ^{B,G}	<i>Kinosternon baurii</i>	CY, FL, FM, HK, HS, SH	Maximum distance from closest water to winter hibernation site	1,350
Florida Mud Turtle ^{B,G}	<i>Kinosternon subrubrum steindachneri</i>	CY, FL, HK, HS, SH, SM, FM	Similar to striped mud turtle	1,350
Eastern Mud Turtle ^C	<i>Kinosternon subrubrum subrubrum</i>	CY, FL, HK, HS, SH, SM, FM	Similar to striped mud turtle	1,350
Loggerhead Musk Turtle ^G	<i>Sternotherus minor minor</i>	CY, FL, HK, HS, SH, SM, FM	Similar to striped mud turtle	1,350
Common Musk Turtle ^C	<i>Sternotherus odoratus</i>	CY, FL, HK, HS, SH, SM.	Similar to striped mud turtle	1,350

		FM		
Florida Softshell Turtle ^B	<i>Apalone ferox</i>	CY, FL, FM, HK, HS, SH	Similar to Florida snapping turtle	497
Spotted Turtle ^C	<i>Clemmys guttata</i>	CY, FL, FM, HK, HS, SH	Similar to Florida snapping turtle	497
Green Anole ^{B,G}	<i>Anolis carolinensis</i>	CY, FL, HK, HS, SH	Similar to rough green snake	51
Eastern Indigo Snake ^{B,G} (T)(T)	<i>Drymarchon corais couperi</i>	FL, HK, SH	Home range diameter	4,654
Broadhead Skink ^{B,G}	<i>Eumeces laticeps</i>	HK, FL	Similar to rough green snake	51
Yellow Rat Snake ^G	<i>Elaphe obsoleta quadrivittata</i>	CY, FL, FM, HK, HS, SH	Home range diameter	1,297
Eastern Mud Snake ^G	<i>Farancia abacura abacura</i>	CY, FL, FM, HK, HS, SH	Needs land for sunning and laying eggs	50
Rainbow Snake ^B	<i>Farancia erythrogramma</i>	FL, HK, SH	Similar to Eastern garter snake	1,395
Eastern Kingsnake ^B	<i>Lampropeltis getula getula</i>	CY, FL, HK, HS	Similar to scarlet kingsnake	1,664
Florida Water Snake ^G	<i>Nerodia fasciata pictiventris</i>	CY, FL, FM, HK, HS, SH	Needs land for sunning and giving birth	50
Rough Green Snake ^{B,G}	<i>Opheodrys aestivus</i>	CY, FL, HK, SH	Home range diameter	51
Striped Crayfish Snake ^G	<i>Regina alleni</i>	CY, FL, FM, HK, HS, SH	Needs land for sunning and laying eggs	50
Glossy Crayfish Snake ^B	<i>Regina rigida</i>	CY, FL, HK, HS, SH	Similar to green water snake	884
North Florida Swamp Snake ^G	<i>Seminatrix pygaea pygaea</i>	HS, CY, FL, FM, HK, SH	Needs land for sunning and laying eggs	50
Florida Brown Snake ^B	<i>Storeria dekayi victa</i>	FL, HK, HS, SH	Distance between capture of same individual	128
Peninsula Ribbon Snake ^{G,B}	<i>Thamnophis sauritus sackenii</i>	CY, FL, HK, SH, HS	Home range diameter	333
Eastern Garter Snake ^B	<i>Thamnophis sirtalis sirtalis</i>	CY, FL, FM, HK, SH	_ of home range diameter	698
Florida Cottonmouth ^G	<i>Agkistrodon piscivorus</i>	CY, FL, FM, HK, HS, SH	Needs land for sunning and giving birth	50
Timber Rattlesnake ^B	<i>Crotalus horridus</i>	CY, HK	Home range diameter	2,756
Dusky Pigmy Rattlesnake ^G	<i>Sistrurus miliarius barbouri</i>	CY, FL, FM, SH	Home range diameter	368
BIRDS				
Horned Grebe ^C	<i>Podiceps auritus</i>	FM, SM	Similar to pied-billed grebe	240
Common Loon ^C	<i>Gavia immer</i>	FM, SM, HK, SH,	Similar to pied-billed grebe	240

		FL		
Pied-Billed Grebe ^B	<i>Podilymbus podiceps</i>	FM, HK, FL, SH	Minimum distance from humans tolerated	240
Brown Pelican ^F (SSC)	<i>Pelecanus occidentalis</i>	SM	Recommended buffer based on flush distance	351
American White Pelican ^C	<i>Pelecanus erythrorhynchus</i>	SM, FM	Similar to brown pelican	351
Double-Crested Cormorant ^F	<i>Phalacrocorax auritus</i>	SM, SH	Recommended buffer based on flush distance	335
Anhinga ^H	<i>Anhinga anhinga</i>	FM, CY, HS, HK, FL, SH	Minimum distance from humans tolerated while nesting	292
American Bittern ^B	<i>Botaurus lentiginosus</i>	FM, HK	Minimum distance from humans tolerated	180
Least Bittern ^B	<i>Ixobrychus exilis</i>	FM	Minimum distance tolerated from humans	180
Great Blue Heron ^F	<i>Ardea herodias</i>	SM, FM, CY, HS, FL, SH	Recommended buffer based on flush distance	328
Great Egret ^F	<i>Ardea alba</i>	SM, FM, CY, HS, HK, FL, SH	Recommended buffer based on flush distance	299
Snowy Egret ^F (SSC)	<i>Egretta thula</i>	SM, FM, CY, HS, HK, FL, SH	Recommended buffer based on flush distance	285
Little Blue Heron ^F (SSC)	<i>Egretta caerulea</i>	SM, FM, CY, HK, FL, SH	Recommended buffer based on flush distance	341
Tricolored Heron ^F (SSC)	<i>Egretta tricolor</i>	SM, FM, CY, HK, FL, SH	Recommended buffer based on flush distance	269
Reddish Egret ^C (SSC) (W)	<i>Egretta rufescens</i>	SM, FM, CY, HK, FL, SH	Similar to tricolored heron	269
Cattle Egret ^H	<i>Bubulcus ibis</i>	CY, HS, HK, FL, SH	Recommended set back distance	230
Green Heron ^F	<i>Butorides virescans</i>	SM, FM, CY, HS, HK, FL, SH	Similar to tricolored heron	269
Limpkin ^F (SSC)	<i>Aamus guarana</i>	FM, CY, HS, HK	Similar to tricolored heron	269
Sandhill Crane ^G	<i>Girus canadensis</i>	FM, FL	Tends to nest away from roads and other development activities	1,200
Black-crowned Night- Heron ^H	<i>Nycticorax nycticorax</i>	SM, FM, CY, HS, HK, FL, SH	Recommended set back distance	318
Yellow-crowned ^C Night-	<i>Nyctanassa violacea</i>	SM, FM,	Similar to black-crowned	318

Purple Gallinule ^G	<i>Porphyryla martinica</i>	FM	Needs enough adjacent land to provide good water quality	50
Common Moorhen ^G	<i>Gallinula chloropus</i>	FM	Needs enough adjacent land to provide good water quality	50
American Coot ^G	<i>Fulica americana</i>	SM, FM	Needs enough adjacent land to provide good water quality	50
Black-bellied Plover ^C	<i>Pluvialis squatarola</i>	SM	Similar to Wilson's plover	60
Piping Plover ^C (T)(T)	<i>Charadrius melodus</i>	SM	Similar to Wilson's plover	60
Wilson's Plover ^B	<i>Charadrius wilsonia</i>	SM, FM	Fairly tolerant of humans	60
Semipalmated Plover ^F	<i>Charadrius semipalmatus</i>		Recommended buffer based on flushing distance	249
American Oystercatcher ^B (SSC)	<i>Haematopus palliatus</i>	SM	Minimum distance from humans tolerated	180
Black-Necked Stilt ^G	<i>Himantopus mexicanus</i>	SM, FM	Needs enough adjacent land to provide good water quality	50
American Avocet ^C	<i>Recurvirostra americana</i>	SM, FM	Similar to American oystercatcher	180
Greater Yellowlegs ^B	<i>Tringa melanoleuca</i>	SM	Minimum distance from humans tolerated	180
Lesser Yellowlegs ^B	<i>Tringa flavipes</i>	SM	Minimum distance from humans tolerated	180
Solitary Sandpiper ^C	<i>Tringa solitaria</i>	SM	Similar to greater yellowlegs	180
Willet ^F (W)	<i>Catoptrophorus semipalmatus</i>	SM	Recommended buffer based on flush distance	243
Spotted Sandpiper ^B	<i>Actitis macularia</i>	SM	Fairly tolerant of humans	60
Whimbrel ^C	<i>Numenius phaeopus</i>	SM, FM	Similar to greater yellowlegs	180
Long-billed Curlew ^C (W)	<i>Numenius americanus</i>	SM, FM	Similar to greater yellowlegs	180
Marbled Godwit ^C	<i>Limosa fedoa</i>	SM, FM	Similar to greater yellowlegs	180
Red Knot ^C (W)	<i>Calidris canutus</i>	SM, FM	Similar to greater yellowlegs	180
Sanderling ^F	<i>Calidris alba</i>	SM	Recommended buffer based on flush distance	220
Semipalmated Sandpiper ^C	<i>Calidris pusilla</i>	SM	Similar to greater yellowlegs	180
Western Sandpiper ^F	<i>Calidris mauri</i>	SM	Recommended buffer based on flush distance	223
Least Sandpiper ^B	<i>Calidris minutilla</i>	SM	Minimum distance from humans tolerated	240
Dunlin	<i>Calidris alpina</i>	SM	Minimum distance from humans tolerated	300
Stilt Sandpiper ^C (W)	<i>Calidris himantopus</i>	SM	Similar to greater yellowlegs	180
Ruddy Turnstone ^F	<i>Arenaria interpres</i>	SM	Recommended buffer based on flush distance	236
Short-Billed Dowitcher ^B (W)	<i>Limnodromus griseus</i>	SM	Minimum distance from humans tolerated	180
Long-Billed Dowitcher ^B	<i>Limnodromus scolopaceus</i>	SM	Minimum distance from humans tolerated	180
Common Snipe ^B	<i>Gallinago gallinago</i>	SM, FM	Minimum distance from humans tolerated	180
American Woodcock ^B	<i>Scolopax minor</i>	HK, FL	Minimum distance from humans tolerated	180
Laughing Gull ^B	<i>Larus atricilla</i>	SM	Fairly tolerant of humans	60
Bonaparte's Gull ^C	<i>Larus philadelphia</i>	SM	Similar to laughing gull	60
Lesser Black-back Gull ^C	<i>Larus fuscus</i>	SM	Similar to laughing gull	60
Greater Black-back Gull ^C	<i>Larus marinus</i>	SM	Similar to laughing gull	60
Ring-Billed Gull ^B	<i>Larus delawarensis</i>	SM	Fairly tolerant of humans	60

Heron ^F		CY, HS, HK, FL, SH	night-heron	
White Ibis ^H (SSC)	<i>Eudocimus albus</i>	FM, CY, HS, HK, FL, SH	Minimum distance from humans tolerated while feeding	249
Glossy Ibis ^C	<i>Plegadis falcinellus</i>	FM, CY, SH, HS, HK, FL	Similar to white ibis	249
Roseate Spoonbill ^C (SSC)(W)	<i>Ajaia ajaja</i>	SM	Similar to great egret	299
Wood Stork ^F (E) (E)	<i>Mycteria americana</i>	FM, CY, HS, HK, FL, SH	Recommended set back distance	253
Fulvous Whistling-Duck ^G	<i>Dendrocygna bicolor</i>		Similar to wood duck	300
Black-bellied Whistling-Duck ^C	<i>Dendrocygna autumnalis</i>	FM, CY, HS, HK, FL, SH, SM	Similar to wood duck	300
Snow Goose ^C	<i>Chen caerulescens</i>	FM, CY, HS, HK, FL, SH	Similar to wood duck	300
Canada Goose ^C	<i>Branta Canadensis</i>	FM, CY, HS, HK, FL, SH	Similar to wood duck	300
Wood Duck ^G	<i>Aix sponsa</i>	FM, CY, HS, HK, FL, SH	Minimum distance from humans tolerated while feeding	300
American Black Duck ^C (W)	<i>Anas rubripes</i>	FM, CY, HS, HK, FL, SH	Similar to wood duck	300
Mottled Duck ^{B,G} (W)	<i>Anas fulvigula</i>	SM, FM, HK, FL, SH	Minimum distance from humans tolerated while feeding	120
Mallard ^B	<i>Anas platyrhynchos</i>	FM, HK, FL, SH	Similar to mottled duck	120
Northern Pintail ^C	<i>Anas acuta</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Bufflehead ^C	<i>Bucephala albeola</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Greater Scaup ^C	<i>Aythya marila</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Black Scoter ^C	<i>Melanitta nigra</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Surf Scoter ^C	<i>Melanitta perspicillata</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
White-winged Scoter ^C	<i>Melanitta fusca</i>	FM, HK, FL, SH, SM	Similar to wood duck	300

Green-Winged Teal ^B	<i>Anas carolinensis</i>	SM, CY, HS, SH	Similar to American wigeon	300
Blue-Winged Teal ^C	<i>Anas discors</i>	SM, EM, HK, FL, SH	Similar to American wigeon	300
Northern Shoveler ^B	<i>Anas clypeata</i>	CY, HS, SH	Minimum distance from humans tolerated	300
Gadwall ^C	<i>Anas strepera</i>	SM, FM, CY, HS, SH	Similar to American wigeon	300
American Wigeon ^{BC}	<i>Anas americana</i>	SM, FM, CY, HS, SH	Minimum distance from humans tolerated	300
Canvasback ^C	<i>Aythya valisineria</i>	SM, FM, CY, HS, SH	Similar to wood duck	300
Redhead ^C	<i>Aythya americana</i>	SM, FM, CY, HS, SH	Similar to wood duck	300
Ring-Necked Duck ^{B,G}	<i>Anthya collaris</i>	FM, HK, FL, SH, SM	Similar to American wigeon and wood duck	300
Lesser Scaup ^C	<i>Aythya affinis</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Hooded Merganser ^B	<i>Lophodytes cucullatus</i>	FM	Similar to American wigeon	300
Red-Breasted Merganser ^C	<i>Mergus serrator</i>	FM, HK, FL, SH, SM	Similar to American wigeon	300
Ruddy Duck ^C	<i>Oxyura jamaicensis</i>	FM, HK, FL, SH, SM	Similar to wood duck	300
Osprey ^B	<i>Pandion haliaetus</i>	SM, FM, CY, HS, FL, SH	Very tolerant of humans near nest site	20
Swallow-Tailed Kite ^{B (W)}	<i>Elandides forficatus</i>	CY, HS, HK, FL	Similar to red-shouldered hawk	795
Bald Eagle ^{B,G (T)}	<i>Haliaeetus leucocephalus</i>	SM, FM, CY, HS, FL, SH	Secondary restrictive activity zone around nests	1,500
Red-Shouldered Hawk ^B	<i>Buteo lineatus</i>	FM, CY, HS, HK, FL	Home range diameter	795
Merlin ^C	<i>Falco columbarius</i>	SM, FM, FL, HK, SH	Similar to peregrine falcon	300
Peregrine Falcon ^{B (E)}	<i>Falco peregrinus</i>	SM, FM, FL	Winter migrant not tolerant of humans	300
Eastern Wild Turkey ^{B,G}	<i>Meleagris gallopavo</i>	HK, FL, SH	Home range diameter	10,472
Clapper Rail ^C	<i>Rallus longirostris</i>	SM, FM	Similar to king rail	50
King Rail ^G	<i>Rallus elegans</i>	SM, FM	Needs enough adjacent land to provide good water quality	50
Virginia Rail ^C	<i>Rallus limicola</i>	SM, FM	Similar to king rail	50
Sora ^C	<i>Porzana carolina</i>	SM, FM	Similar to king rail	50

Herring Gull ^C	<i>Larus argentatus</i>	SM	Similar to laughing gull	60
Gull-Billed Tern ^B	<i>Sterna nilotica</i>	SM	Minimum distance from humans tolerated	180
Sandwich Tern ^C	<i>Sterna sandvicensis</i>	SM	Similar to gull-billed tern	180
Common Tern ^C	<i>Sterna hirundo</i>	SM	Similar to gull-billed tern	180
Forster's Tern ^B	<i>Sterna forsteri</i>	SM	Minimum distance from humans tolerated	180
Least Tern ^H (T)	<i>Sterna antillarum</i>	SM	Recommended set back distance	505
Royal Tern ^B	<i>Sterna maxima</i>	SM	Minimum distance from humans tolerated	180
Black Tern ^C	<i>Chilidonias niger</i>	SM	Similar to royal tern	180
Caspian Tern ^C	<i>Sterna caspia</i>	SM	Similar to royal tern	180
Yellow-billed Cuckoo ^G	<i>Coccyzus americanus</i>	CY, HK, FL, HS	Diameter of smallest isolated patch in which species was found	745
Black Skimmer ^F (SSC)	<i>Rynchops niger</i>	SM	Flush distance	279
Barred Owl ^B	<i>Strix varia</i>	CY, HS, HK, FL	Minimum forest habitat width	180
Belted Kingfisher ^{B, G}	<i>Ceryle alcyon</i>	FM, HK, FL, SH	Fairly tolerant of humans	60
Pileated Woodpecker ^B	<i>Dryocopus pileatus</i>	CY, HS, HK, FL, SH	Home range diameter	4,221
Tree Swallow ^B	<i>Tachycineta bicolor</i>	SM, FM	Fairly tolerant of humans	60
Fish Crow ^{B, G}	<i>Corvus ossifragus</i>	SH, SM, FM, FL, CY, HS, HK	Fairly tolerant of humans	60
Sedge Wren ^B	<i>Cistothorus platensis</i>	SM, FM	Similar to marsh wren	196
Marsh Wren ^B	<i>Cistothorus palustris</i>	SM, FM	Home range diameter	196
Swainson's Thrush ^C	<i>Catharus ustulatus</i>	CY, HK, FL, HS	Similar to northern waterthrush	180
Yellow Warbler ^C	<i>Dendroica petechia</i>	CY, HS, HK, FL	Similar to northern waterthrush	180
Prothonotary Warbler ^{B, G} (W)	<i>Protonotaria citrea</i>	CY, HS, HK, FL	Similar to hooded warbler	450
Northern Waterthrush ^B	<i>Seiurus noveboracensis</i>	CY, HS, HK, FL	Similar to Louisiana waterthrush	180
Louisiana Waterthrush ^B	<i>Seiurus motacilla</i>	CY, HS, HK, FL	Minimum forest habitat width	180
Hooded Warbler ^{B, G}	<i>Wilsonia citrina</i>	CY, HS, HK, FL	Minimum forest habitat width bordered by development where species was found	450
Saltmarsh Sharp-tailed Sparrow ^C (W)	<i>Ammodramus caudacutus</i>	SM, FM	Similar to seaside sparrow	196
Nelson's Sharp-tailed Sparrow ^C	<i>Ammodramus nelsoni</i>	SM, FM	Similar to seaside sparrow	196
Seaside Sparrow ^B (W)	<i>Ammodramus maritima</i>	SM	Home range diameter	196
Song Sparrow ^C	<i>Melospiza melodia</i>	SM, FM	Similar to seaside sparrow	196
Boat-tailed Grackle ^C			Tolerant of humans	60

Swamp Sparrow ^B	<i>Melospiza georgiana</i>	CY, HS	Home range diameter	196
Rusty Blackbird ^C	<i>Euphagus carolinus</i>	SM, CY, HS	Similar to red-winged blackbird	50
Red-Winged Blackbird ^G	<i>Agelaius phoeniceus</i>	SM, FM	Needs enough adjacent land to maintain good water quality	50
MAMMALS				
Eastern Pipistrelle ^B	<i>Pipistrellus subflavus</i>	SH, FM, CY, HS, HK, FL	Fairly tolerant of humans	60
Marsh Rabbit ^{B,G}	<i>Sylvilagus palustris</i>	FM	Maximum distance found from shore	700
Round-Tailed Muskrat ^G	<i>Neofiber alleni</i>	FM	Needs enough adjacent land to maintain good water quality	50
Marsh Rice Rat ^G	<i>Oryzomys palustris</i>	SM, CY	Needs enough adjacent land to maintain good water quality	50
Florida Black Bear ^{B (T)}	<i>Ursus americanus floridanus</i>	CY, HS, HK, FL, SH	Home range diameter	17,287
River Otter ^G	<i>Lutra canadensis</i>	SH, FM, CY, HS, HK, FL	Needs land for denning	100
Mink ^B	<i>Mustela vison</i>	FM, CY, HS, HK, FL, SH	Maximum distance of den from closest water	300
Raccoon ^G	<i>Procyon lotor</i>	SH, SM, FM, CY, HS, FL	Tolerant of humans	60
Bobcat ^B	<i>Felis rufus</i>	HK, FL, SH	Home range diameter	5,912

Notes:

- ^A E = Endangered
T = Threatened
T (S/A) = Threatened/Similarity of Appearance
SSC = Species of Special Concern
W = Species listed on the National Audubon Society Watch List.

Where two abbreviations are listed, the first one is a state listed species listed by the Florida Game and Freshwater Fish Commission (FGFWFC), and the second is a federal listed species listed by the U.S. Fish and Wildlife Service (USFWS).

- ^B Because no spatial requirement data were found for these species, the numbers used here are reported by Brown et al. 1990a (for B footnote) and Brown et al. 1990b (for G footnote) to represent spatial requirements for species that are closely related, similar-sized, or found in comparable habitats.
- ^C Because no spatial requirement data were found for these species, the numbers used here are reported by the JEA Project Team to represent spatial requirements for species that are closely related, similar-sized, or found in comparable habitats (from JEA Project Team).
- ^D Species code corresponds to code used in Brown et al. 1990a.
- ^E Habitats:
CY = Cypress

FL = Flatwoods
FM = Freshwater Marsh
HK = Hammock
HS = Hardwood Swamp
SH = Sandhill
SM = Saltwater Marsh

- ^F Spatial requirements based on Rodgers and Smith 1997.
- ^G Because no spatial requirement data were found for these species, the numbers used here are reported by Brown et al. 1990a (for B footnote) and Brown et al. 1990b (for G footnote) to represent spatial requirements for species that are closely related, similar-sized, or found in comparable habitats.
- ^H Spatial requirements based on Rodgers and Smith 1995.

References

- Brown, M.T., J.M. Schaefer, and K.H. Brandt. 1990a. Buffer zones for water, wetlands, and wildlife in East Central Florida. Report prepared for the East Central Florida Regional Planning Council. CFW Publ. #89-07.
- Brown, M.T., C.S. Luthin, J. Tucker, R. Hamann, J. Schaefer, L. Wayne and M. Dickinson. 1990b. Econlockhatchee River basin natural resources development and protection plan. Report to the SJRWMD. Publ. No. SJ 91-SP1.
- Rogers J. A. Jr., and H. T. Smith. 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. Conservation Biology 9:89-99.

Invasive exotics or other invasive plant species

Category I - Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. *This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.*

Scientific Name	Common Name	EPPC Cat.	Gov. list	Reg. Dist.
<i>Abrus precatorius</i>	rosary pea	I		C, S
<i>Acacia auriculiformis</i>	earleaf acacia	I		S
<i>Albizia julibrissin</i>	mimosa, silk tree	I		N, C
<i>Albizia lebbbeck</i>	woman's tongue	I		C, S
<i>Ardisia crenata</i> (= <i>A. crenulata</i>)	coral ardisia	I		N, C
<i>Ardisia elliptica</i> (= <i>A. humilis</i>)	shoebutton ardisia	I		S
<i>Asparagus densiflorus</i>	asparagus-fern	I		C, S
<i>Bauhinia variegata</i>	orchid tree	I		C, S
<i>Bischofia javanica</i>	bischofia	I		C, S
<i>Calophyllum antillanum</i> (= <i>C. calaba</i> ; <i>C. inophyllum</i> misapplied)	santa maria (names "mast wood," "Alexandrian laurel" used in cultivation)	I		S
<i>Casuarina equisetifolia</i>	Australian pine	I	P	N,C,S
<i>Casuarina glauca</i>	suckering Australian pine	I	P	C, S
<i>Cestrum diurnum</i>	day jessamine	I		C, S
<i>Cinnamomum camphora</i>	camphor-tree	I		N,C,S
<i>Colocasia esculenta</i>	wild taro	I		N,C,S
<i>Colubrina asiatica</i>	lather leaf	I		S
<i>Cupaniopsis anacardioides</i>	carrotwood	I	N	C, S
<i>Dioscorea alata</i>	winged yam	I	N	N,C,S
<i>Dioscorea bulbifera</i>	air-potato	I	N	N,C,S
<i>Eichhornia crassipes</i>	water-hyacinth	I	P	N,C,S
<i>Eugenia uniflora</i>	Surinam cherry	I		C, S
<i>Ficus microcarpa</i> (<i>F. nitida</i> and <i>F. retusa</i> var. <i>nitida</i> misapplied)	laurel fig	I		C, S
<i>Hydrilla verticillata</i>	hydrilla	I	P, U	N,C,S
<i>Hygrophila polysperma</i>	green hygro	I	P, U	N,C,S
<i>Hymenachne amplexicaulis</i>	West Indian marsh grass	I		C, S
<i>Imperata cylindrica</i> (<i>I. brasiliensis</i> misapplied)	cogon grass	I	N, U	N, C, S
<i>Ipomoea aquatica</i>	waterspinach	I	P, U	C
<i>Jasminum dichotomum</i>	Gold Coast jasmine	I		C, S
<i>Jasminum fluminense</i>	Brazilian jasmine	I		C, S

<i>Lantana camara</i>	lantana, shrub verben	I		N,C,S
<i>Ligustrum lucidum</i>	glossy privet	I		N, C
<i>Ligustrum sinense</i>	Chinese privet, hedge privet	I		N,C,S
<i>Lonicera japonica</i>	Japanese honeysuckle	I		N,C,S
<i>Lygodium japonicum</i>	Japanese climbing fern	I	N	N,C, S
<i>Lygodium microphyllum</i>	Old World climbing fern	I	N	C, S
<i>Macfadyena unguis-cati</i>	cat's claw vine	I		N,C, S
<i>Manilkara zapota</i>	sapodilla	I		S
<i>Melaleuca quinquenervia</i>	melaleuca, paper bark	I	P, N, U	C, S
<i>Melia azedarach</i>	Chinaberry	I		N,C,S
<i>Mimosa pigra</i>	catclaw mimosa	I	P, N, U	C, S
<i>Nandina domestica</i>	nandina, heavenly bamboo	I		N
<i>Nephrolepis cordifolia</i>	sword fern	I		N,C,S
<i>Nephrolepis multiflora</i>	Asian sword fern	I		C, S
<i>Neyraudia reynaudiana</i>	Burma reed; cane grass	I	N	S
<i>Paederia cruddasiana</i>	sewer vine, onion vine	I	N	S
<i>Paederia foetida</i>	skunk vine	I	N	N,C,S
<i>Panicum repens</i>	torpedo grass	I		N,C,S
<i>Pennisetum purpureum</i>	Napier grass	I		C, S
<i>Pistia stratiotes</i>	water lettuce	I	P	N,C,S
<i>Psidium cattleianum</i> (=P. littorale)	strawberry guava	I		C, S
<i>Psidium guajava</i>	guava	I		C, S
<i>Pueraria montana</i> (=P. lobata)	kudzu	I	N, U	N,C, S
<i>Rhodomyrtus tomentosa</i>	downy rose-myrtle	I	N	C, S
<i>Rhoeo spathacea</i> (see <i>Tradescantia spathacea</i>)				
<i>Ruellia brittoniana</i>	Mexican petunia	I		N, C, S
<i>Sapium sebiferum</i>	popcorn tree, Chinese tallow tree	I	N	N, C, S
<i>Scaevola sericea</i> (=Scaevola taccada var. sericea, S. frutescens)	scaevola, half-flower, beach naupaka	I		C, S
<i>Schefflera actinophylla</i> (=Brassaia actinophylla)	schefflera, Queensland umbrella tree	I		C, S
<i>Schinus terebinthifolius</i>	Brazilian pepper	I	P, N	N, C, S
<i>Senna pendula</i> (=Cassia coluteoides)	climbing cassia, Christmas cassia, Christmas senna	I		C, S
<i>Solanum tampicense</i> (=S. houstonii)	wetland night shade, aquatic soda apple	I	N, U	C, S
<i>Solanum viarum</i>	tropical soda apple	I	N, U	N, C, S
<i>Syngonium podophyllum</i>	arrowhead vine	I		C, S

<i>Syzygium cumini</i>	jambolan, Java plum	I		C, S
<i>Tectaria incisa</i>	incised halberd fern	I		S
<i>Thespesia populnea</i>	seaside mahoe	I		C, S
<i>Tradescantia fluminensis</i>	white-flowered wandering jew	I		N, C
<i>Tradescantia spathacea</i> (= <i>Rhoeo spathacea</i> , <i>Rhoeo discolor</i>)	oyster plant	I		S
<i>Urochloa mutica</i> (= <i>Brachiaria mutica</i>)	Pará grass	I		C, S

Category II - Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. *These species may become ranked Category I, if ecological damage is demonstrated.*

Scientific Name	Common Name	EPPC Cat.	Gov. list	Reg. Dist.
<i>Adenanthera pavonina</i>	red sandalwood	II		S
<i>Agave sisalana</i>	sisal hemp	II		C, S
<i>Aleurites fordii</i> (= <i>Vernicia fordii</i>)	tung oil tree	II		N, C
<i>Alstonia macrophylla</i>	devil-tree	II		S
<i>Alternanthera philoxeroides</i>	alligator weed	II	P	N, C, S
<i>Antigonon leptopus</i>	coral vine	II		N, C, S
<i>Aristolochia littoralis</i>	calico flower	II		N, C
<i>Asystasia gangetica</i>	Ganges primrose	II		C, S
<i>Begonia cucullata</i>	begonia	II		N, C
<i>Broussonetia papyrifera</i>	paper mulberry	II		N, C
<i>Callisia fragrans</i>	inch plant, spironema	II		C, S
<i>Casuarina cunninghamiana</i>	Australian pine	II	P	C, S
<i>Cordia dichotoma</i>	sebsten plum	II		S
<i>Cryptostegia madagascariensis</i>	rubber vine	II		C, S
<i>Cyperus involucratus</i> (<i>C. alternifolius</i> misapplied)	umbrella plant	II		C, S
<i>Cyperus prolifer</i>	dwarf papyrus	II		C
<i>Dalbergia sissoo</i>	Indian rosewood, sissoo	II		C, S
<i>Elaeagnus pungens</i>	thorny eleagnus	II		N, C
<i>Epipremnum pinnatum</i> cv. Aureum	pothos	II		C, S
<i>Ficus altissima</i>	false banyan	II		S
<i>Flacourtia indica</i>	governor's plum	II		S
<i>Flueggea virosa</i>	Chinese waterberry	II		S

<i>Hibiscus tiliaceus</i>	mahoe, sea hibiscus	II		C, S
<i>Hiptage benghalensis</i>	hiptage	II		S
<i>Jasminum sambac</i>	Arabian jasmine	II		S
<i>Koelreuteria elegans</i>	flamegold tree	II		C, S
<i>Leucaena leucocephala</i>	lead tree	II		N, C, S
<i>Limnophila sessiliflora</i>	Asian marshweed	II		N, C, S
<i>Melinis minutiflora</i>	molasses grass	II		S
<i>Merremia tuberosa</i>	wood-rose	II		S
<i>Murraya paniculata</i>	orange-jessamine	II		S
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	II	P	N, C, S
<i>Ochrosia elliptica</i> (= <i>O. parviflora</i>)	kopsia	II		C, S
<i>Oeceoclades maculata</i>	ground orchid	II		C, S
<i>Passiflora biflora</i>	twin-flowered passion vine	II		S
<i>Passiflora foetida</i>	stinking passion-flower	II		C, S
<i>Pennisetum setaceum</i>	green fountain grass	II		S
<i>Phoenix reclinata</i>	Senegal date palm	II		C, S
<i>Phyllostachys aurea</i>	golden bamboo	II		N, C
<i>Pteris vittata</i>	Chinese brake fern	II		N, C, S
<i>Ptychosperma elegans</i>	solitary palm	II		S
<i>Rhynchelytrum repens</i>	Natal grass	II		N, C, S
<i>Ricinus communis</i>	castor bean	II		N, C, S
<i>Sansevieria hyacinthoides</i>	bowstring hemp	II		C, S
<i>Sesbania punicea</i>	purple sesban, rattlebox	II		N, C, S
<i>Solanum diphyllum</i>	twinleaf nightshade	II		N, C, S
<i>Solanum jamaicense</i>	Jamaica nightshade	II		C
<i>Solanum torvum</i>	susumber, turkey berry	II	N, U	N, C, S
<i>Syzygium jambos</i>	rose-apple	II		C, S
<i>Terminalia catappa</i>	tropical almond	II		C, S
<i>Terminalia muelleri</i>	Australian almond	II		C, S
<i>Tribulus cistoides</i>	puncture vine, bur-nut	II		N, C, S
<i>Urena lobata</i>	Caesar's weed	II		N, C, S
<i>Wedelia trilobata</i>	wedelia	II		N, C, S
<i>Wisteria sinensis</i>	Chinese wisteria	II		N, C
<i>Xanthosoma sagittifolium</i>	malanga, elephant ear	II		N, C, S

Source: FLEPPC. 2001. List of Florida's Invasive Species. Florida Exotic Pest Plant Council. Internet: <http://www.fleppc.org/01list.htm>

Section Divider

Water Environment - 62-345.500(6)(b), FAC

a. Water levels and flows

Guidance: *Depending on season and wetland type, standing water may or may not be present in an assessment area. During the wet season (May-August), cypress swamps, floodplain forests, basin swamps, and freshwater marshes may all have standing water. However, in the dry (November-March) season, even the wettest sites may only exhibit saturated soils. While every year is different, most of the [precipitation in Florida](#) occurs between May and August, so expect to see standing water in a wetland beginning in late summer (June and July) extending into the early fall.*

Regional differences can affect the amounts of flowing or standing water as well. For instance, in north Florida during the winter months, reduced transpiration from deciduous species may result in higher water levels than otherwise expected.

Reduced transpiration in surrounding upland vegetation as a result of logging operations, for instance, can significantly increase water levels in wetlands and water bodies.

When scoring this indicator criterion, determine whether the water levels and flows are appropriate for the particular system you are evaluating, taking into consideration seasonal variation, antecedent weather, and other climatic effects.

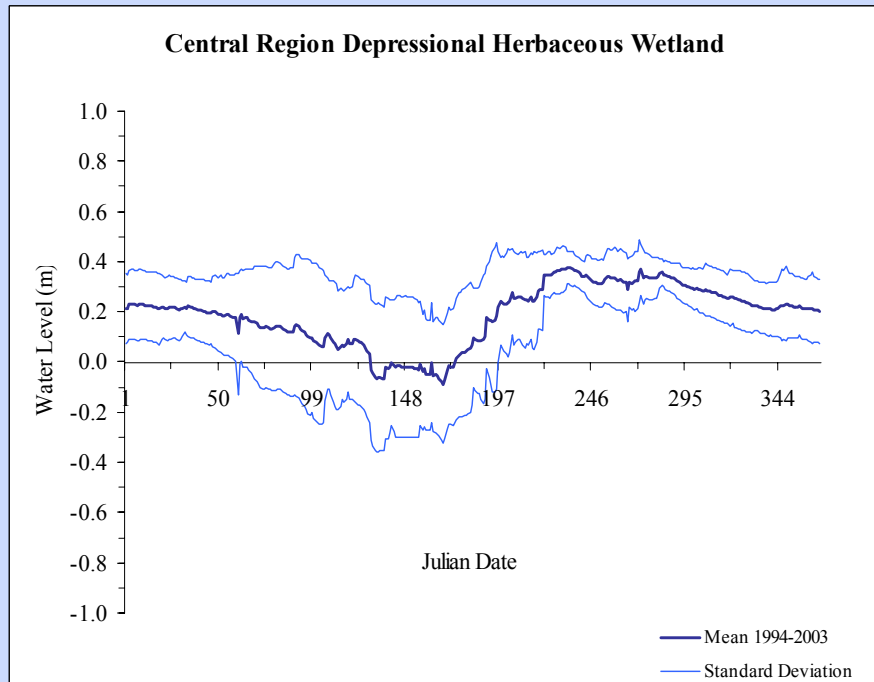
Below are typical hydroperiods of some common wetland communities (FNAI, 1990):

wet flatwoods	30-90 days/yr
wetland hardwood forests	60 days/yr
wet prairie	50-100 days/yr
basin marshes	200 days/yr
isolated cypress domes	200-300 days/yr
floodplain swamps	300 days/yr

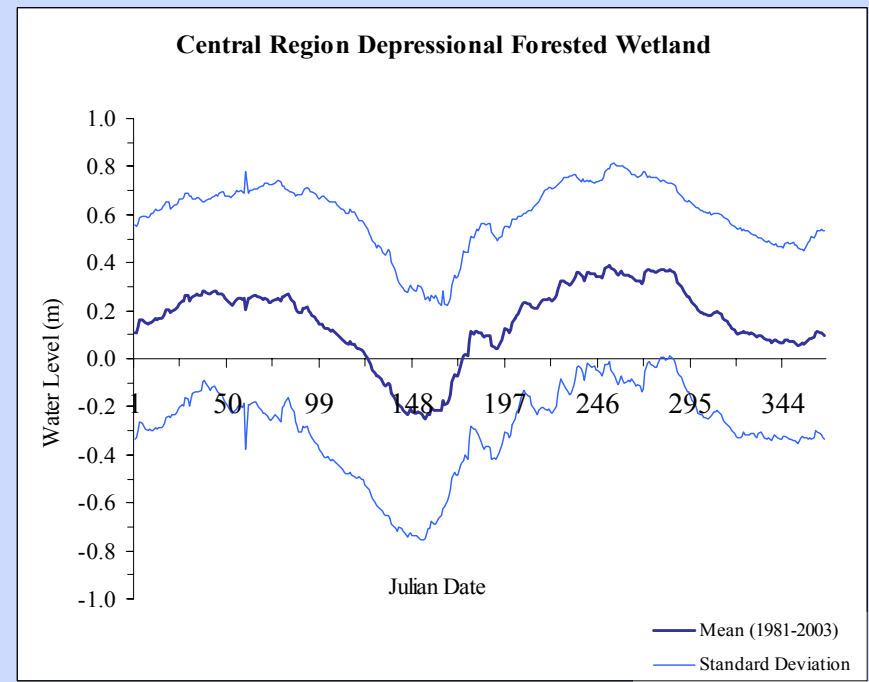
Water Environment - 62-345.500(6)(b), FAC

a. Water levels and flows (continued)

The graphs below provide examples of average “expected” levels for depressional herbaceous (left) and forested (right) wetlands in central Florida. Since water levels are extremely variable and dependent on many factors (precipitation, weather patterns, etc.), please take all other variables into account when scoring this indicator.



Data from SWFWMD 1994-2003.



Data from SWFWMD 1981-2003.

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b. Water level indicators

Guidance: *Several hydrologic indicators exist that help assess water conditions at a site. This section focuses on those indicators that give insight into typical water levels experienced at a site. Can you see distinct water lines? Are they indicative of reasonable water levels for the community type you are assessing?*

Mosses or liverworts. These are in a group of plants called bryophytes, which lack true roots and leaves, and are found in moist environments. When water levels fall, they appear as a dark greenish-brown growth on the bark of trees or on hard substrates such as rocks.



Moss collars and lichen lines on a cypress trunk. (KCR)



Moss collars, lichen lines, and water marks on cypress trees during low water levels. (KCR)

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b. Water level indicators (continued)

Aufwuchs. Aufwuchs are assemblages of sessile, attached or free-living, nonvascular plants and invertebrate animals that develop during periods of inundation. They can be present on branches, rocks or other objects that have been submerged, and when dry appear as a crusty growth, sometimes white.

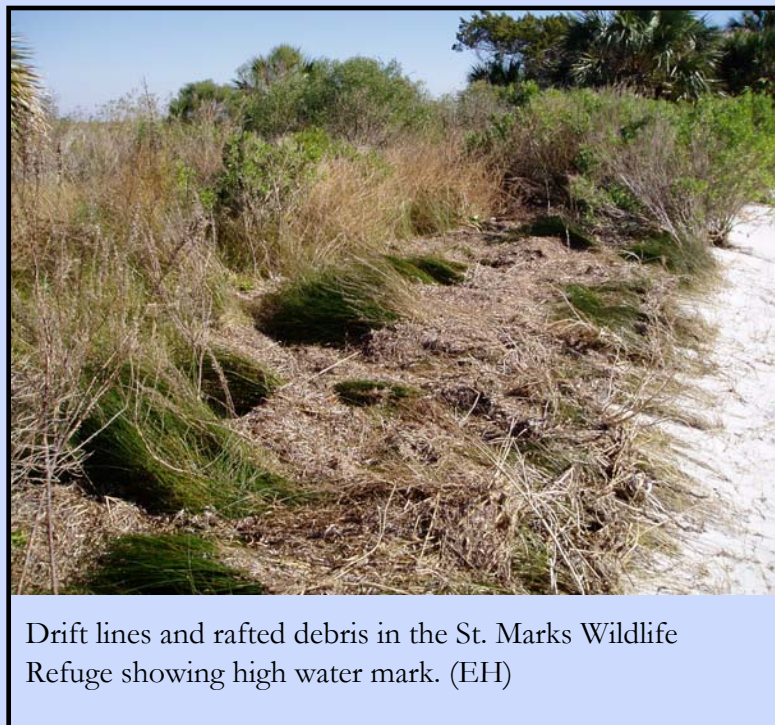


Dried out aufwuchs in Meritt Island. (EH)

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b. Water level indicators (continued)

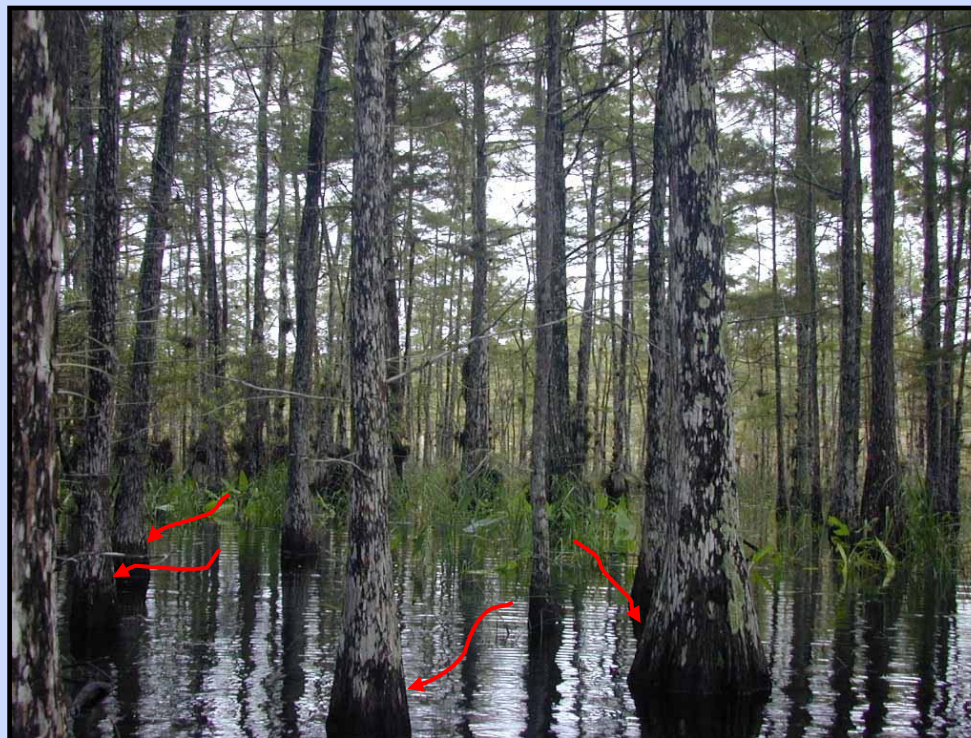
Drift lines and rafted debris. These are composed of vegetation, litter, and other materials that have been carried by water and have been deposited, usually in distinct lines or locations, directly on the ground or sometimes entangled within vegetation. They can be indicative of high water levels. This indicator will typically be found in coastal wetlands as well as floodplains or any wetland exhibiting high water levels fluctuations.



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b. Water level indicators (continued)

Elevated lichen lines. Lichens are an association of a fungus and an alga, and appear as flattened film on the bark of trees. They are not tolerant of inundation, therefore high standing water around the trunks of trees impedes their growth, thus producing a distinct line which is indicative of ordinary or seasonal high water levels. In wetlands that do not have prolonged inundation, lichens can grow on the trunks at ground level.



Lichen lines on tree trunks, stopping at the high water line. (KCR)

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b. Water level indicators (continued)

Morphological Plant Adaptations. These refer to special structures or features developed by plants under water logged conditions, which are not normally present in dry conditions. They include adventitious roots and lenticels. The former are usually developed on the stem or trunk of certain plants, and they aid the plant's aerobic respiration during anoxic periods. When the inundation period ends, these roots stop developing. Lenticels are another mechanism for aerobic respiration, and they appear as blister-like breaks on the outer bark of stems and roots.

Many species of bottomland hardwood trees develop adventitious roots and lenticels, as well as shrub species such as wax myrtle (*Myrica cerifera*), water-primrose (*Ludwigia* spp.), and St. John's wort (*Hypericum* spp.).

Other examples of morphological plant adaptations to water logged conditions include the "knees" of cypress trees (*Taxodium* spp.), and the buttressed trunks of swamp tupelo (*Nyssa sylvatica* var. *biflora*), American elm (*Ulmus americana*), and swamp laurel oak (*Quercus laurifolia*).

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b. Water level indicators (continued)



Lenticels on trunk of water tupelo. (EB)



Buttresses on cypress trees. (EB)

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b. Water level indicators (continued)

Water Marks. Water marks are the result of sustained water levels and appear as distinct stain lines on fixed objects and vegetation. These are usually related to the elevated lichen lines, and can be used to evaluate ordinary or seasonal high water levels.



Distinct water stain lines, approximately 2 feet high, on trunks of bald cypress in the Lower Suwannee NWR floodplain ecosystem. Photo taken March 2004. (EB)



Water stain lines and lichen lines on trunks of bald cypress. (KS)

c. Soil moisture

Guidance: *Most wetlands exhibit moist or saturated soils throughout the year. In some cases, practices such as excessive well water pumping result in lowered groundwater tables and consequent drainage of wetlands. Dry soils oxidize rapidly and this can result in soil subsidence, which is defined as the lowering of the soil level caused by the shrinkage of organic layers due to desiccation, consolidation, and biological oxidation. When scoring this indicator criterion, you must determine whether the soil moisture is appropriate for the particular system you are evaluating, taking into consideration seasonal variation, antecedent weather, and other climatic effects.*



Soil subsidence that has resulted in root exposure (MS).



Soil subsidence exposing roots of cypress knees (EH).

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c. Soil moisture (continued)

The following hydric soil indicators identify soils with a high water table capable of providing saturation to the soil surface for extended periods of time.

All Soils	Sandy Soils	Loamy and Clayey Soils
Stratified Layers	Sandy Redox	Depleted Matrix
Organic Bodies	Stripped Matrix	Marl
	Dark Surface	Umbric Surface
	Polyvalue Below Surface	Thick Dark Surface
	Thin Dark Surface	Fe/Mn Masses
		Depleted Dark Surface
		Redox Dark Surface

A fact sheet on hydric soil characteristics is available from FDEP at the following URL:

<http://www.dep.state.fl.us/water/wetlands/delineation/fact.htm>

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c. Soil moisture (continued)

Generally, in sandy textured soils, if the soils are wetland/hydric soils, the hydric soil indicators should be prevalent within 6 inches of the soil surface.

In loamy and clayey textured soils, the hydric soil indicators should be prevalent within 12 inches of the soil surface.



Soil core from reference marsh in Apalachicola Nat. Forest, Leon County (RF).



Consolidation and oxidation in a cypress forest in Clay county. (JS)

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d. Soil erosion or deposition

Guidance: Evidence of soil erosion and deposition is usually found in flowing systems such as floodplain swamps. When the river or stream overflows its banks, it deposits its sediment load in the floodplain. Water flowing through the system can also carry away some of the topsoil, and this is more prominent when water levels and velocity are excessively high. It is important to make the distinction between natural erosion/deposition and one indicative of deviation from that normal state (ie, bends in a river versus a delta at the mouth of a canal).



Creek in Leon County that is receiving run-off high in sediments and eroded soil from a nearby wetland. (EH)



Soil deposition in forested wetland (EH).

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e. Evidence of fire history

Guidance: *This attribute assesses whether the evidence of fire history indicates increased fire frequency and intensity due to decreased water supply/hydroperiod, or, on the opposite side of the spectrum, fire suppression, perhaps caused by seasonally or permanently impounding too much water. Excessively dry wetlands burn more often, with greater intensity, and may lead to deep muck fires than the same type wetland with normal hydrology. On the opposite side of the spectrum, fires could be suppressed in those communities adapted to it by seasonally or permanently impounding too much water.*



Prescribed fire in pine flatwoods adjacent to a forested wetland in Leon County. (JS)



A thick layer of evergreen shrubs in the background of this urban forested wetland in Lee County has developed perhaps from water impoundment causing higher water depth and sustained periods of flooding, in turn decreasing the possibility of fire. (KCR)

Water Environment - 62-345.500(6)(b), FAC

e. Evidence of fire history (continued)



Comparison of a prescribed fire in Taulking State Forest pine flatwoods with adjacent unburned area (EH).



Extreme fire in pitcher plant bog in Escambia county (EH).

f. Vegetation – community zonation

Guidance: *This attribute assesses whether the community zonation is appropriate for the ecosystem type. Many wetland types exhibit distinct community zonation. For instance, isolated freshwater marshes may have distinct rings of vegetation from the edge towards the interior. Similarly, cypress domes may have an inner core dominated by pure cypress canopy and a shrub layer adapted to deep standing water, whereas the outer zone may include a variety of species.*

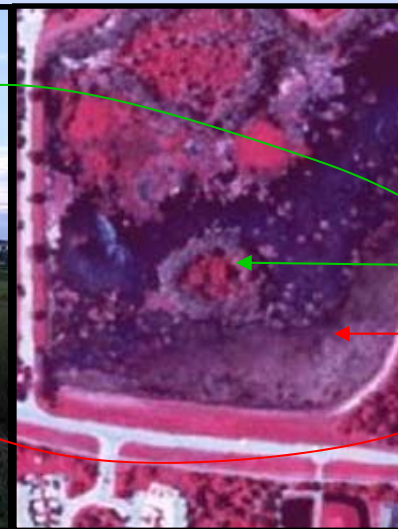
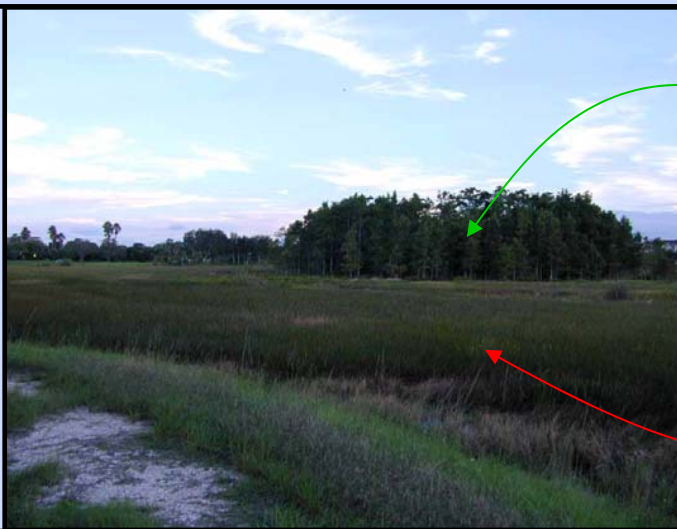
*When a wetland becomes hydrologically impaired, this community zonation can be disrupted. For instance, the presence of young pines (slash and loblolly), indicating regeneration, in the center of a cypress dome can be indicative of water drawdown. Similarly, upland species encroachment into a wetland is also indicative of wetland drainage. On the other hand, community zonation can also be disrupted by water impoundment. For instance, cattails (*Typha* spp.) are adapted to high water levels in marshes, while in forested systems water impoundment results in the lack of a herbaceous layer.*

Urban wetland in Osceola County receiving excess water inputs from large roadways and commercial parcels, showing limited herbaceous layer and an abundance of red maple (*Acer rubrum*) seedlings. (KCR)



f. Vegetation – community zonation (continued)

Wetland complex in Palm Beach County with distinct community zonation, herbaceous vegetation in the foreground and forested areas in the distance. Photos show the landscape view (left) and the aerial view (right). (KCR)



Forested vegetation zone

Herbaceous vegetation zone



Zonation in reference wetland in Hale Scott showing species zonation starting with Rhexia, then hypericum, etc progressing to forested hammock with increasing water levels. (EH)

Water Environment - 62-345.500(6)(b), FAC

g. Vegetation – hydrologic stress

Guidance: This attribute assesses the extent of hydrologic stress on vegetation. Hydrologic stress can manifest itself in many different ways, including increased mortality, leaning or fallen trees, thinning canopy, as well as susceptibility to insect damage or disease. Do you see a large number of leaning or fallen trees? Is there increased plant mortality at the site? Is there evidence of insect damage or disease?



This image was taken in late May 2001. Notice how the cypress trees have not yet leafed out, most likely due to hydrologic stress. This is also indicated by the growth of pasture grass at the base of the cypress trees. (KCR)



Fallen and leaning trees in a hydrologically impacted forested wetland in Saint Lucie County. The wetland is surrounded by orange groves, and water is routinely drawn down or impounded according to the needs of the orange growers. (KCR)

Water Environment - 62-345.500(6)(b), FAC

h. Use by animal species with specific hydrological requirements

Guidance: *This attribute assesses the presence or evidence of use by certain animal species with specific hydrologic requirements. However, when scoring this factor keep in mind that many species will not be seen during a brief site investigation, so the mere absence of sightings should not be counted against the particular site.*

Many amphibians, such as pinewoods treefrog, barking treefrog, striped newt, and flatwoods salamander, can only survive and reproduce in ephemeral isolated wetlands that lack predatory fish. Apple snails, mostly found in freshwater marshes in south Florida (Everglades) and in spring runs, lay their eggs above the water line on vegetation, logs, boats, or other suitable structures. Therefore, water levels need to be consistent in order for apple snails' eggs to hatch successfully. Wood storks require decreasing water levels that concentrate food when nesting and feeding their young.



pinewoods treefrog



barking treefrog



crayfish chimneys



striped newt



flatwoods salamander



apple snail

Water Environment - 62-345.500(6)(b), FAC

i. Plant community composition – species tolerant of and associated with water quality degradation or alterations in water levels and flows

Guidance: *The presence of tolerant wetland plant species can be an indication of degraded water quality. For instance, cattails (*Typha* spp.), duckweeds (*Lemna* spp. and *Spirodela* spp.), water lettuce (*Pistia stratiotes*) and water hyacinth (*Eichornia crassipes*) are usually associated with high levels of nutrients. Species typical of low nutrient conditions include bladderwort (*Utricularia* spp.), sawgrass (*Cladium jamaicense*), pitcher plants (*Sarracenia* spp.), and wire grass (*Aristida beyrichiana*).*



Forested wetland in Holmes County with a floating mat of duckweed, which is indicative of water quality degradation and excess nutrients (notice the cows in the background). (MMH)



Forested wetland in Lower Suwannee NWR with bladderwort in water column, which is indicative of oligotrophic conditions. (EB)

Water Environment - 62-345.500(6)(b), FAC

- i. **Plant community composition – species tolerant of and associated with water quality degradation or alterations in water levels and flows (continued)**



Urban wetland in Citrus county receiving excess water inputs from golf courses and high density residential, showing limited herbaceous layer and no regeneration of tree species . (JS)

Water Environment - 62-345.500(6)(b), FAC

j. Direct observation of standing water

Guidance: *When standing water is present, observations of water discoloration, turbidity, and oil sheen can help assess the water quality conditions at a site. It is extremely important, however, not to confuse what is a normal discoloration and turbidity from an atypical situation. For instance, even natural ecosystems exhibit an oil sheen on the water surface, but its appearance is very different from anthropogenic sources of oil.*



Normal oil sheen (covered in pollen) in reference cypress dome within the Lower Suwannee National Wildlife Refuge. March 2004. (EB)



Rusty water color resulting from algal growth in impacted wetland in Collier county. (JK)

Water Environment - 62-345.500(6)(b), FAC

j. Direct observation of standing water (continued)



Water color in a pristine marsh (above, Goethe State Forest), and a pristine cypress forest (right, LSRNWR), March 2004. (EB)

k. Existing water quality data

Guidance: *When water quality data exist for a particular site, it is important to compare them with expected values for the same ecosystem type. Studies have been conducted over the years that show typical values for nutrients and oxygen levels in different types of wetlands. However, the natural variability can be high, so caution needs to be used when including water quality data, especially if the information was collected only once and does not represent long-term collection and analysis.*

Following are typical values expected in a variety of sites.

		DO	T	Color	pH	Turbidity	Specific Conductance	Ammonia-N	NO ₂ NO ₃ -N	TKN	TP
		mg O ₂ /L	°C	PCU		NTU	umhos/cm	mg N/L	mg N/L	mg N/L	mg P/L
Marsh Reference	Minimum	0.62	15.0	30	3.43	0.4	13	0.005	0.002	0.410	0.008
	Maximum	27.00	36.0	1200	7.72	10.0	410	2.600	0.091	6.000	0.120
	Mean	4.53	25.8	289	5.05	2.1	76	0.174	0.006	1.899	0.036
Marsh Agricultural	Minimum	0.02	16.0	100	4.10	0.4	18	0.010	0.002	0.730	0.008
	Maximum	11.80	37.5	8000	8.14	5600.0	1400	48.000	0.220	110.000	45.000
	Mean	4.08	26.9	598	6.26	163.7	247	1.378	0.009	5.365	1.747
Forested Reference	Minimum	1.08	18.7	30	3.76	0.2	24	0.002	0.002	0.002	0.020
	Maximum	8.10	32.6	1000	7.77	20.0	180	1.700	1.900	5.600	0.640
	Mean	2.93	26.2	285	5.21	3.8	81	0.152	0.088	1.930	0.079
Forested Agricultural	Minimum	0.72	21.5	80	4.58	0.7	28	0.022	0.002	1.000	0.019
	Maximum	4.05	31.0	750	7.54	180.0	410	2.200	0.021	8.500	5.000
	Mean	1.64	25.2	346	6.22	17.7	136	0.332	0.007	3.174	0.808
Forested Urban	Minimum	0.32	18.5	50	4.06	0.7	62	0.012	0.002	0.600	0.040
	Maximum	4.40	29.4	600	7.74	58.0	580	0.960	0.120	3.700	1.100
	Mean	1.91	24.9	198	6.36	9.5	231	0.188	0.019	1.838	0.235

Data from UF-CFW 1999-2002.

Water Environment - 62-345.500(6)(b), FAC

1. Water depth, wave energy, currents, and light penetration

Guidance: *This attribute assesses the appropriateness of water depth, wave energy, currents, and light penetration in the particular type of wetlands or surface waters. For instance, seagrasses or other submerged aquatic vegetation are more likely found in clear water versus turbid water, where instead the submerged vegetation is usually sparse. While wave energy and currents do not generally apply to isolated systems, they can be quite important to stream and lake swamps and coastal systems.*



Light penetration in a reference cypress forest within the Lower Suwannee NWR. Notice bladderwort, indicative of oligotrophic systems, suspended in the water column. (EB)

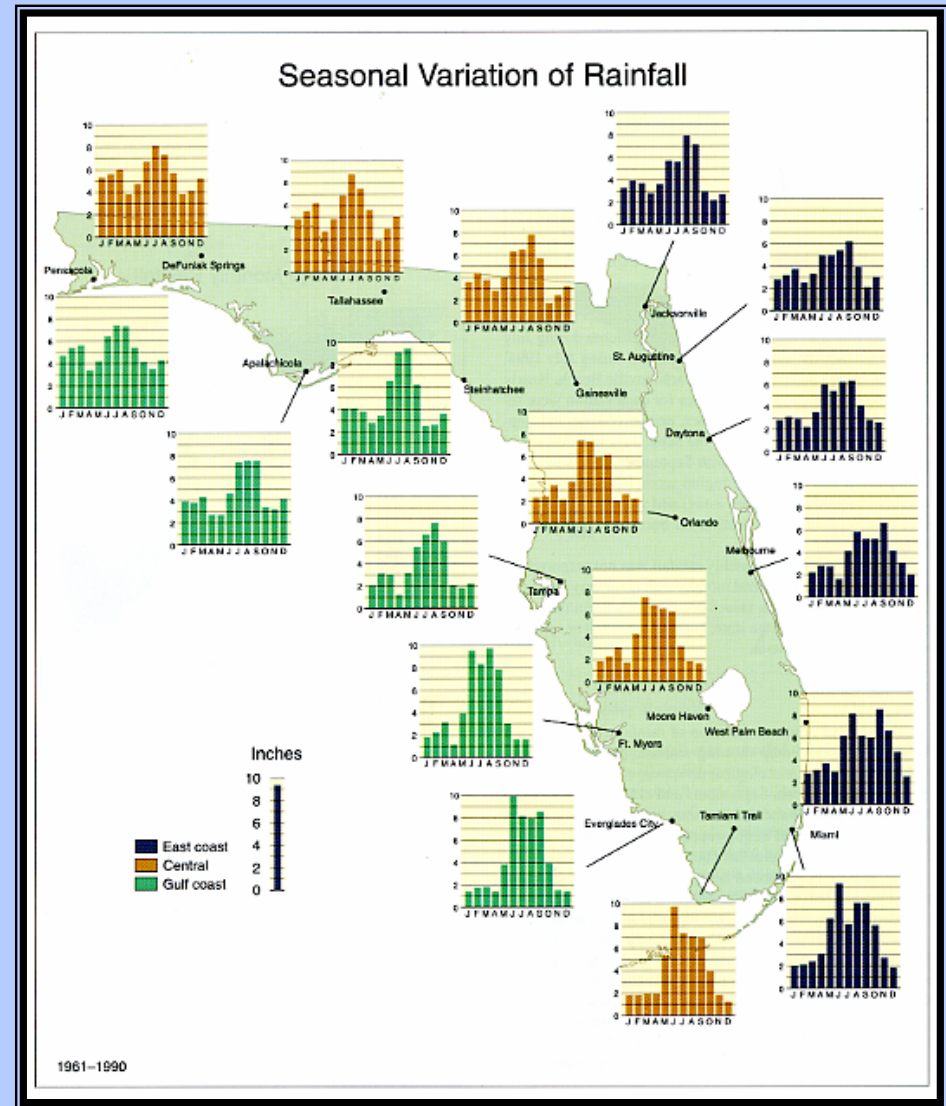


Forested and herbaceous wetland in Wakulla county with extremely turbid waters that significantly limit light penetration. (JS)

Section Divider

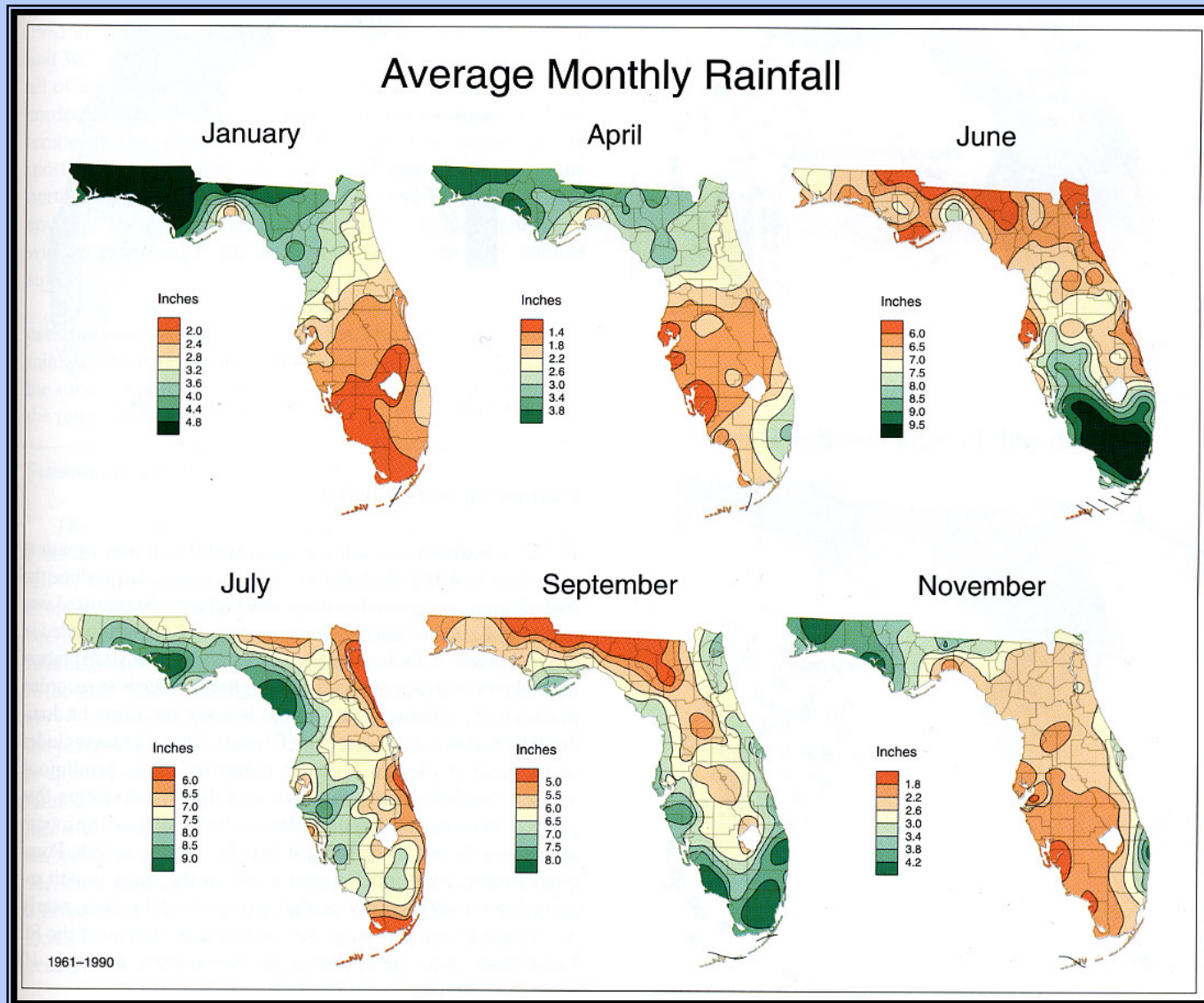
Florida Precipitation...

Precipitation varies from year to year. The graphs at right show average conditions for various locations in Florida. Generally, there is more rain fall in northern peninsular Florida and the panhandle in the winter months than is southern Florida. The dry season tends to be more pronounced in the south, while north Florida often has a relatively wet winter season.



From: Fernald, E.A. and E.D. Purdum (eds). 1998. Water Resources Atlas of Florida.

Florida Precipitation...



From: Fernald, E.A. and E.D. Purdum (eds). 1998. Water Resources Atlas of Florida.

Section Divider

1. Vegetation and Structural Habitat

I. Plant cover and species in the canopy, shrub, or ground stratum

Guidance: *This attribute evaluates the appropriateness of the plant composition in the canopy, shrub, and ground stratum of the wetland type being evaluated. Refer to the [wetland field guides](#) provided in this manual to identify appropriate and desirable species based on the wetland type. All three strata should be evaluated when present. In forested wetlands, often the herbaceous community (ground stratum) will exhibit changes in species composition resulting from degraded environment conditions long before the species composition of the shrub or canopy stratum.*



Cypress dome with typical species, including cypress and gum in the canopy layer, wax myrtle and sabal palmetto in the shrub layer, and chain fern and maidencane in the herbaceous layer.
(KCR)



Floodplain swamp with typical species, including cypress, tupelo, sweet gum, red maple, and American elm in the canopy layer.
(EB)

1. Vegetation and Structural Habitat

II. Invasive exotics or other invasive plant species

Guidance: *Identify any invasive exotic species within the assessment area, and estimate their cover with respect to desirable vegetation. Become familiar with the Florida Exotic Pest Plant Council's [list of Invasive Species](#). You can also refer to the [wetland field guides](#) for identification of the most common exotic wetland hardwood species.*



Brazilian pepper



Chinese tallow



Melaleuca



Cypress wetland with majority of plant cover composed of invasive exotics such as Brazilian pepper and melaleuca (left). (KCR)

Floodplain swamp with typical species, and no invasive exotics or other invasive plant species (right). (EB)



1. Vegetation and Structural Habitat

II. Invasive exotics or other invasive plant species (continued)



Tuberous sword fern (*Nephrolepis cordifolia*) an EPPC Category I invasive exotic found in an urban forested wetland in Palm Beach County. (KCR)



The EPPC Category II invasive exotic wedelia (*Wedelia trilobata*) and the exotic species wandering-jew (*Tradescantia virginiana*) in an urban forested wetland in Palm Beach County. (KCR)

1. Vegetation and Structural Habitat

III. Regeneration and recruitment

Guidance: Regeneration and recruitment should be noted, since evidence of seed production can provide insight into the health of an ecosystem. Is there evidence of tree recruitment or seed production? Recruitment is not always evenly spaced throughout a wetland. For instance, a higher density of seedlings is typical in open canopy areas, where canopy cover is reduced either due to natural causes (tree fall or fire), or anthropogenic disturbance (harvest). In some ecosystems, such as cypress domes, regeneration and recruitment is often highest on the outskirts of the depression, where the high water levels deposit the seeds and hydroperiods and light levels are conducive to generation.



Regeneration and recruitment along the edge of a cypress dome, where the high water levels deposit the seeds. (KCR)



Lack of regeneration and recruitment in a heavily grazed cypress dome in Alachua county as evidenced by the lack of small diameter trees and seedlings. (JS)

1. Vegetation and Structural Habitat

IV. Age and size distribution

Guidance: Forested wetland ecosystems should exhibit a wide range of age and size distribution that includes several cohorts of mature trees, younger trees, and a variety of seedlings and saplings. This ensures that when the mature tree dies and/or falls, there will be quick recruitment by younger trees to fill the open space. Age and size distributions that lack young (small) trees may be indicative of environmental conditions that preclude germination.



Age and size distribution in a logged cypress swamp, where only smaller trees have been left. (KCR)



Normal age and size distribution in a floodplain swamp, showing trees of different ages and sizes throughout. (EB)

1. Vegetation and Structural Habitat

V. Density and quality of coarse woody debris, snag, den and cavity

Guidance: *Woody debris, snags, dens and tree cavities provide cover habitat for wildlife, as well as offering a diversity of forage and nesting sites. Fallen tree logs also increase the microtopographic diversity within sites, thus allowing a diverse assemblage of plant species and providing microhabitats for various wildlife. Does the density and quality of coarse woody debris, snags, dens and cavities within the wetland appear to provide appropriate structural habitat for the type of system being evaluated?*



Fallen tree logs and woody debris in a reference cypress dome in Lower Suwannee NWR, showing overall optimal structural habitat. (EB)



Wildlife cavity at the base of a water tupelo. (EB)

1. Vegetation and Structural Habitat

V. Density and quality of coarse woody debris, snag, den and cavity (continued)



Forested wetland with excessive quantity of woody debris, because of increased levels of dying vegetation in a cow impacted wetland in Lee county (note “cow patties” in the foreground) . (KCR)



Normal woody debris in a forested wetland in Osceola County. (KCR)

1. Vegetation and Structural Habitat

VI. Plant condition

Guidance: *The overall condition of the plant community can be an indication of disturbance and can be evaluated by observing dead or dying vegetation, chlorotic (yellowing or bleaching) or spindly growth, and damage caused by insects. Often herbaceous vegetation and tree seedlings will exhibit chronic conditions before more mature vegetation.*

Careful attention should be given to [seasonality effects on plant communities](#).



Dead cypress trees in a wetland in Polk County. Death probably due to water discharge from chicken farm. (KCR)



Impounded wetland near Bristol in Liberty County, used for storm water storage prior to discharge into Apalachicola River. (PJ)

1. Vegetation and Structural Habitat

VII. Land management practices

Guidance: *This attribute includes observations of land management practices in and around the wetland. Mowing, grazing, fire suppression and water control features (furrows or ditches), as well as logging operations can affect the condition of the plant community. Is there evidence of the management practices that will affect the plant community either in a positive (enhancing long term sustainability of the community) or negative manner?*



Wetland in Hendry county surrounded by high intensity pasture showing drainage ditch. (KCR)



Age and size distribution in a logged cypress swamp, where only smaller trees have been left. (KCR)

1. Vegetation and Structural Habitat

VIII. Topographic features such as refugia ponds, creek channels, flats or hummocks

Guidance: *Topographic diversity offers a variety of forage and cover sites for wildlife, as well as a diversity of microhabitat for the plant community. Forested wetlands generally have higher micro-topographic diversity, while herbaceous wetlands tend to exhibit less. Deeper areas that do not dry out during the dry season offer wildlife refugia within a wetland.*



A refugia pond in the center of a forested wetland that holds water during drier periods. (KCR)



Secondary stream channel in a forested riparian wetland, Lower Suwannee River National Wildlife Refuge, June 2004 (EB).

1. Vegetation and Structural Habitat

VIII. Topographic features such as refugia ponds, creek channels, flats or hummocks (continued)



Recently constructed wetland, showing NO topographic relief (MTB).



Recently constructed wetland adjacent to forested riparian wetland, showing some topographic relief resulting from dozer tracks (MTB).

1. Vegetation and Structural Habitat

IX. Siltation or algal growth in submerged aquatic plant communities

Guidance: *Applicable only to submerged aquatic plant communities, this attribute evaluates the degree of siltation and algal growth, and the degree that it can impede normal aquatic plant growth. Waters dominated by algae or that have high silt impede photosynthesis of submerged vegetation. Secchi depth is a long-accepted methods for evaluating the transparency of water in lakes. However, care must be used in interpreting secchi data because of the potential influence of non-algal or silt particulate material, such as the tea color of some lakes that's due to dissolved organic matter and organic tannins.*



Blue-green algal growth, indicative of poor water quality, and would greatly impede normal aquatic plant growth. (RF)



Filamentous algae, the density of which is indicative of poor water quality and would impede normal aquatic plant growth. (MTB)

1. Vegetation and Structural Habitat

- X. Upland mitigation area – the level of habitat and life history support provided by the uplands for the fish and wildlife in the associated wetlands and surface waters

Guidance: *Applicable to upland mitigation area only, this attribute assesses whether the plant community and physical structure of the upland provide an optimal level of habitat and life history support for fish and wildlife associated with the nearby wetlands and other surface waters.*



Upland providing optimal level of habitat and life history support for fish and wildlife in the associated wetlands in Alachua County. (CRL)



Upland providing little or no habitat and life history support for fish and wildlife in the associated wetland in Flagler County. (KCR)

2. Benthic Communities

I. Species number and diversity of benthic organisms

Guidance: *This attribute evaluates the appropriateness, number and diversity of benthic organisms.*

2. Benthic Communities

II. Non-native and inappropriate species

2. Benthic Communities

III. Regeneration, recruitment and age distribution

Guidance: *Natural regeneration and recruitment should be noted, as well as evidence of appropriate age distribution.*

2. Benthic Communities

IV. Condition of appropriate species

Guidance: *This attribute evaluates the health and biomass of appropriate species.*

2. Benthic Communities

V. Structural features

Guidance: *This attribute evaluates whether the structural features are appropriate for the system or whether there is evidence of physical damage.*

2. Benthic Communities

VI. Topographic features

Guidance: *This attribute evaluates the appropriateness and condition of topographic features such as relief, stability, and interstitial spaces for hardbottom and reef communities, or snags and coarse woody debris for riverine systems.*

2. Benthic Communities

VII. Spawning or nesting habitats

Guidance: *This attribute assesses the condition and number of spawning and nesting habitats such as rocky or sandy bottoms.*

Section Divider

Expected Variation

Natural wetland communities may exhibit seasonal and regional variability in vegetation community structure and hydrology. For example, many wetland communities will be inundated during the wet season but may have no standing water during the dry season.



Depressional marsh in Goethe State Forest surrounded by pine flatwoods. Photo taken in March 2004. Marsh dominated by maiden cane with a distinct ring of St. John's Wort (yellow line left and continuing around wetland). (EB)



The same wetland in June 2004. Note the ring of St. John's wort, remnant from the previous year's bloom, that has not yet leafed out. This is the typical field condition and should not be confused for abnormal, stressed, or diseased condition (EB).

Expected Variation (continued)

Deciduous wetland communities will appear green and lush in the summer months, while they will be bare of leaves in the winter. The lack of lush vegetation during the winter months should not be taken as a sign of diseased or stressed vegetation.



Isolated cypress dome in Lower Suwannee National Wildlife Refuge, March 2004. Depicted in photo are deciduous cypress trees, a red maple (far left), and the ecotone composed of evergreen shrubs and saw palmetto (EB).



The same isolated cypress dome in Lower Suwannee National Wildlife Refuge, June 2004. Notice the green cypress canopy after leaf-out, and the red colored maple leaves (EB).

Expected Variation (continued)

Forested wetland communities may completely lack an understory depending on time of year and water depths, while at other times they may be heavily vegetated.



Cypress wetland in north central Florida during the summer months. The understory vegetation is relatively dense (MTB).



The same cypress wetland in winter. The dense understory is absent (MTB).

Expected Variation (continued)

Tidally influenced wetlands may exhibit daily tidal fluctuations, while other wetlands like hydric hammocks exhibit little change seasonally.



Hydric Hammock along the west coast of Florida near Crystal River. Depths of inundation rarely change throughout the year. (MTB)



The Withlachoochee River, a tidally influenced riparian wetland affected by two tidal cycles each day. Water levels fluctuate nearly 1 meter between low and high tides. (MTB)

Expected Variation (continued)

Similar hydrologic conditions may result in very different vegetative communities and standing biomass.

From year to year a wetland may be dominated by different vegetation depending on depths of inundation, fire history, or time of year.



A lake fringe wetland dominated by *Nuphar luteum*. Water depths at this time are about average. (MTB).



The similar lake fringe wetland, with comparable water depths, dominated by *Orontium aquaticum*. (MTB).

Expected Variation (continued)

Nutrient availability has a significant effect on the vegetative community. Oligotrophic (low nutrient) environments result in relatively sparse vegetation, small in stature, and often very slow growing, while eutrophic (high nutrient) environments are often dominated by thick vegetation, robust in stature, and relatively fast growing.



“Hat-rack” cypress (Pond Cypress) in the Big Cypress area of south Florida. The low nutrient environment and frequent fires result in very slow growing, widely spaced cypress trees of small stature. (MTB).



Pond Cypress in the Big Cypress area of south Florida. These trees are growing in a wetland slough with higher nutrient availability. (MTB).

Section Divider

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Wetland Field Guides

FLUCCS Codes for wetlands in Florida

Florida Land Use Cover and Forms Classification System (FLUCCS, January 1999)

610 Wetland Hardwood Forests

- 611 Bay Swamps
- 612 Mangrove Swamps
- 613 Gum Swamps
- 614 Titi Swamps
- 615 Stream and Lake Swamps (Bottomland)
- 616 Inland Ponds and Sloughs
- 617 Mixed Wetland Hardwoods
- 618 Willow and Elderberry
- 619 Exotic Wetland Hardwoods

620 Wetland Coniferous Forests

- 621 Cypress Forests
- 622 Pond Pine
- 623 Atlantic White Cedar
- 624 Cypress-Pine-Cabbage Palm
- 625 Hydric Pine Flatwoods
- 626 Hydric Pine Savanna
- 627 Slash Pine Swamp Forest

630 Wetland Forested Mixed

- 631 Wetland Scrub

640 Vegetated Non-Forested Wetlands

- 641 Freshwater Marshes
- 642 Saltwater Marshes
- 643 Wet Prairies
- 644 Emergent Aquatic Vegetation
- 645 Submergent Aquatic Vegetation
- 646 Treeless Hydric Savanna

Identification Key to Wetlands by FLUCCS Codes

- 1) Is the community forested (minimum 10 percent closure)?
 - a. Yes, go to 2.
 - b. No, go to 16.
- 2) Is the community dominated (66 percent or more) by hardwood species?
 - a. Yes, go to 3.
 - b. No, go to 9.
- 3) Is the community dominated by bay species (loblolly bay, sweetbay, swamp bay)?
 - a. Yes – **611 Bay Swamp**
 - b. No, go to 4.
- 4) Is the community dominated by mangrove species (black or red mangrove)?
 - a. Yes – **612 Mangrove Swamp**
 - b. No, go to 5.
- 5) Is the community dominated by swamp tupelo, water tupelo, or Ogeechee tupelo?
 - a. Yes – **613 Gum Swamp** (please continue below)
 - i. Is the community associated with river, streams, and lakes floodplains and overflow areas?
Yes - **615 Stream and Lake Swamp (Bottomland)**
No, go to ii.
 - ii. Is the community associated with depression and drainage areas that are not associated with rivers and streams?
Yes - **616 Inland Ponds Slough**
No – **613 Gum Swamp**
 - b. No, go to 6.
- 6) Is the community dominated by titi?
 - a. Yes – **614 Titi Swamp**
 - b. No, go to 7.
- 7) Is the community dominated by willow (sometimes in association with elderberry)?
 - a. Yes – **618 Willow and Elderberry**
 - b. No, go to 8.
- 8) Is the community composed by a variety of hardwood species with an ill defined mixture of species?
 - a. Yes – **617 Mixed Wetland Hardwoods** (please continue below)
 - i. Is the community associated with river, streams, lakes floodplain and overflow areas?
Yes - **615 Stream and Lake Swamp (Bottomland)**
No, go to ii.
 - ii. Is the community associated with depression and drainage areas that are not associated with rivers and streams?
Yes - **616 Inland Ponds Slough**
No – **617 Mixed Wetland Hardwood**
 - b. No, go to 2.

- 9) Is the community dominated by coniferous tree species (cypress, pine, cedar)?
 - a. Yes, go to 10.
 - b. No, go to 15.
- 10) Is the community dominated by pond cypress or bald cypress?
 - a. Yes – **621 Cypress**
 - b. No, go to 11.
- 11) Is the community dominated by Atlantic White Cedar?
 - a. Yes – **623 Atlantic White Cedar**
 - b. No, go to 12.
- 12) Is the community dominated by pond pine (*Pinus serotina*)?
 - a. Yes – **622 Pond Pine**
 - b. No, go to 13.
- 13) Is the community dominated by slash pine (*Pinus elliottii*)?
 - a. Yes – **625 Hydric Pine Flatwoods** (also see FLUCCS codes **626 Hydric Pine Savanna** and **627 Slash Pine Swamp Forest**)
 - b. No, go to 14.
- 14) Is the community composed of cypress, pine and cabbage palm, with no one species achieving dominance?
 - a. Yes – **624 Cypress-Pine-Cabbage Palm**
 - b. No, go to 2.
- 15) Is the community composed of hardwood and coniferous species, where neither achieves 66 percent dominance?
 - a. Yes – **630 Wetland Forested Mixed** (also see FLUCCS code **631 Wetland Scrub**)
 - b. No, go to 2.
- 16) Is the community dominated by floating vegetation or vegetation that is found either partially or completely above the surface of water (ex. water lettuce, spatterdock, water hyacinth, duckweed, water lily).
 - a. Yes – **645 Emergent Aquatic Vegetation**
 - b. No, go to 17.
- 17) Is the community composed of aquatic species growing completely below the surface (ex. hydrilla)?
 - a. Yes – **646 Submergent Aquatic Vegetation**
 - b. No, go to 18.
- 18) Is the community dominated by wiregrass and cutthroat grass, and is it usually associated with wet pine flatwoods?
 - a. Yes – **646 Treeless Hydric Savannah**
 - b. No, go to 19.
- 19) Is the community dominated by salt-tolerant plants such as smooth cordgrass, blackneedle rush, or saltwart?
 - a. Yes – **642 Salt Marsh**
 - b. No, go to 20.
- 20) Is the community found on flat topography, and is it only seasonally inundated or saturated (50-100 days/year)?
 - a. Yes – **643 Wet Prairie**
 - b. No – **641 Freshwater Marsh**

FLUCCS Classification Cross-reference Table (adapted from Doherty et al. 2000)

FLUCCS	FNAI	SCS	FWC	NWI
610 - Wetland Hardwood Forests				
611 - Bay Swamps	Baygall	22-Shrub Bog/Bay Swamp	14-Bay Swamp	PFO3-Palustrine, Forested, Broad-Leaved Evergreen, PFO6Palustrine, Forested Deciduous (mixed)
613 - Gum Swamps	Basin Swamp, Dome Swamp, Floodplain Swamp, Freshwater Tidal Swamp, River Floodplain/Swamp	21-Swamp Hardwood, 12-Wetland Hardwood Hammock	13-Hardwood Swamp	PFO1-Palustrine Forested, Broad-LeavedDeciduous, PFO6-Palustrine, Forested, Deciduous (mixed)
614 - Titi Swamps	Seepage Slope, Bog, Baygall	22-Shrub Bog/Bay Swamp	15-Shrub Swamp	PFO1-Palustrine Forested, Broad-Leaved Deciduous, PFO6-Palustrine, Forested Deciduous (mixed) , PFO6 -Palustrine, Forested Deciduous (mixed)
615 - Stream and Lake Swamps (Bottomland)	Bottomland Forest, Floodplain Forest, Floodplain Swamp, Freshwater Tidal Swamp, River Floodplain Lake/Swamp Lake	20-Bottomland Hardwood	17-Bottomland Hardwood	PFO1-Palustrine Forested, Broad-Leaved Deciduous, PFO6-Palustrine, Forested Deciduous (mixed)
616 - Inland Ponds and Sloughs	Basin Swamp, Dome Swamp	26-Slough	13-Hardwood Swamp	PSS-Palustrine, Scrub Shrub, PFO1-Forested, Broad-Leaved Deciduous, PFO6-Palustrine, Forested, Deciduous (mixed)
617 - Mixed Wetland Hardwoods	Hydric Hammock, Bottomland Forest, Floodplain Forest, Basin Swamp	12-Wetland Hardwood Hammock	13-Hardwood Swamp	PFO1-Palustrine, Forested, Broad-Leaved Deciduous, PFO6- Palustrine, Forested, Deciduous (mixed)
618 - Willow and Elderberry	Bog, Slough, Floodplain Forest	22-Shrub Bog/Bay Swamp, 21-Swamp Hardwood	15-Shrub Swamp	PSS- Palustrine, Scrub Shrub, PFO1-Palustrine, Forested, Broad-Leaved Deciduous, PFO6-Palustrine, Forested, Deciduous (mixed)
619 - Exotic Wetland Hardwood	Bog, Slough, Floodplain Forest	22-Shrub Bog/Bay Swamp, 21-Swamp Hardwood	15-Shrub Swamp	PSS-Palustrine, Scrub Shrub, PFO6-Palustrine, Forested, Deciduous (mixed)
620 - Wetland Coniferous Forests				
621 - Cypress	Dome Swamp, Basin Swamp, Strand Swamp, Floodplain Swamp, Marl Prairie	16-Scrub Cypress, 17-Cypress Swamp	12-Cypress Swamp	PFO2-Palustrine, Forested, Needle-Leaved Deciduous, PFO6-Palustrine, Forested, Deciduous (mixed)
622 - Pond Pine	Wet Flatwoods	6-7-N/S Florida Flatwoods, 20-Bottomland Hardwood	3-Pinelands	PFO4- Palustrine, Forested, Needle-Leaved Evergreen, PFO7-Palustrine, Forested, Evergreen (mixed)
623 - Atlantic White Cedar	Bottomland Forest, Freshwater Tidal Swamp	20-Bottomland Hardwood, 21-Swamp Hardwood	17-Bottomland Hardwood	PFO4-Palustrine, Forested, Needle-Leaved Evergreen, PFO7-Palustrine, Forested, Evergreen (mixed)
624 - Cypress - Pine-Cabbage Palm	Wet Flatwoods, Freshwater Tidal Swamp	8-Cabbage Palm Flatwoods, 21-Swamp Hardwood	17-Bottomland Hardwood	PFO6- Palustrein, Forested, Deciduous (mixed), PFO7-Palustrine, Forested, Evergreen (mixed)
625 - Hydric Pine Flatwoods	Wet Flatwoods	6-7-N/S Florida Flatwoods	3-Pinelands	PFO4-Palustrine, Forested, Needle-Leaved Evergreen
626 - Hydric Pine Savanna	Wet Flatwoods	7-S Florida Flatwoods	3-Pinelands	PFO4-Palustrine, Forested, Needle-Leaved Evergreen
627 - Slash Pine Swamp Forest	Wet Flatwoods	6-7-N/S Florida Flatwoods	3-Pinelands	PFO4-Palustrine, Forested, Needle-Leaved Evergreen

FLUCCS Classification Cross-reference Table

FLUCCS	FNAI	SCS	FWC	NWI
630 - Wetland Forested Mixed				
631 - Wetland Scrub	Bog, Wet Flatwoods, Bottomland Forest, Floodplain Forest, Flatwoods/Prairie/ Marsh Lake	22-Shrub Bog/Bay Swamp	15-Shrub Swamp	PSS-Palustrine, Scrub Shrub
640 - Vegetated Non-Forested Wetlands				
641 - Freshwater Marshes	Basin Marsh, Depression Marsh, Swale, Marl Prairie, Flatwoods/Prairie/Marsh Lake	25-Freshwater Marsh, 24-Sawgrass Marsh	11-Freshwater Marsh and wet Prairie	PEM- Palustrine, Emergent, R2EM-Riverine, Lower Perennial, Emergent, non-persistent, R4SB-Riverine, Intermittent, Streambed, L2EM-Lacustrine, Littoral, Emergent, Non-Persistent
643 - Wet Prairies	Wet Prairie, Marl Prairie, Seepage Slope, Swale, Basin Marsh, Flatwoods/Prairie/Marsh Lake	23-Pitcher Plant Bog, 25-Freshwater Marsh	11-Freshwater Marsh and wet Prairie	PEM-Palustrine, Emergent, R2EM- Riverine, Lower Perennial, Emergent, non-persistent, R4SB-Riverine Intermittent, Streambed, L2EM-Lacustrine, Littoral, Emergent, non-persistent
644 - Emergent Aquatic Vegetation	Basin Marsh, Depression Marsh, Floodplain Marsh, Flatwoods/Prairie/Marsh Lake	25-Freshwater Marsh, 24-Sawgrass Marsh	11-Freshwater Marsh and wet Prairie	R2AB-Riverine, Lower Perennial, Aquatic Bed, R3AB-Riverine, Upper Perennial, Aquatic Bed, L1AB-Lacustrine, Limnetic, Aquatic Bed, L2AB-Lacustrine, Littoral, Aquatic Bed, PAB3-Palustrine, Aquatic Bed, Rooted Vascular, PAB4-Palustrine, Aquatic Bed, Floating Vascular
645 - Submerged Aquatic Vegetation	River Floodplain Lake/Swamp Lake	25-Freshwater Marsh	11-Freshwater Marsh and wet Prairie	R2AB- Riverine, Lower Perennial, Aquatic Bed, R3AB- Riverine, Upper Perennial, Aquatic Bed, L1AB-Lacustrine, Limnetic, Aquatic Bed, L2AB-Lacustrine, Littoral, Aquatic Bed, PAB3-Palustrine, Aquatic Bed, Rooted Vascular
646 - Treeless Hydric Savanna	Wet Flatwoods	26-Slough	3-Pinlands, 11-Freshwater marsh and wet prairie	PFO4-Palustrine, Forested, Needle-Leaved Evergreen
653 - Intermittent Ponds	Depression Marsh	25-Freshwater Marsh, 26-Slough	11-Freshwater Marsh and wet Prairie	PEM1-Palustrine, Forested, Broad-Leaved Deciduous, PAB4- Palustrine, Aquatic Bed, Floating Vascular

FNAI. Florida Natural Areas Inventory. 1990. Guide to the natural communities of Florida. Prepared by FNAI and Florida Department of Natural Resources, Tallahassee FL. 111 pp.

SCS. Soil Conservation Service, U.S. Department of Agriculture. 1984. 26 Ecological Communities of Florida.

FWC. Florida Fish and Wildlife Conservation Service. Land Cover map.

NWI. National Wetlands Inventory. Cowardin, L.M., V. Carter, F.C. Golet and E.T. Laroe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. U.S. Fish and Wildlife Service / Department of the Interior, Washington, D.C. 103 pp.

611 Bay Swamps

FLUCCS Description

This community is composed of dominant trees loosely described as bays, such as *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweetbay), *Persea palustris* (swamp bay), with *Pinus elliottii* (slash pine) and *Pinus taeda* (loblolly pine) as an associated component at times.

Bay Swamps (synonyms: Bay Gall, Bayhead, Seepage Swamp) - Generally depressional forested wetlands with mucky, organic soils, often associated with a seepage bog. May represent a fire suppressed version of a typically open seepage bog in some areas.

Vegetation: Dominated by evergreen tree and shrub species, including *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweetbay), and *Persea palustris* (swamp bay). In north Florida deciduous taxa such as *Taxodium ascendens* (pond cypress) and *Nyssa sylvatica* (swamp tupelo) are often co-dominants and share the canopy with *Chamaecyparis thuyoides* (Atlantic white cedar), *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweetbay), and *Pinus elliottii* (slash pine). Bay Swamps in central and south Florida are characterized by more *Magnolia virginiana* (sweetbay) and *Gordonia lasianthus* (loblolly bay) in the canopy with subtropical species such as *Myrsine guianensis* (myrsine) and tropical fern species in the groundcover. The understory is typically dominated by a variety of *Ilex* spp. (holly species) and *Lyonia lucida* (fetterbush). Other typical plants include *Aronia arbutifolia* (red chokeberry), *Clethra* spp. (white alder), *I. cassine* (dahoon holly), *I. coriacea* (large gallberry), *I. myrtifolia* (myrtle-leaved holly), *Itea virginica* (Virginia willow), *Leucothoe axillaris* (dog-hobble), *L. racemosa* (hurrah-bush), *Liquidambar styraciflua* (sweetgum), *Lyonia ligustrina* (male-berry), *Myrica cerifera* (wax myrtle), *M. inodora* (odorless wax myrtle), *Osmunda cinnamomea* (cinnamon fern), *Rhaphidophyllum hystrix* (needle palm), *Saururus cernuus* (lizard's tail), *Smilax laurifolia* (laurel greenbrier), *Toxicodendron radicans* (poison ivy), *Viburnum nudum* (possum-haw viburnum), *Vitis* spp. (wild grape), *Woodwardia areolata* (netted chainfern), and *W. virginica* (Virginia chainfern). The species composition of Bay swamps frequently overlaps with 613 Gum Swamps, 615 Stream and Lake Swamps (Bottomland), 617 Mixed Wetland Hardwoods, 621 Cypress Forests, 625 Hydric Pine Flatwoods, and 631 Wetland Scrub.

Wildlife:

Mammals - *Blarina carolinensis* (short-tailed shrew), *Didelphis virginiana* (opossums), *Lynx rufus* (bobcat), *Mustela vison* (southern mink), *Procyon lotor* (raccoons), *Sorex longirostris* (southeastern shrew), *Sylvilagus palustris* (marsh rabbits), and *Ursus americanus floridanus* (black bears)^T.

Herpetofauna - *Ambystoma talpoideum* (mole salamanders), *Desmognathus auriculatus* (southern dusky salamanders), and *Pseudotriton montanus* (mud salamanders).

Landscape Location: May be located at the base of a slope where seepage maintains a saturated peat substrate, near the edge of floodplains or in other low lying areas where high water tables help maintain soil moisture.

Soils: Peat with an acidic pH (3.5 - 4.5).

Fire Interval: Uncommon with a frequency of 50-100 years or more. Severe fires may change a Bay Swamp into a different community type. Surface fires that remove only a small amount of peat may lead to a 625 Hydric Pine Flatwoods community. Deeper fires that lower the ground surface considerably may allow the invasion of 618 Willow and Elderberry followed by the establishment of a cypress-gum community (such as 613 Gum Swamps or 621 Cypress Forests). Frequent fires may lead to the development of a shrub bog. When the subsurface peat is not consumed and the fire and hydrologic regimes remain undisturbed, a Bay Swamp may be replaced with 623 Atlantic White Cedar.

Hydrology: Dependent upon seepage flow and a high water table. Changes in the local and regional hydrology could impact Bay swamp communities, and they may require fire protection during droughts, especially if water tables are lowered. Threats to Bay Swamps include logging, peat mining, and conversion to agricultural land. When drained, the peat soils are valued for farming, although they begin to oxidize and disappear when exposed.

Functions:

- Important fire buffers since seepage water keeps them almost constantly moist.
- As an evergreen community, offer important habitat and cover for a variety of wildlife year around.
- Peat soils serve as valuable stores of organic matter.
- High water storage.
- Slow discharge to groundwater and downstream wetlands (if connected).
- Detrital export (if connected).

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/2004. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Loblolly bay

Gordonia lasianthus

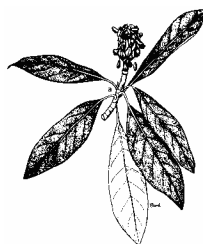
FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Swamp bay

Persea palustris

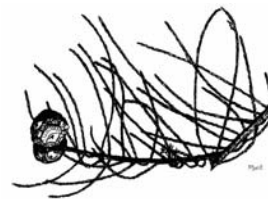
OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Swamp Tupelo

Nyssa sylvatica

OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Atlantic White Cedar

Chamaecyparis thyoides

OBL-Evergreen canopy tree, "Christmas tree" shaped when young, with branchlets of individual twigs fan-like in a single plane. Twigs are not prickly. Found in NW Florida.



Myrsine

Myrsine guianensis

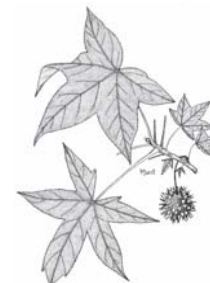
FAC-Evergreen shrub, smooth gray bark, leaves alternate, bright green, oblong-ovate with rounded tip and prominent mid vein, generally clustered near twig tips.



Dahoon Holly

Ilex cassine

OBL-Evergreen shrub, smooth gray bark, alternate leathery leaves of variable shape and entire margins, often with few short spines, bright red to orange red drupe fruit, and ascending branches.



Sweet gum, Red gum

Liquidambar styraciflua

FACW-Deciduous canopy tree to 37 m tall; alternate, star-shaped palmately veined leaves with 5 (rarely 7) pointed lobes, margins toothed; hard, spiny, round fruit capsule; thick, stiff branches, twigs with corky wings/warts; gray bark deeply vertically furrowed.



Slash Pine

Pinus elliotii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Large Gallberry

Ilex coriacea

FACW-Evergreen shrub, alternate leathery, elliptic to oval leaves with scattered punctate glands on lower surface; bristle-like marginal teeth that frequently diverge away from margin; found in W and N Florida, and southward to the central peninsula.



Fetterbush

Lyonia lucida

FACW-Evergreen shrub; simple alternate leathery leaves with distinct vein paralleling the leaf margin; flowers reddish to deep pink.



Maleberry, He-huckleberry

Lyonia ligustrina

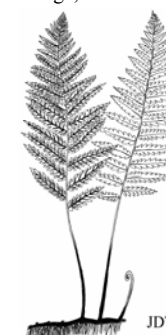
FAC-Deciduous shrub to 4 m tall with thin and ascending branches; simple, alternate leaves with finely serrate margins and tooth on leaf tip, pubescence along veins on lower surface; small rounded flowers in clusters.



Cinnamon fern

Osmunda cinnamomea

FACW - Rhizomatous fern, clustered, deciduous, pinnately compound, alternating leaflets with tufts of orange hair at the base.



Virginia Chainfern

Woodwardia virginica

FACW - Medium-sized creeping fern, bright green pinnatifid leaves with glands on surface, "chainlike" venation along the middle costa of each pinna.

612 Mangrove Swamps

FLUCCS Description

This coastal hardwood community is composed of *Avicennia germinans* (black mangrove) and/or *Rhizophora mangle* (red mangrove) in pure or dominant stands. The major associates include *Coccoloba uvifera* (sea grape), *Conocarpus erecta* (buttonwood), *Laguncularia racemosa* (white mangrove), and *Sabal palmetto* (cabbage palm).

Mangrove Swamps - Found along the southern reaches of the Gulf and Atlantic Coasts of Florida, with the most extensive stands in sheltered bays and other low-wave energy environments. The term “mangrove” can apply to both the mangrove trees and to the community as a whole.

Vegetation: *Avicennia germinans* (black mangrove), *Laguncularia racemosa* (white mangrove), and *Rhizophora mangle* (red mangrove) are the dominant vascular plant species, along with *Conocarpus erecta* (buttonwood) along the upland fringe. Salt marsh species such as *Batis maritima* (saltwort), *Borrchia frutescens* (sea oxeye), *Distichlis spicata* (saltgrass), *Eleocharis cellulosa* (glasswort), *Juncus roemerianus* (black needlerush), *Salicornia virginica* and *S. bigelovii* (glassworts), and *Spartina alterniflora* (smooth cordgrass) may also be found, mostly in open canopy areas between the mangrove trees. In addition, there are many species of algae that grow on the mud surface and on the exposed roots systems.

Wildlife:

Mammals – *Lutra canadensis* (river otter), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Odocoileus virginianus clavium* (key deer), *Procyon lotor* (raccoon), *Sciurus niger avicennia* (mangrove fox squirrel), and *Sylvilagus palustris* (marsh rabbit).

Birds – Over 80 species of birds have been identified that use mangroves for feeding, nesting or roosting in South Florida mangroves. The most common wading and shorebirds are egrets (*Casmerodius albus* – great; *Egretta thula* – snowy; and *Egretta rufescens* - reddish egrets), herons (*Ardea herodias* - great blue; *Egretta caerulea* - little blue; *Butorides striatus* - green-backed; *Nycticorax nycticorax* - night), rails (ex. *Rallus longirostris*), sandpipers (ex. *Actitis macularia*), *Ajaia ajaja* (roseate spoonbill), *Botaurus lentiginosus* (American bittern), *Eudocimus albus* (white ibis), *Himantopus mexicanus* (black-necked stilts) and *Ixobrychus exilis* (least bittern). Other common avifauna include cormorants (ex. *Phalacrocorax dilophus*), coots (ex. *Fulica americana* – American coot), grackles (ex. *Quiscalus major* – boat-tailed grackle) pelicans (ex. *Pelecanus occidentalis* – brown pelican; *P. erythrorhynchos* – white pelican), warblers (ex. *Dendroica dominica* – yellow-throated warbler), *Ceryle alcyon* (belted kingfisher), *Coccyzus americanus* (yellow-billed cuckoo), *Falco peregrinus* (peregrine falcon), *Frigata* sp. (frigate bird), *Haliaeetus leucocephalus* (bald eagle), *Pandion haliaetus* (osprey), *Rynchops nige* (black skimmer), and *Sterna maxima* (royal tern) may also be present.

Herpetofauna – marine turtles (*Eretmochelys imbricate* - hawksbill; *Chelonia mydas* - green, *Caretta caretta* - loggerhead; *Lepidochelys kempi* - Atlantic Ridley)^E, *Alligator mississippiensis* (American alligator), *Anolis* spp. (anoles), *Crocodylus Acutus* (crocodile), *Kinosternon* sp. (mud turtle), *Malaclemys terrapin* (diamondback terrapin),

and *Nerodia clarkii compressicauda* (mangrove water snake) are associated with or dependent upon mangrove communities, at least during part of their life.

Fish and Other Aquatic Species – *Albula vulpes* (bonefish), *Archosargus probatocephalus* (sheepshead), *Centropomus undecimalis* (snook), *Cynoscion* sp. (seatrout), *Dasyatis americana* (stingrays), *Gambusia affinis* (mosquito fish), Lutjanidae (snapper), *Megalops atlanticus* (tarpon), *Mugil cephalus* (mullet), *Perca* spp. (perch), *Pogonias cromis* (drum), *Rivulus* spp. (marsh killifish), *Sphyrna* sp. (barracuda), and sharks (Lamnidae) utilize mangroves, depending upon the type of community. Mangroves are also important nursery habitat for *Panulirus argus* (spiny lobster) and *Penaeus duorarum* (pink shrimp). Other invertebrates include many species of insects, crabs (*Uca* sp. – fiddler; Zanthidae – mud; *Callinectes sapidus* – blue; *Goniopsis cruentata*, *Aratus pisonii*, and *Sesarma curacaoense* - mangrove), and sessile organisms in the mud substrate or on prop roots (oysters, barnacles, polychaetes).

Landscape Location: The composition of a Mangrove Swamp depends upon the hydrologic flushing regime. Riverine forests are found along tidal creeks and rivers, as a type of saltwater floodplain. Fringe forests are generally narrow communities along the shoreline, between uplands and deeper open waters. Basin forests occur inland from fringing and riverine systems and may be found in shallow depressions, on slightly higher elevations, or on marl substrate. Overwash mangroves are typically low island forests surrounded by open water. Distribution and the northern extent is limited by winter freezes.

Soils: Generally level and anaerobic. Soil materials can range from fine or calcareous mud, shell and marl to sand and muck and/or peat. In depositional settings, stable and long-term populations of red mangroves can result in peat development up to several meters thick.

Fire Interval: Fire is unexpected in mangrove communities.

Hydrology: Hydrology reflects the tidal pattern (frequency, amplitude, and duration) of the waters in which the mangrove community is located.

Functions:

- Trap and cycle organic materials.
- Provide important food chain resources for marine organisms.
- Provide habitat and nursery grounds for many species (some with important commercial value).
- Offer shoreline protection by buffering wind and wave action.

^E Listed as Endangered by Florida Fish and Wildlife Conservation Commission

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
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4. Odum, W.E., C.C. McIvor, and T.J. Smith, III. 1982. *The Ecology of the Mangroves of South Florida: A Community Profile*. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/OBS-81/24.
5. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.

613 Gum Swamps

FLUCCS Description

This forest community is composed of *Nyssa aquatica* (water tupelo), *N. ogeche* (Ogeechee tupelo), or *N. sylvatica* (swamp tupelo or blackgum), which are pure or predominant in the canopy. Associate species may include *Taxodium distichum* (bald cypress) and a variety of hardwood species tolerant of wet conditions.

Gum Swamps (synonyms: Basin Swamp, Floodplain Swamp, Bottomland Hardwood) - Found in large and irregularly shaped basins not associated with rivers as well as within river floodplains or in areas that exhibit extended periods of standing water.

Vegetation: Dominant plants include *Nyssa aquatica* (water tupelo), *N. ogeche* (Ogeechee tupelo), *N. sylvatica* (swamp tupelo or blackgum), *Pinus elliottii* (slash pine), and *Taxodium* spp. (cypress). Other typical plants include *Acer rubrum* (red maple), *Cephalanthus occidentalis* (buttonbush), *Cyrilla racemiflora* (titi), *Gordonia lasianthus* (loblolly bay), *Itea virginica* (Virginia willow), *Lyonia lucida* (fetterbush), *Magnolia virginiana* (sweetbay), *Myrica cerifera* (wax myrtle), *Persea palustris* (swamp bay), *Smilax laurifolia* (laurel greenbrier), *Sphagnum* spp. (sphagnum moss), and *Tillandsia usneoides* (Spanish moss). The species composition of Gum Swamps frequently overlaps with 611 Bay Swamps, 615 Stream and Lake Swamps (Bottomland), 616 Inland Ponds and Sloughs, 617 Mixed Wetland Hardwoods, and 621 Cypress Forests.

Wildlife:

Mammals – *Lutra canadensis* (river otter), *Lynx rufus* (bobcat), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), and *Ursus americanus floridanus* (black bear)^T.

Birds – hawks (ex. *Buteo lineatus* - red-shouldered hawk), songbirds, *Aix sponsa* (wood duck), *Bubo virginianus* (great horned owl), *Dryocopus pileatus* (pileated woodpecker), *Meleagris gallopavo* (turkey), and *Strix varia* (barred owl).

Herpetofauna – *Acris gryllus* (cricket frog), *Agkistrodon piscivorus* (cottonmouth snake), *Deirochelys reticularia* (chicken turtle), *Desmognathus auriculatus* (southern dusky salamander), *Diadophis punctatus* (ring-necked or ringneck snake), *Kinosternon baurii* (striped mud turtle)^E, *Lampropeltis triangulum elapsoides* (scarlet kingsnake), *Limnaea ocularis* (little grass frog), and *Regina* sp. (crayfish snake).

Landscape Location: Gum Swamps are usually found in depressional basins or within river floodplains.

Soils: Generally acidic, very poorly drained, nutrient poor peat soils, and often overlying a clay lens or other impervious layer.

Fire Interval: Typical fire intervals may be anywhere from 5-150 years, depending on landscape location and hydrology.

Hydrology: The typical hydroperiod is approximately 200-300 days in depressional areas (Basin Swamps) with periodic flooding essential in maintaining this ecosystem. If the system is drained or flooded for periods of time uncharacteristic of Gum Swamps (dry for more than 200 days or wet for more than 300 days), a new community may form. Dry conditions may permit invasion of less water tolerant

species and change the character of the understory or may allow a devastating fire to burn, thus drastically altering the community. Extended periods of standing water limit growth and reproduction.

Functions:

- Natural storage areas of water.
- Flood protection by slowing the flow of water and gradually feeding water back to rivers.
- Enhance water quality by assimilating inorganic and organic waste.
- Export detritus and enhance oxygen diffusion to downstream systems.
- Provide food and cover for a variety of wildlife species, including waterfowl, reptiles, amphibians, and mammals.
- Provide recreational opportunities.

^E Listed as Endangered by Florida Fish and Wildlife Conservation Commission

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.





Water Tupelo

Nyssa aquatica

OBL-Tree up to 30m tall with swollen buttressed base, large, deciduous, alternate, simple leaves with a few large teeth on margin and long petioles, blue drupe fruit on a long stalk.



Ogeechee tupelo

Nyssa ogeche

OBL-Small to medium deciduous tree, usually with enlarged base, typically growing with multiple trunks; bark dark brown and fissured; leaves large 8-15 cm, simple, alternate, margins entire or with few large teeth.



Swamp Tupelo

Nyssa sylvatica

OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Swamp bay

Persea palustris

OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Titi

Cyrtilla racemiflora

FAC- Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Red Maple

Acer rubrum

FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



Fetterbush

Lyonia lucida

FACW-Evergreen shrub; simple alternate leathery leaves



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Buttonbush

Cephalanthus occidentalis

OBL-Understory shrub to 3 m tall; arching branches with raised lenticels, simple elliptic or ovate deciduous leaves, opposite or in whorls of 3-4; ball-like clusters of white flowers hanging on long stalks below leaves; fruiting structure distinct, round, brown, often persists throughout year.



Loblolly bay

Gordonia lasianthus

FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Wax Myrtle

Myrica cerifera

FAC-Evergreen shrub, gray bark, alternate leaves, aromatic, with teeth on margins, surface rough; from a distance leaves



Slash Pine

Pinus elliotii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Laurel greenbrier

Smilax laurifolia

OBL*-High-climbing evergreen woody vine, tough and wiry; stems green, round in cross-section, usually very spiny but sometimes almost spineless; spines stiff, green, round at base; leaves leathery, oblong to oblong-lanceolate, 6-20 cm long with thick midrib, apex pointed.



Virginia Willow

Itea virginica

OBL-Simple alternate leaves with fine-toothed margins, upper surface glabrous, lower surface sparsely pubescent, with prominent veins below. Small white flowers borne

614 Titi Swamps

FLUCCS Description

This community is composed of often extremely dense stands of *Cliftonia monophylla* (black titi) and *Cyrilla racemiflora* (titi) which are either the pure or predominant species. At times titi can dominate non-wetland sites in the absence of a natural fire regime.

Titi Swamps (synonyms: Seepage Slope, Bog, Shrub Bog, Shrub Swamp) - Occur throughout north central Florida as relatively small communities. Titi Swamps dominated by *Cliftonia monophylla* (black titi) occur primarily in the panhandle region, while ones dominated by *Cyrilla racemiflora* (titi) occur across the northern and central portions of the state.

Vegetation: Additional plant species include *Gordonia lasianthus* (loblolly bay), *Ilex coriacea* (large gallberry), *Lyonia lucida* (fetterbush), *Magnolia virginiana* (sweetbay), *Persea palustris* (swamp bay), and *Sphagnum* spp. (sphagnum moss). Other vegetation includes *Acer rubrum* (red maple), *Aronia arbutifolia* (red chokeberry), *Cephalanthus occidentalis* (buttonbush), *Chamaecyparis thyoides* (white cedar), *Chrysobalanus icaco* (cocoplum), *Clethra alnifolia* (sweet pepperbush), *Drosera* spp. (sundews), *Eriocaulon* spp. (hatpins), *Ilex cassine* (dahoon holly), *I. decidua* (possumhaw), *I. glabra* (gallberry), *Itea virginica* (Virginia willow), *Lachnanthes caroliana*, (redroot), *Lachnocaulon* spp. (bog buttons), *Leucothoe axillaris* (dog-hobble), *L. racemosa* (racemed fetterbush), *Lyonia ligustrina* (male-berry), *Myrica cerifera* (wax myrtle), *M. inodora* (odorless wax myrtle), *Nyssa sylvatica* (swamp tupelo), *Orontium aquaticum* (golden club), *Osmunda cinnamomea* (cinnamon fern), *Parnassia grandifolia* (grass-of-parnassus), *Peltandra* spp. (arum), *Pinus elliottii* (slash pine), *P. serotina* (pond pine), *Sagittaria* spp. (arrowheads), *Sarracenia* spp. (pitcher plants), *Smilax walteri* (coral greenbrier), *Taxodium* spp. (cypress), *Vaccinium* spp. (blueberry), *Xyris* spp. (yellow-eyed grass), and orchids (Orchidaceae).

Wildlife:

Mammals – Titi Swamps provide escape cover for *Colinus virginianus* (bobwhite quail), *Meleagris gallopavo* (turkey), *Odocoileus virginianus* (white-tailed deer), and *Ursus americanus floridanus* (black bear)^T.

Herpetofauna – *Agkistrodon piscivorus* (cottonmouth snake), *Eurycea quadridigitata* (dwarf salamander), *Hyla andersonii* (pine barren treefrog)^{SSC}, *Hyla squirella* (squirrel treefrog), *Limnaeodius ocularis* (little grass frog), and *Nerodia fasciata* (banded water snake).

Landscape Location: May border 625 Hydric Pine Flatwoods and serve as a fire buffer for 611 Bay Swamps. They often grade imperceptibly into 611 Bay Swamps. Occasionally, Titi Swamps also border 613 Gum Swamps, 616 Inland Ponds and Sloughs, and 621 Cypress Forests, also protecting these areas from fire. The community may occur on hillsides, in depressions within pine flatwoods, in ravines, or at the base of a slope where moisture derives from seepage of higher lands.

Soils: Peaty, acidic, very poorly drained soils.

Fire Interval: Fire frequency is highly variable. In shrubby types fires occur normally every 3-8 years, while in woody systems every 50-150 years.

Hydrology: Characteristic of depressional areas. Occur in sites where the ground water table is close to the surface and moisture is drawn up from below by capillary action. Those found on seepage slopes are dependent upon water seeping from higher lands.

Management: Though many Titi Swamps occur naturally throughout the landscape, the correct fire regime is essential in managing these forests to ensure that they do not encroach on other native ecosystems. In the absence of fire, titi and other shrub species can enter 625 Hydric Pine Flatwoods and form a dense understory, thus limiting ground cover growth and dominating the site. When a destructive fire consumes a nearby 611 Bay Swamp, titi species (which are adapted to fire and re-sprout readily from their roots after a fire) will regenerate and grow faster than the bay species. The site then becomes a Titi Swamp for a number of years until the bay trees become tall enough to form a canopy. Preserving the hydrology of these communities is critical, as seepage slopes are very sensitive to hydrological barriers such as fire lanes, right-of-ways, and ditches that disturb the delicate hydrologic balance.

Functions:

- Important as fire buffers for adjoining swamps.
- Provide cover for larger mammals, such as bears, as well as providing habitat for a variety of wildlife species.
- Act as small water reservoirs, receiving seepage from uphill slopes and trickling it down in small but steady supply.

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

^{SSC} Listed as Species of Special Concern by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Black titi

Cliftonia monophylla

FACW-Evergreen shrub or small tree to 30 ft; smooth bark, gray to grayish-brown; simple alternate leaves, evergreen, short-stalked to sessile; flowers white to pinkish in short racemes, clustered; winged fruits.



Titi

Cyrilla racemiflora

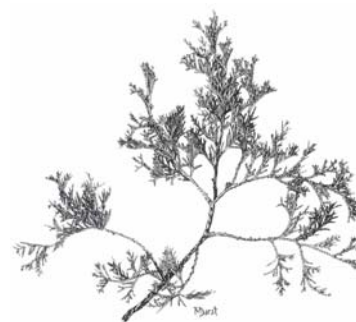
FAC - Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Loblolly bay

Gordonia lasianthus

FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Atlantic White Cedar

Chamaecyparis thyoides

OBL-Evergreen canopy tree, "Christmas tree" shaped when young, with branchlets of individual twigs fan-like in a single plane. Twigs are not prickly. Found in NW Florida.



Possumhaw

Ilex decidua

FACW - Deciduous shrub or small understory tree, alternate leaves with crenate margins, each tooth bearing a minute gland, pubescence along veins on lower surface; globose or sub-globose, red to orange-red drupe borne close to the stem.



Gallberry

Ilex glabra

UPL-Evergreen shrub, alternate leathery leaves, with 2-3 crenate teeth along leaf margin toward the tip, lower surface has scattered reddish, punctate glands. Black berry-like fruit persistent into winter.



Dog-hobble

Leucothoe auxillaris

FACW-Small, low evergreen shrub to 1.5 m tall, with branches running parallel to the ground; simple, alternate, dark green, leathery leaves, lacking pubescence on upper surfaces; urn-shaped white flowers in short racemes from leaf axils.



Swamp bay

Persea palustris

OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.



Virginia Willow

Itea virginica

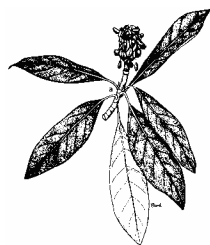
OBL-Simple alternate leaves with fine-toothed margins, upper surface glabrous, lower surface sparsely pubescent, with prominent veins below. Small white flowers borne bottlebrush, terminal.



Redroot, Bloodroot

Lachnanthes caroliniana

FAC-Perennial, less than 1 m tall from slender rhizomes, which along with roots are red to red-orange in color; leaves mostly basal and laterally flattened.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Large Gallberry

Ilex coriacea

FACW- Evergreen shrub, alternate leathery, elliptic to oval leaves with scattered punctate glands on lower surface; bristle-like marginal teeth that frequently diverge away from margin; found in W and N Florida, and southward to the central peninsula.



Cinnamon fern

Osmunda cinnamomea

FACW - Rhizomatous fern, clustered, deciduous, pinnately compound, alternating leaflets with tufts of orange at the base.



Sweet pepperbush

Clethra alnifolia

FACW-small shrub to 3 m tall; simple, alternate, shiny green leaves (11 cm long, 2-5 cm wide), coarsely saw toothed margins on upper half of leaf; generally pubescent below; fragrant flowers with 5 white petals in erect to drooping racemes; fruit are capsules with small brown seeds.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

OBL, except *S. minor* (FACW)- Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.

This list is not intended to be all inclusive.

615 Stream and Lake Swamps (Bottomland)

FLUCCS Description

This forested community, often referred to as bottomland hardwoods, is usually found on but not restricted to river, creek and lake floodplains. This category has a wide variety of predominantly hardwood species.

Stream and Lake Swamps (synonyms: Bottomland Hardwoods, River Bottom, Stream Bottom, Lowland Hardwood Forest, Mesic Hammock) - Characterized as low-lying, closed-canopy forests occurring along stream channels and in low spots and oxbows within river floodplains or lake edges.

Vegetation: Dominant canopy species are buttressed hydrophytic trees such as *Nyssa* spp. (tupelos) and *Taxodium* spp. (cypress), with *Acer rubrum* (red maple), *Carpinus caroliniana* (American hornbeam), *Carya aquatica* (water hickory), *Cephalanthus occidentalis* (buttonbush), *Chamaecyparis thyoides* (white cedar), *Cornus amomum* (swamp dogwood), *C. foemina* (stiffcornel dogwood), *Fagus grandifolia* (American beech), *Fraxinus* spp. (ash), *Gordonia lasianthus* (loblolly bay), *Ilex cassine* (dahoon holly), *Liquidambar styraciflua* (sweetgum), *Magnolia grandiflora* (southern magnolia), *M. virginiana* (sweetbay), *Myrica cerifera* (wax myrtle), *Persea palustris* (swamp bay), *Pinus serotina* (spruce pine), *P. taeda* (loblolly pine), *Populus deltoides* (river birch), *Quercus laurifolia* (diamond-leaf oak), *Q. nigra* (water oak), *Sabal palmetto* (cabbage palm), *Salix* spp. (willows), and *Ulmus americana* var. *floridana* (Florida elm). Other typical plants include *Acrostichum danaeifolium* (leather fern), *Alnus serrulata* (hazel alder), *Clethra* spp. (white alder), *Crataegus* spp. (hawthorn), *Cyrilla racemiflora* (swamp titi), *Forestiera acuminata* (swamp privet), *Ilex coriacea* (large gallberry), *I. deciduas* (possumhaw), *I. myrtifolia* (myrtle-leaved holly), *Juncus effusus* (soft rush), *Leucothoe racemosa* (hurrah-bush), *Osmunda regalis* (royal fern), *Saururus cernuus* (lizard's tail), *Smilax laurifolia* (laurel greenbrier), and *Thelypteris palustris* (marsh fern). Associated species include *Pinus elliottii* (slash pine) and *P. glabra* (spruce pine). The species composition of Stream and Lake Swamps is frequently similar to 613 Gum Swamps, 616 Inland Ponds and Sloughs, 617 Mixed Wetland Hardwoods, and 621 Cypress Forests.

Wildlife: Host variety of wildlife including both temporary and permanent residents.

Mammals – *Blarina carolinensis* (short-tailed shrew), *Castor canadensis* (beaver), *Didelphis virginiana* (opossum), *Glaucomys volans* (flying squirrel), *Lynx rufus* (bobcat), *Mustela vison* (mink), *Neotoma floridana* (wood rat), *Odocoileus virginianus* (white-tailed deer), *Oryzomys palustris* (rice rat), *Peromyscus gossypinus* (cotton mouse), *Peromyscus nuttali* (golden mouse), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), *Sorex longirostris* (southeastern shrew), *Urocyon cinereoargenteus* (gray fox), and *Ursus americanus floridanus* (black bear)^T.

Birds – *Aix sponsa* (wood duck), *Archilochus colubris* (ruby-throated hummingbird), *Bombicilla cedrorum* (cedar waxwing), *Bubo virginianus* (great-horned owl), *Buteo jamaicensis* (red-tailed hawk), *B. lineatus* (red-shouldered hawk), *Cardinalis cardinalis* (northern cardinal), *Catharus fuscescens* (veery), *C. guttatus* (hermit thrush), *Chaetura pelagica* (chimney swift), *Coccyzus americanus* (yellow-billed

cuckoo), *Dendroica dominica* (yellow-throated warbler), *Dryocopus pileatus* (pileated woodpecker), *Elanoides forficatus* (swallowtail kite), *Empidonax virescens* (Acadian flycatcher), *Ictinia mississippiensis* (Mississippi kite), *Limnothlypis swainsonii* (Swainson's warbler), *Meleagris gallopavo* (wild turkey), *Nyctanassa violacea* (yellow-crowned night-heron), *Otus asio* (eastern screech-owl), *Parula americana* (northern parula), *Picoides villosus* (hairy woodpecker), *Pipilo erythrophthalmus* (rufous-sided towhee), *Protonotaria citrea* (prothonotary warbler), *Scolopax minor* (woodcock), *Strix varia* (barred owl), *Thryothorus ludovicianus* (Carolina wren), *Vireo griseus* (white-eyed vireo), *Vireo olivaceus* (red-eyed vireo), and *Wilsonia citrine* (hooded warbler).

Herpetofauna – *Acris gryllus* (cricket frog), *Agkistrodon piscivorus* (cottonmouth snake), *Alligator mississippiensis* (alligator), *Ambystoma opacum* (marbled salamander), *A. talpoideum* (mole salamander), *Amphiuma means* (two-toed amphiuma), *Bufo terrestris* (southern toad), *Desmognathus auriculatus* (Southern dusky salamander), *Diadophis punctatus* (ring-necked snake), *Elaphe obsoleta spiloides* (gray rat snake), *Eumeces inexpectatus* (Southeastern five-lined skink), *E. laticeps* (broadhead skink), *Eurycea cirrigera* (two-lined salamander), *E. longicauda guttolineata* (three-lined salamander), *E. quadridigitata* (dwarf salamander), *Farancia abacura* (mud snake), *F. erythrogramma* (rainbow snake), *Hyla avivoca* (bird-voiced treefrog), *H. chrysoscelis* (gray treefrog), *Lampropeltis getulus* (eastern king snake), *Necturus alabamensis* (Alabama waterdog), *Nerodia erythrogaster* (redbelly water snake), *N. taxispilota* (brown water snake), *Plethodon glutinosus* (slimy salamander), *Pseudemys concinna* (river cooter), *Pseudotriton montanus floridanus* (rusty mud salamander), *Rana catesbeiana* (bullfrog), *R. heckscheri* (river frog), *R. utricularia* (Southern leopard frog), *Regina rigida* (glossy crayfish snake), *Seminatrix pygaea* (black swamp snake), and *Sternotherus odoratus* (stinkpot).

Landscape Location: Found on river, creek and lake flood plain or overflow areas.

Soils: Composed of variable mixtures of sand, organic, and alluvial materials. Some sites, especially within sloughs or on smaller streams, may have considerable peat accumulation, as well as a mixture of clay and organic materials.

Fire Interval: Generally too wet to support fire.

Hydrology: Some Stream and Lake Swamps are flooded for most of the year. Those situated along channels are inundated by flowing water, while swamps along sloughs and back-water swamps are flooded with stagnant water for long periods of time. When prolonged inundation occurs, the growth of most shrubs and herbs is restricted, leaving most of the ground surface open or thinly blanketed with leaf litter. Other Bottomland Swamps occur on low-lying flatlands that border streams with distinct banks, so that water overflow rarely occurs and the forest is seldom inundated. In these cases, while the water table may be high, the forests are inundated only during extreme floods or exceptionally heavy rains (i.e., not annually). This is usually the case for Bottomland Swamps found in the panhandle region of Florida, where there is little or no inundation during the growing season. In other cases, Bottomland Swamps may be inundated for a portion of the growing season every year. Floods are extremely important in that they redistribute accumulated detritus to other portions of the floodplain or into the main river

channel. This provides an essential source of mineral and nutrients to downriver ecosystems such as estuaries. Alterations to hydrologic processes from impoundments or river diversions and the disruption of bottomland communities by forest clearcutting, intensive agriculture, and pesticide use may have devastating effects to entire riverine and estuarine systems. Many plant and animal species, both onsite and down river, depend on the presence and natural fluctuations of these swamps for survival and reproduction.

Functions:

- Flood abatement.
- Water quality enhancement by assimilation of inorganic and organic waste.
- Oxygen diffusion and detritus export to downstream systems.
- Food and cover provided for wildlife species, including waterfowl, reptiles, amphibians and mammals.
- Recreational opportunities.

[†] Listed as Threatened by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.

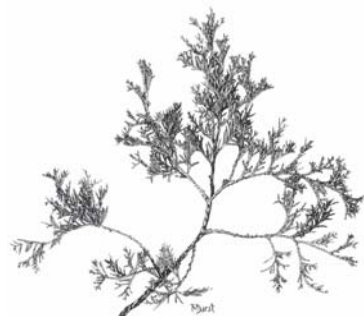


DHB

Stiff cornel dogwood

Cornus foemina

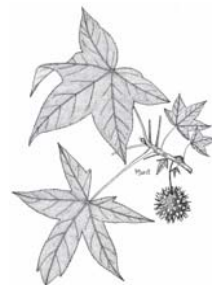
FACW-Deciduous; generally encountered as a shrub, often multi-stemmed and/or colonial; can be small tree to 8 m tall; pointed opposite leaves, upper surface on non-terminal mature leaves smooth, fewer veins and smaller leaves than other dogwood species; arching, ascending branches with white pith.



Atlantic White Cedar

Chamaecyparis thyoides

OBL-Evergreen canopy tree, "Christmas tree" shaped when young, with branchlets of individual twigs fan-like in a single plane. Twigs are not prickly. Found in NW Florida.



Sweet gum, Red gum

Liquidambar styraciflua

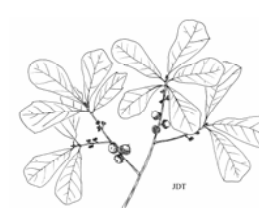
FACW-Deciduous canopy tree to 37 m tall; alternate, star-shaped palmately veined leaves with 5 (rarely 7) pointed lobes, margins toothed; hard, spiny, round fruit capsule; thick, stiff branches, twigs with corky wings/warts; gray bark deeply vertically furrowed.



Carolina Ash

Fraxinus caroliniana

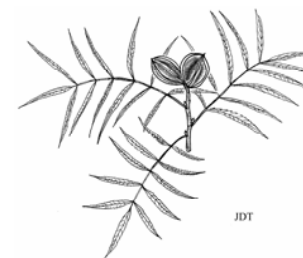
OBL - Tree up to 12m tall, opposite, pinnately compound leaves, twigs flattened at the nodes, fruit is a flat, diamond-shaped, winged samara.



Water Oak

Quercus nigra

FACW- Deciduous tree with alternate, spatulate to broadly 3 lobed leaves with tufts of hairs on lower leaf surface in most major vein axils.



Water Hickory

Carya aquatica

OBL – thin, compound leaves, 7 to 17 slender scythe shaped leaflets, coarsely toothed on the margin, dark green above and brownish and hairy along the veins beneath. Fruit usually clustered, one and one-quarter inches long, angled and compressed.



American hornbeam

Carpinus caroliniana

FACW-Small tree with fluted trunk ("flexed muscle"); bark gray, smoothish and thin; alternate leaves with parallel veins, doubly serrate margins, rough upper surface.



Florida Elm

Ulmus americana var. floridana

FACW-Tall tree up to 30m, vase shaped in outline; alternate deciduous leaves, elliptic, doubly saw-toothed blades with prominent parallel lateral veins, leaf base asymmetrical with surface rough.



Water Tupelo

Nyssa aquatica

OBL-Tree up to 30m tall with swollen buttressed base, large, deciduous, alternate, simple leaves with a few large teeth on margin and long petioles, blue drupe fruit on a long stalk.



Swamp Tupelo

Nyssa sylvatica

OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Ogeechee tupelo

Nyssa ogeche

OBL-Small to medium deciduous tree, usually with enlarged base, typically growing with multiple trunks; bark dark brown and fissured; leaves large 8-15 cm, simple, alternate, margins entire or with few large teeth.

616 Inland Ponds and Sloughs

FLUCCS Description

These communities are associated with depressions and drainage areas, particularly those not associated with streams or lakes.

Inland Ponds and Sloughs (synonyms: Basin Swamp, Dome Swamp, Slough) - Found in large and irregularly shaped basins or broad shallow channels, usually elongated depressions not associated with rivers. They often grade into forested strand swamps (synonyms: 618 Willow and Elderberry and 621 Cypress Forests) and herbaceous swales (synonyms: 641 Freshwater Marshes and 643 Wet Prairies), and may also occur in floodplain and basin swamps (615 Stream and Lake Swamps) where they are slightly lower in elevation than the surrounding communities.

Vegetation: Typical plants include *Canna flaccida* (golden canna), *Cephalanthus occidentalis* (buttonbush), *Lemna* spp. (duckweed), *Limnium spongia* (frog's bit), *Nyssa ogeche* (ogeechee tupelo), *Pistia stratiotes* (water lettuce), *Planera aquatica* (water elm), *Pontederia cordata* (pickerelweed), *Sagittaria* spp. (arrowheads), *Salix caroliniana* (coastal plain willow), *Saururus cernuus* (lizard's tail), *Thalia geniculata* (fire flag), and *Zizaniopsis miliacea* (giant cutgrass). Canopied sloughs, especially in south Florida, are ideal moist, warm habitats for rare and endangered tropical epiphytes. They may also have extensive gum/cypress communities. *Annona glabra* (pond apple) branches are often heavily loaded with epiphytic orchids, bromeliads, ferns and peperomias. Other plants found in this community include: *Acer rubrum* (red maple), *Acrostichum danaeifolium* (leather fern), *Bacopa* spp. (water hyssop), *Cladium jamaicense* (sawgrass), *Crinum americanum* (swamp lily), *Drosera* spp. (sundew), *Ficus aurea* (strangler fig), *Ludwigia palustris* (swamp primrose), *Magnolia virginiana* (sweet bay), *Myrica cerifera* (wax myrtle), *Myrsine guianensis* (myrsine), *Nymphoides aquatica* (floating heart), *Osmunda regalis* (royal fern), *Panicum hemitomon* (maidencane), other *Panicum* spp., *Peltandra* spp. (arum), *Persea borbonia* (red bay), *Polygonum punctatum* (dotted smartweed), *Quercus hemisphaerica* (laurel oak), *Roystonea regia* (royal palm), *Sabal palmetto* (cabbage palm), *Toxicodendron radicans* (poison ivy), and rushes (Juncaceae). The species composition of Inland Ponds and Sloughs overlaps with that of 611 Bay Swamps, 615 Stream and Lake Swamps, and 621 Cypress Forests.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lutra canadensis* (river otter), *Lynx rufus* (bobcat), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Procyon lotor* (raccoon), *Puma concolor coryi* (Florida panther)^E, *Sciurus carolinensis* (gray squirrel), *Sigmodon hispidus* (cotton rat), *Sylvilagus palustris* (marsh rabbit), *Urocyon cinereoargenteus* (gray fox), and *Ursus americanus floridanus* (black bear)^T.

Birds – cranes (ex. *Grus canadensis* – sandhill crane), egrets (ex. *Casmerodius albus* – great egret), herons (ex. *Egretta tricolor* – tricolor heron), ibis (*Eudocimus albus* – white ibis)^{SSC}, and *Buteo lineatus* (red-shouldered hawks).

Herpetofauna – *Acris gryllus* (southern cricket frog), *Agkistrodon piscivorus* (cottonmouth snake), *Diadophis punctatus* (ring-necked snake), *Pseudacris ocularis*

(grass frog), *Sistrurus miliarius* (pygmy rattlesnake), *Thamnophis sauritus* (ribbon snake)^T, and salamanders.

Landscape Location: Often aligned with the lowest part of linear depressions or troughs in the underlying limestone bedrock or in a flat limestone plain. They are characterized as broad shallow channels, usually elongated depressions inundated with water (except during extreme droughts) and are the deepest drainage ways within strand swamp and swale systems.

Soils: Generally acidic, nutrient poor peats, often overlying a clay lens or other impervious layer.

Fire Interval: Low to moderate fire frequencies, from 5-150 years.

Hydrology: Seasonally inundated with a normal hydroperiod of at least 250 days per year. One species may dominate in certain areas possibly because of local differences in hydrology. Flooding in these areas is related to local rain events and water levels rise and fall rapidly. These systems are exceptionally vulnerable to hydrologic disturbance and must have a reliable water source of exceptional quality to persist. Fire and artificial water level fluctuations are major reorganizing factors and variations in the natural sequence will change diversity and productivity. The complete exclusion of fire or permanent water level reduction will cause succession to a wooded community. Peat mining and clearcutting are additional threats.

Functions:

- Serve as natural drainage ways for water during periods of heavy and prolonged rainfall.
- Improve water quality by nutrient assimilation and sediment deposition.
- Retain water, help slow down water flows, and thereby regulate water quantity.

^E Listed as Endangered by Florida Fish and Wildlife Conservation Commission

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

^{SSC} Listed as Species of Special Concern by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
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4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Ogeechee tupelo

Nyssa ogeche

OBL—Small to medium deciduous tree, usually with enlarged base, typically growing with multiple trunks; bark dark brown and fissured; leaves large 8-15 cm, simple, alternate, margins entire or with few large teeth.



Sweetbay

Magnolia virginiana

OBL—Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Pickerelweed

Pontederia cordata

OBL—Tall colonial, perennial herb; leaves basal, long petioles, to 1 m tall, erect heart- to lance-shaped; showy blue to purple flowers with yellow markings in spikes at ends of elongated stems. Spikes may be all white, rarely.



Water elm

Planera aquatica

OBL—shrub or small tree to 18m; bark scaly and flaky or bumpy, peeling in long plates with reddish inner bark; shallowly toothed, alternate leaves rough on the upper surface and with an asymmetrical base.



Red Maple

Acer rubrum

FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



Royal Fern

Osmunda regalis

OBL - clustered, bipinnately compound fronds with oblong, alternate, stalked leaflets with rounded bases and finely toothed margins; sporangia on stalked structures from upper portion of some leaves; black fibrous roots may form a mass up to 60 cm tall.



Pond Apple

Annona glabra

OBL - Densely branched shrub or small tree up to 6m tall, upwardly buttressed trunk with dark reddish-brown bark. Reflexed, evergreen leaves, cream-white to pale yellow flowers with thick petals, large, fleshy, egg or heart shaped fruit.



Swamp Tupelo

Nyssa sylvatica

OBL—Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Lizard's tail

Saururus cernuus

OBL—Erect perennial herb with zigzag stem; alternate heart shaped leaves; white flowers (spring to early summer) in clusters, bottlebrush-like, curving downward.



Coastal Plain Willow

Salix caroliniana

OBL - Deciduous, stalked, alternate, usually lance-shaped leaves with toothed margins, whitish-glaucous beneath mature leaves; flowers in dense catkins; seeds with a cluster of cottony, white hairs



Pond Cypress

Taxodium ascendens

OBL—Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Cabbage palm

Sabal palmetto

FAC—Palm tree with evergreen, fan shaped leaves, to 30 m; trunk partially or completely covered by the bases of the petioles of broken off dead leaves.



Buttonbush

Cephalanthus occidentalis

OBL—Understory shrub to 3 m tall; arching branches with raised lenticels, simple elliptic or ovate deciduous leaves, opposite or in whorls of 3-4; ball-like clusters of white flowers hanging on long stalks below leaves; fruiting structure distinct, round, brown, often persists throughout year.



Leather fern

Acrostichum danaeifolium

OBL—Large ascending fern to 4 m tall; pinnate fronds 12-60 cm wide with leathery, coarse leaf blades; 20-30 pair of closely touching or overlapping pinnae, 7-30 cm long with netted venation and smooth margins; bottom surface of pinnae covered with sporangia (not in discrete sori); rhizomes generally massive and woody.

This list is not intended to be all inclusive.

617 Mixed Wetland Hardwoods

FLUCCS Description

This classification is reserved for those wetland hardwood communities which are composed of a large variety of hardwood species tolerant of hydric conditions.

Mixed Wetland Hardwoods (synonyms: Swamp Forests, Wetland Hardwood Hammocks, Freshwater Swamp Forests, Mixed Hardwood Swamps, Bottomland Forests, Stillwaters, Basin or Depression Wetlands) - Found in large and irregularly shaped basins not associated with rivers (refer to FLUCCS code 616 Inland Ponds and Sloughs), as well as within river floodplains (refer to FLUCCS code 615 Stream and Lake Swamp (Bottomland)).

Vegetation: Commonly composed of species such as *Acer rubrum* (red maple), *Annona glabra* (pond apple), *Carya* spp. (hickory), *Craetagus* spp. (hawthorns), *Ficus aurea* (strangler fig), *Fraxinus caroliniana* (Carolina ash), *Hamamelis virginiana* (witch hazel), *Ilex cassine* (dahoon holly), *Juniperus virginiana* (red cedar), *Liquidambar styraciflua* (sweet gum), *Magnolia virginiana* (sweet bay), *Myrsine guianensis* (myrsine), *Nyssa aquatica* (water tupelo), *N. sylvatica* (swamp tupelo or blackgum), *Persea palustris* (swamp bay), *Pinus* spp. (pines), *Quercus laurifolia* (diamond-leaf oak), *Q. nigra* (water oak), *Roystonea regia* (royal palm), *Sabal palmetto* (cabbage palm), and *Taxodium distichum* (bald cypress). Other plants may include *Carpinus caroliniana* (American hornbeam), *Celtis* spp. (hackberry), *Magnolia grandiflora* (southern magnolia), *Myrica cerifera* (wax myrtle), *Osmunda cinnamomea* (cinnamon fern), *O. regalis* (royal fern), *Quercus michauxii* (swamp chestnut oak), *Rhaphidophyllum hystrix* (needle palm), *Sabal minor* (bluestem palmetto), *Serenia repens* (saw palmetto), *Toxicodendron radicans* (poison ivy), and *Ulmus americana* var. *floridana* (Florida elm).

Wildlife:

Mammals – *Lynx rufus* (bobcat), *Neotoma floridana* (wood rat), *Odocoileus virginianus* (white-tailed deer), *Oryzomys palustris* (rice rats), *Sciurus carolinensis* (gray squirrel), raccoon (*Procyon lotor*), and *Ursus americanus floridanus* (black bear)^T. *Puma concolor coryi* (Florida panther)^E may also be found in this wetland habitat.

Birds – hawks (ex. *Buteo jamaicensis* – red-tailed hawk), herons (ex. *Egretta caerulea* – little blue heron), woodpeckers (ex. *Picoides pubescens* – downy woodpecker, *Dryocopus pileatus* - pileated woodpecker), *Aix sponsa* (wood duck), , *Elanoides forficatus* (swallow-tailed kite), *Ictinia mississippiensis* (Mississippi kite), *Limnithlypis swainsonii* (Swainson's warblers), *Meleagris gallopavo* (wild turkey), *Mycteria americana* (wood stork)^E, *Protonotaria citrea* (prothonotary warblers), and *Strix varia* (barred owl).

Herpetofauna – *Acris gryllus* (southern cricket frog), *Agkistrodon piscivorus* (cottonmouth snake), *Alligator mississippiensis*^{SCC} (alligator), *Ambystoma opacum* (marbled salamander), *Ambystoma talpoideum* (mole salamander), *Anolis carolinensis* (green anole), *Desmognathus auriculatus* (southern dusky salamander), *Diadophis punctatus* (ring-necked snake), *Eumeces inexpectatus* (southeastern five-lined skink), *Eurycea longicauda guttolineata* (three-lined salamander), *Plethodon glutinosus* (slimy salamander), and *Regina* sp. (crayfish snake).

Landscape Location: Occur on low, flat, wet sites in a variety of lowland situations such as in depressional basins (refer to FLUCCS code 616 Inland Ponds and Sloughs) or within river floodplains (refer to FLUCCS code 615 Stream and Lake Swamp (Bottomland)). Shallow lakes with fluctuating water levels may be ringed by cypress trees, grading into mixed hardwoods around the landward edge.

Soils: Seasonally flooded organic soils with organic matter accumulation of greater than 1 meter.

Fire Interval: Low fire frequencies of approximately one fire per century. Mixed wetland hardwoods regenerate readily in stands protected from fire in South Florida, displacing cypress from dominance in such areas.

Hydrology: The hydroperiod is moderate ranging from 6-9 months. The main water source in these wetlands may be shallow, acid, groundwater or bodies of water such as rivers, lakes, streams or creeks. These communities tend to have a deep, fairly permanent pool of water. The maintenance of natural hydrologic regimes is important to the health of these wetlands. The species composition and functional relationships within the wetland would be negatively impacted by hydrological alterations such as artificial impoundments, river diversion projects, pesticide use, forest clearcutting, or intensive agriculture.

Functions:

- Provide permanent water pools for wildlife while improving water quality and controlling quantity.
- Structural and species diversity within canopy layer supports one of the most productive and diverse habitats.
- Support recreational activities including hunting, hiking, and nature study.

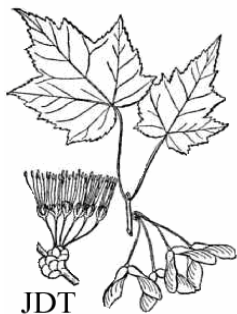
^EListed as Endangered by Florida Fish and Wildlife Conservation Commission

^TListed as Threatened by Florida Fish and Wildlife Conservation Commission

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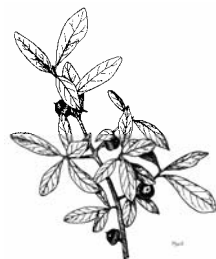
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Red Maple

Acer rubrum

FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



Diamond-Leaf Oak

Quercus laurifolia

FACW- Tardily deciduous tree, alternate leaves, some diamond shaped, with tufts of short hairs in main vein axils on lower surface of mature leaves.



Swamp bay

Persea palustris

OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.



Pond Apple

Annona glabra

OBL - Densely branched shrub or small tree up to 6m tall, upwardly buttressed trunk with dark reddish-brown bark. Reflexed, evergreen leaves, cream-white to pale yellow flowers with thick petals, large, fleshy, egg or heart shaped fruit.



Water Tupelo

Nyssa aquatica

OBL-Tree up to 30m tall with swollen buttressed base, large, deciduous, alternate, simple leaves with a few large teeth on margin and long petioles, blue drupe fruit on a long stalk.



Southern magnolia

Magnolia grandiflora

FAC*-Large, broad-leaved evergreen tree 18-27 m; trunk up to 1 m diameter, typically straight and erect with spreading branches that form a dense, broadly pyramidal crown; large leaves 13-20 cm long, leathery and dark glossy green above with rusty, velveteen undersides; large, showy white flowers.



Carolina Ash

Fraxinus caroliniana

OBL - Tree up to 12m tall, opposite, pinnately compound leaves, twigs flattened at the nodes, fruit is a flat, diamond-shaped, winged samara.



Dahoon Holly

Ilex cassine

OBL-Evergreen shrub, smooth gray bark, alternate leathery leaves of variable shape and entire margins, often with few short spines, bright red to



Swamp Tupelo

Nyssa sylvatica

OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Pond Cypress

Taxodium ascendens

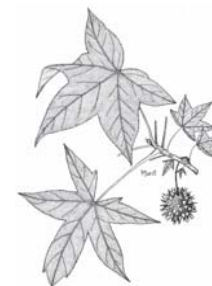
OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



American hornbeam

Carpinus caroliniana

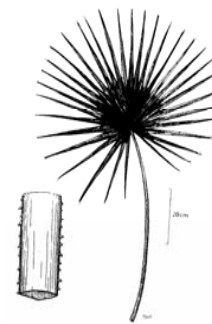
FACW-Small tree with fluted trunk ("flexed muscle"); bark gray, smoothish and thin; alternate leaves with parallel veins, doubly serrate margins, rough upper surface.



Sweet gum, Red gum

Liquidambar styraciflua

FACW-Deciduous canopy tree to 37 m tall; alternate, star-shaped palmately veined leaves with 5 (rarely 7) pointed lobes, margins toothed; hard, spiny, round fruit capsule; thick, stiff branches, twigs with corky wings/warts; gray bark deeply vertically furrowed.



Saw palmetto

Serenoa repens

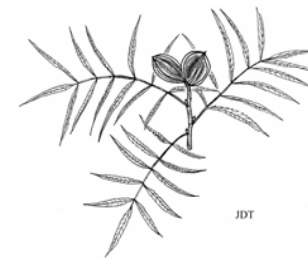
FACU*-Small fan palm growing in clumps often 6m or more wide, main stem usually underground; palmate leaves 0.6-0.9 m across attached by sharply saw-toothed petioles (~0.6 m long).



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Water Hickory

Carya aquatica

OBL - thin, compound leaves, 7 to 17 slender scythe shaped leaflets, coarsely toothed on the margin, dark green above and brownish and hairy along the veins beneath. Fruit usually clustered, one and one-quarter inches long, angled and compressed.

617 Willow and Elderberry

FLUCCS Description

In this community willow is pure or predominant species. In some areas of Florida such as in Paynes Prairie State Preserve elderberry is the primary associate species.

Willow and Elderberry (synonyms: Shrub Swamp, Bog, Floodplain Forest) – These communities are generally found in large thickets in flowing water systems, often becoming established as early successional species after a disturbance. Willow is also a dominant early successional species in restored phosphate mined lands.

Vegetation: The two common willow species in Florida are *Salix caroliniana* (coastal plain willow) throughout Florida, and *S. nigra* (black willow) in the northwest. Another species of willow, (*S. floridana*), is endemic to Florida and Georgia and is usually found along spring runs. When willow occurs along flowing systems, it is usually associated with *Acer rubrum* (red maple), *Betula nigra* (river birch), *Carpinus caroliniana* (American hornbeam), *Carya aquatica* (water hickory), *Cephalanthus occidentalis* (buttonbush), *Fraxinus* spp. (ash), *Gordonia lasianthus* (loblolly bay), *Ilex cassine* (dahoon holly), *Liquidambar styraciflua* (sweetgum), *Magnolia grandiflora* (southern magnolia), *Myrica cerifera* (wax myrtle), *Nyssa* spp. (tupelos), *Persea palustris* (swamp bay), *Pinus serotina* (spruce pine), *P. taeda* (loblolly pine), *Quercus nigra* (water oak), *Sabal palmetto* (cabbage palm), *Taxodium* spp. (cypress) and *Ulmus americana* var. *floridana* (Florida elm). Other typical plants include *Cyrilla racemiflora* (swamp titi), *Ilex coriacea* (large gallberry), *I. deciduas* (possumhaw), *I. myrtifolia* (myrtle-leaved holly), *Juncus effusus* (soft rush), *Leucothoe racemosa* (hurrah-bush), *Osmunda regalis* (royal fern), *Saururus cernuus* (lizard's tail), *Smilax laurifolia* (laurel greenbrier), and *Thelypteris palustris* (marsh fern). Willow can sometimes be found in association with elderberry (*Sambucus canadensis*), as in Paynes Prairie Preserve State Park. In restored mine lands, willow and elderberry are often found as monoculture or mixed stands in depressional or seepage areas. The species composition of Willow and Elderberry is frequently similar to 615 Stream and Lake Swamps, 616 Inland Ponds and Sloughs, and 617 Mixed Wetland Hardwoods.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon).

Birds – *Aix Bombycilla cedrorum* (cedar waxwing), *Bubo virginianus* (great-horned owl), *Buteo jamaicensis* (red-tailed hawk), *B. lineatus* (red-shouldered hawk), *Cardinalis cardinalis* (northern cardinal), *Nyctanassa violacea* (yellow-crowned night-heron), *Otus asio* (eastern screech-owl), *Thryothorus ludovicianus* (Carolina wren), *Vireo griseus* (white-eyed vireo), *V. olivaceus* (red-eyed vireo), and *Wilsonia citrine* (hooded warbler).

Herpetofauna – *Acris gryllus* (cricket frog), *Agkistrodon piscivorus* (cottonmouth snake), *Alligator mississippiensis* (alligator), *Amphiuma means* (two-toed amphiuma), *Bufo terrestris* (southern toad), *Coluber constrictor priapus* (Southern black racer), *Diadophis punctatus* (ring-necked snake), *Farancia abacura* (mud snake), *Hyla chrysoscelis* (gray treefrog), *Lampropeltis getulus* (eastern king snake),

Nerodia erythrogaster (redbelly water snake), *N. taxispilota* (brown water snake), *Rana catesbeiana* (bullfrog), *R. heckscheri* (river frog), *R. utricularia* (Southern leopard frog), *Regina rigida* (glossy crayfish snake), *Seminatrix pygaea* (black swamp snake), and *Sternotherus odoratus* (stinkpot).

Landscape Location: May be located along flowing water sites or in restored lands such as in the phosphate mining district of central Florida. Also common in roadside swales/ditches, borrow areas and other disturbed sites.

Soils: Composed of variable mixtures of sand, organic, and alluvial materials. In restored phosphate mined lands, there is considerable clay accumulation.

Fire Interval: Generally too wet to support fire.

Hydrology: These communities are typically inundated or saturated for most of the year. During periods of low water, moisture is maintained by capillary action.

Functions:

- Flood abatement.
- Water quality enhancement by assimilation of inorganic and organic waste.
- Food and cover provided for limited wildlife species, including waterfowl, reptiles, amphibians and mammals.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
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4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Black willow

Salix nigra
OBL-Mature trees with brown, ridged, furrowed bark; restricted to NW FL; green, glabrous, simple, alternate lance-shaped leaves, margins usually with teeth; fruit a capsule, clustered in catkin.



Coastal Plain Willow

Salix caroliniana
OBL - Deciduous, stalked, alternate, usually lance-shaped leaves with toothed margins, whitish-glaucous beneath mature leaves; flowers in dense catkins; seeds with a cluster of cottony, white hairs



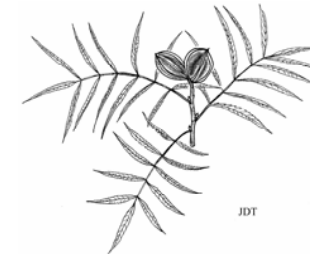
Red Maple

Acer rubrum
FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



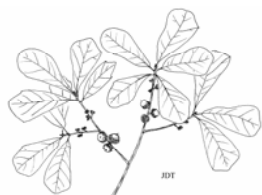
American hornbeam

Carpinus caroliniana
FACW-Small tree with fluted trunk ("flexed muscle"); bark gray, smoothish and thin; alternate leaves with parallel veins, doubly serrate margins, rough upper surface.



Water Hickory

Carya aquatica
OBL - thin, compound leaves, 7 to 17 slender scythe shaped leaflets, coarsely toothed on the margin, dark green above and brownish and hairy along the veins beneath. Fruit usually clustered, one and one-quarter inches long, angled and compressed.



Water Oak

Quercus nigra
FACW- Deciduous tree with alternate, spatulate to broadly 3 lobed leaves with tufts of hairs on lower leaf surface in most major vein axils.



Carolina Ash

Fraxinus caroliniana
OBL - Tree up to 12m tall, opposite, pinnately compound leaves, twigs flattened at the nodes, fruit is a flat, diamond-shaped, winged samara.



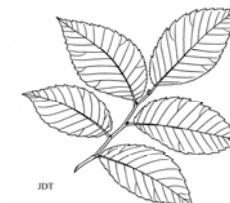
Swamp Tupelo

Nyssa sylvatica
OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Water Tupelo

Nyssa aquatica
OBL-Tree up to 30m tall with swollen buttressed base, large, deciduous, alternate, simple leaves with a few large teeth on margin and long petioles, blue drupe fruit on a long stalk.



Florida Elm

Ulmus americana var. floridana
FACW-Tall tree up to 30m, vase shaped in outline; alternate deciduous leaves, elliptic, doubly saw-toothed blades with prominent parallel lateral veins, leaf base asymmetrical with surface rough.



Buttonbush

Cephalanthus occidentalis
OBL-Understory shrub to 3 m tall; arching branches with raised lenticels, simple elliptic or ovate deciduous leaves, opposite or in whorls of 3-4; ball-like clusters of white flowers hanging on long stalks below leaves; fruiting structure distinct, round, brown, often persists throughout year.



Wax Myrtle

Myrica cerifera
FAC-Evergreen shrub, gray bark, alternate leaves, aromatic, with teeth on margins, surface rough; from a distance leaves appear brownish yellow.



Loblolly bay

Gordonia lasianthus
FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Royal Fern

Osmunda regalis
OBL - clustered, bipinnately compound fronds with oblong, alternate, stalked leaflets with rounded bases and finely toothed margins; sporangia on stalked structures from upper portion of some leaves; black fibrous roots may form a mass up to 60 cm tall.



Lizard's tail

Saururus cernuus
OBL-Erect perennial herb with zigzag stem; alternate heart shaped leaves; white flowers (spring to early summer) in clusters, bottlebrush-like, curving downward.

619 Exotic Wetland Hardwoods

FLUCCS Description

This community is comprised of wetlands with dominant vegetative cover from exotic species, such as *Schinus terebinthifolius* (Brazilian pepper), *Melaleuca quinquenervia* (melaleuca), or other exotic species.

Exotic Wetland Hardwoods, as the name implies, are not native communities to Florida. Often, these ecosystems invade areas that have been previously disturbed. This field guide focuses on 3 of the most common invasive trees and shrubs in Florida: *Schinus terebinthifolius* (Brazilian pepper), *Melaleuca quinquenervia* (melaleuca or paper bark tree), and *Sapium sebiferum* (Chinese tallow).

To score a community occupied by invasive exotic species, you must always refer to the native wetland community that existed prior to invasion. For instance, if you are scoring a melaleuca forest that was previously dominated by cypress, you must score each indicator attribute using the cypress forest (which in this case has been degraded) as the target ecosystem (not the melaleuca forest).

BRAZILIAN PEPPER (*Schinus terebinthifolius*)



A medium size evergreen shrub or tree to 13 m (43 ft) tall. Alternate compound leaves with 3-11 (usually 7-9) toothed leaflets; dark green above, lower surface paler; lateral veins obvious (lighter in color). The leaves are aromatic when crushed and have been described as smelling peppery or of turpentine. Brazilian pepper originates from the coast of Brazil, Paraguay, and Argentina, and was introduced to Florida as a landscape

ornamental in the mid 1800's. Brazilian pepper generally invades disturbed lands in southern Florida, but its distribution is now so widespread that even areas with low human development, such as pinelands, are being invaded. Seedling survival is so high (66-100%) that within a few years dense monospecific stands can form. Brazilian pepper may be allelopathic, suppressing other plants' growth.

Hydrology: Brazilian pepper can withstand a variety of hydrologic conditions, preferring well-drained sites, and thriving in disturbed soils and habitats resulting altered by drainage and farming. It can also grow in a broad range of habitats, including fallow farmland, pinelands, hardwood hammocks, roadsides, and mangrove forests.

CHINESE TALLOW (*Sapium sebiferum*)



A small to medium sized deciduous tree to 10-16 m (33-52 ft) tall. Simple alternate leaves with an entire margin and a broadly rounded base tapering to a slender point. In spring it produces small flowers in spikes up to 8 inches long. Its fruits are a 3-lobed capsule that is brown at maturity, splitting to reveal 3 dull white seeds, often attached through winter and resembling popcorn.

Chinese tallow was imported from China in the mid 1700's as an ornamental. It has since spread in northern and central Florida counties, though it has been observed as far south as Dade County. Once established, it forms dense monospecific stands.

Hydrology: Chinese tallow thrives in wet soils, spreading along roadside ditches and low lying areas, but can survive in a variety of hydrologic conditions. It flourishes in uplands and well-drained areas, and can invade undisturbed areas such as closed canopy forests, bottomland hardwood forests, shores of water bodies, and sometimes floating islands. It can also withstand saline environments.

MELALEUCA (*Melaleuca quinquenervia*)



A large evergreen tree to 33m (100 ft) tall with many-layered whitish peeling bark. Simple alternate grayish green lance shaped leaves 10 cm long to 2 cm wide and smelling of camphor when crushed. Flowers creamy-white in bottlebrush spikes. Melaleuca is native to Australia, New Caledonia, and New Guinea, and was first introduced to Florida in the early 1900's for its

"swamp drying abilities." Once established, almost impenetrable stands are formed (up to 4000 trees/ha) that limit use by native wildlife. Its distribution in Florida is limited to the southern half of the state including the Everglades.

Hydrology: Melaleuca prefers seasonally wet sites, but can also tolerate extended flooding, droughts, and some salinity. It can invade a wide variety of habitats, including roadsides, ditch banks, mesic prairies, sawgrass marshes, lake shorelines, pine flatwoods, hardwood bottomlands, and cypress forests.

Other exotic species commonly found in forested wetlands:

Lonicera japonica (Japanese honeysuckle), *Lygodium japonicum* (Japanese climbing fern), *L. microphyllum* (small-leaf climbing fern), *Ligustrum sinense* (Chinese privet), *Momordica charantia* (balsampear), and *Cinnamomum camphora* (camphortree).

Main sources:

1. FDEP, Bureau of Invasive Plant Management. 2004. Weed Alert: Brazilian Pepper. <http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/BrazilianPepper.pdf> (Last accessed July 20, 2004)
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4. Wunderlin, R. P., and B. F. Hansen. 2004. Atlas of Florida Vascular Plants (<http://www.plantatlas.usf.edu/>). [S. M. Landry and K. N. Campbell (application development), Florida Center for Community Design and Research.] Institute for Systematic Botany, University of South Florida, Tampa.

621 Cypress Forests

FLUCCS Description

This community is composed of *Taxodium* spp. (pond cypress or bald cypress), which is either pure or predominant. Note that some authorities do not distinguish between the two varieties of cypress.

Cypress Forests (synonyms: Dome Swamp, Floodplain Swamp, Cypress Pond/Cypress Strand, Cypress Slough or Swale) - Occur along rivers, lake margins, slough and strands, or interspersed throughout other communities such as flatwoods.

Vegetation: The dominant canopy vegetation in cypress wetlands includes *Taxodium ascendens* (pond cypress) in flatwoods and prairies and/or *Taxodium distichum* (bald cypress) along lake and stream margins. *Nyssa aquatica* (water tupelo) or *N. sylvatica* (swamp tupelo or blackgum) are also common. *Pinus* spp. (pine trees) and hardwoods can be present if cypress areas are drained or face drought conditions. The epiphyte *Tillandsia usneoides* (Spanish moss) is found on the stems and branches of canopy trees. In the case of *Taxodium ascendens* (pond cypress), common associates are *Cliftonia monophylla* (black titi), *Pinus elliotii* (slash pine), and *Nyssa sylvatica* (swamp tupelo or blackgum). In the case of *Taxodium distichum* (bald cypress), common associates are *Acer rubrum* (red maple), *Carya aquatica* (water hickory), *Fraxinus caroliniana* (Carolina ash), *F. profunda* (pumpkin ash), *Nyssa sylvatica* (water tupelo), *Populus heterophylla* (swamp cottonwood), *Quercus lyrata* (overcup oak), and *Ulmus americana* var. *floridana* (Florida elm). *Taxodium distichum* (bald cypress) may be associated with *Liquidambar styraciflua* (sweetgum), *Magnolia virginiana* (sweetbay), and *Quercus hemisphaerica* (laurel oak) on less moist sites. Dominant understory vegetation includes *Cephalanthus occidentalis* (buttonbush), *Lyonia lucida* (fetterbush), and *Myrica cerifera* (wax myrtle) shrubs. Herbs and ferns including *Eriocaulon* spp. (hatpins), *Lemna* spp. (duckweed), and *Saururus cernuus* (lizard's tail) present in understory. Other typical plants include: *Bacopa* spp. (water hyssop), *Calydorea coelestina* (Bartram's ixia)^E, *Crinum americanum* (swamp lily), *Ficus aurea* (strangler fig), *Gordonia lasianthus* (loblolly bay), *Ilex cassine* (dahoon holly), *Itea virginica* (Virginia willow), *Lachnanthes caroliniana* (redroot), *Ludwigia palustris* (swamp primrose), *Magnolia virginiana* (sweetbay), *Myrsine guianensis* (myrsine), *Nymphoides aquatica* (floating heart), *Osmunda cinnamomea* (cinnamon fern), *O. regalis* (royal fern), *Persea borbonia* (red bay), *P. palustris* (swamp bay), *Polygonum punctatum* (dotted smartweed), *Pontederia cordata* (pickerel weed), *Quercus hemisphaerica* (laurel oak), *Roystonea regia* (royal palm), *Sabal palmetto* (cabbage palm), *Salix caroliniana* (coastal plain willow), *Smilax laurifolia* (laurel greenbrier), *Woodwardia areolata* (netted chainfern), and *W. virginica* (Virginia chainfern). Tropical species such as *Annona glabra* (pond apple) may be found in cypress domes in south Florida. The species composition of Cypress Forests frequently overlaps with 611 Bay Swamps, 616 Inland Ponds and Sloughs, and 615 Stream and Lake Swamps.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lutra canadensis* (river otter), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Procyon lotor* (raccoon),

Puma concolor coryi (Florida panther)^E, *Sciurus carolinensis* (gray squirrel), and *Ursus americanus floridanus* (black bears)^T.

Birds – egrets (ex. *Casmerodius albus* - great egret), herons (ex. *Ardea herodias* - great blue heron), *Aix sponsa* (wood duck), *Anhinga anhinga* (anhinga), *Aramus guarauna* (limpkin)^{SSC}, *Dryocopus pileatus* (pileated woodpecker), *Elanoides forficatus* (swallow-tailed kite), *Euphagus carolinus* (rusty blackbird), *Mycteria americana* (wood stork)^E, *Myiarchus crinitus* (great-crested flycatcher), *Porphurula martinica* (purple gallinule), *Protonotaria citrea* (prothonatory warbler), and *Strix varia* (barred owl).

Herpetofauna – *Acris gryllus* (southern cricket frog), *Agkistrodon piscivorus piscivorus* (cottonmouth snake), *Alligator mississippiensis* (alligator)^{SSC}, *Ambystoma cingulatum* (flatwoods salamander)^{SSC}, *A. talpoideum* (mole salamander), *Bufo guercicus* (oak toad), *Farancia abacura* (mud snake), *Gastrophryne carolinensis* (Eastern narrowmouth toad), *Hyla femoraus* (pinewoods treefrog), *Kinosternon* sp. (mud turtle), *Shelydra serpentine* (snapping turtle), and *Thamnophis sauritus sauritus* (Eastern ribbon snake).

Landscape Location: Found interspersed throughout other communities such as flatwoods, savanna, or wet prairie landscapes. Cypress Forests may be depressional wetlands with a domed canopy and may also be associated with a seepage bog or karst areas. They also occur along rivers, lake margins, slough, and strands.

Soils: Poorly drained mucky, organic soils, composed of peat, and often underlain by acidic sands and limestone. Some have a clay confining layer that retains surface water levels.

Fire Interval: Fire is essential for the maintenance of a Cypress Forest community. Without periodic fires, hardwood invasion and peat accumulation would convert the forest to another community 613 Gum Swamps or 617 Mixed Wetland Hardwoods. The interval between fires may be short from 3-5 years or longer from 30-200 years. Cypress trees are very tolerant of light surface fires, but fires burning into the peat can cause mortality, lower the ground surface, and transform the community.

Hydrology: In depressional wetlands, where the shallow water table is exposed, ground water is the dominant water source. Surface runoff from surrounding uplands can also contribute to the water budget. The hydroperiod of these communities ranges from 200-300 days per year. Deeper than normal water levels are not likely to harm the community, but extended periods of flooding will limit tree growth and regeneration. Shortened periods of flooding will permit the invasion of mesophytic species, which will change the composition of the understory and eventually allow hardwoods to replace cypress trees. Cypress Forests and 613 Gum Swamps are similar in characteristics and species composition with a shift in dominant species driven primarily by slight differences in fire frequency and hydro- pattern.

Functions:

- Extremely important for wildlife habitat and refuge, in particular for waterfowl, wading birds and aquatic animals, which may depend on Cypress Forests for breeding purposes.
- Provide water storage by holding excess water and slowly releasing it into the water table.
- Enhance water quality by absorbing nutrients from the water.

- Important for environmental education, scientific research and recreation.
- Valued for cypress wood.

^{SCC} Listed as Species of Special Concern by FFWCC

^E Listed as Endangered by FFWCC

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Bald Cypress

Taxodium distichum

OBL-Deciduous coniferous canopy tree with soft, feather-like foliage. Base of the trunk is often swollen and buttressed with knees present.



Water Tupelo

Nyssa aquatica

OBL-Tree up to 30m tall with swollen buttressed base, large, deciduous, alternate, simple leaves with a few large teeth on margin and long petioles, blue drupe fruit on a long stalk.



Swamp Tupelo

Nyssa sylvatica

OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Slash Pine

Pinus elliotii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates



Buttonbush

Cephalanthus occidentalis

OBL-Understory shrub to 3 m tall; arching branches with raised lenticels, simple elliptic or ovate deciduous leaves, opposite or in whorls of 3-4; ball-like clusters of white flowers hanging on long stalks below leaves; fruiting structure distinct, round, brown, often persists throughout year.



Florida Elm

Ulmus americana var. *floridana*

FACW-Tall tree up to 30m, vase shaped in outline; alternate deciduous leaves, elliptic, doubly saw-toothed blades with prominent parallel lateral veins, leaf base asymmetrical with surface rough.



Carolina Ash

Fraxinus caroliniana

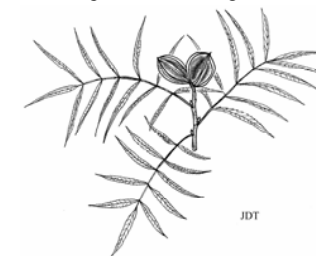
OBL - Tree up to 12m tall, opposite, pinnately compound leaves, twigs flattened at the nodes, fruit is a flat, diamond-shaped, winged samara.



Pickerelweed

Pontederia cordata

OBL-Tall colonial, perennial herb; leaves basal, long petioles, to 1 m tall, erect heart- to lance-shaped; showy blue to purple flowers with yellow markings in spikes at ends of elongated stems. Spikes may be all white, rarely.



Water Hickory

Carya aquatica

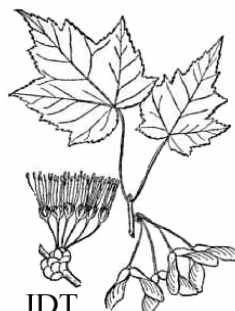
OBL - thin, compound leaves, 7 to 17 slender scythe shaped leaflets, coarsely toothed on the margin, dark green above and brownish and hairy along the veins beneath. Fruit usually clustered, one and one-quarter inches long, angled and compressed.



Royal Fern

Osmunda regalis

OBL - clustered, bipinnately compound fronds with oblong, alternate, stalked leaflets with rounded bases and finely toothed margins; sporangia on stalked structures from upper portion of some leaves; black fibrous roots may form a mass up to 60 cm tall.



Red Maple

Acer rubrum

FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



Swamp bay

Persea palustris

OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.

This list is not intended to be all inclusive.

622 Pond Pine

FLUCCS Description

This community is composed of *Pinus serotina* (pond pine) which is typically dominant or occasionally codominant in the canopy and established on hydric soils. *Cyrilla racemiflora* (titi) is the major associated species.

Pond Pine (synonyms: Wet Flatwoods, Low Flatwoods, Hydric Flatwoods, Pocosin or Pond Pine Flatwoods) - Forests with a canopy of *Pinus serotina* (pond pine) on flat, poorly drained land with either thick shrubby understory, or a sparse understory and a diverse mix of grasses and herbs, depending on the fire regime.

Vegetation: *Pinus serotina* (pond pine) is the dominant canopy tree with a shrub layer of *Cyrilla racemiflora* (titi), *Ilex glabra* (gallberry), and/or *Serenoa repens* (saw palmetto). Minor associates include *Cliftonia monophylla* (black titi), *Gordonia lasianthus* (loblolly bay), *Ilex myrtifolia* (myrtle-leaved holly), *Magnolia virginiana* (sweetbay), *Nyssa sylvatica* (swamp tupelo or blackgum), *Persea borbonia* (red bay), and *P. palustris* (swamp bay). Common groundcover plants include *Andropogon* spp. (bluestem), *Aristida* spp. (wiregrass), *Carphephorus odoratissimus* (deer tongue), *Desmodium incanum* (creeping beggarweed), *Drosera* spp. (sundews), *Eleocharis* spp. (spikerush), *Lachnocaulon* spp. (bog-buttons), *Liatris* spp. (gay feather), *Pinguicula* spp. (butterworts), *Rhexia* spp. (meadow-beauty), *Rhynchospora* spp. (beakrush), *Sarracenia* spp. (pitcher plants), *Smilax* spp. (greenbrier), *Xyris* spp. (yellow-eyed grass), and sedges (Cyperaceae family). In North Florida, there is higher pine tree density which leads to a less open appearance and less ground cover. The species composition of Pond Pine frequently overlaps with 625 Hydric Pine Flatwoods, 626 Hydric Pine Savannah, and 627 Slash Pine Swamp Forest.

Wildlife:

Mammals - *Dasyurus novemcinctus* (armadillo), *Didelphis virginiana* (opossum), *Glaucomys volans* (Southern flying squirrel), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), *Sigmodon hispidus* (cotton rat), *Spilogale putorius* (Eastern spotted skunk), *Sylvilagus floridanus* (cottontail rabbit), and *Urocyon cinereoargenteus* (gray fox).

Birds - *Colinus virginianus* (Northern bobwhite), *Dendroica dominica* (yellow-throated warbler), *D. pinus* (pine warbler), *Dryocopus pileatus* (pileated woodpecker), *Melanerpes carolinus* (red-bellied woodpecker), *Pipilo erythrophthalmus* (rufous-sided towhee), *Sitta pusilla* (brown-headed nuthatch), and *Sturnella magna* (Eastern meadowlark).

Herpetofauna - *Bufo guercicus* (oak toad), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Hyla femoraus* (pinewoods treefrog), *Pseudacris* sp. (chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: Pond pine communities are found on flat, poorly drained lands.

Soils: The soils may consist of 1 to 3 feet of acidic soil overlying an organic hardpan or clay layer. They are generally poorly drained and coarse textured or may be level to nearly level alluvial soils.

Fire Interval: Fire is an essential factor for these communities, since the serotinous cones require the heat of fire to trigger the release of the seeds. The trees regenerate and re-establish very well after a burn and may form pure stands. In addition, pond pines are shade intolerant, thus fires help thin the understory and provide much needed light. Natural fires probably occurred every 3 to 10 years during pre-Columbian times. Without relatively frequent fires, these communities succeed into hardwood-dominated forests with a closed canopy that would eliminate the ground cover herbs and shrubs. Where fires are frequent, the subcanopy is sparse or absent and the groundcover is a diverse mix of grasses and herbs—a wet prairie with pines.

Hydrology: The hydrology of this community is similar to that of hydric, wet flatwoods. The typically flat topography and lack of gradient results in frequent flooding. During the summer rainy season, water frequently stands on the surface, inundating the community for 1 or more months per year. During the dry season, however, the water is low and could result in stress to the vegetation whose roots cannot penetrate the hardpan. Pond pine can withstand short periods of drought.

Functions:

- Important natural resource for wildlife. Since few trees are able to withstand the extremes of this habitat (fire, flooding and droughts), many animals depend on pond pine communities to provide shelter and edible seeds. It is especially important as a wildlife buffer zone between urban areas on better-drained soils.
 - Valuable recreation and scenic system with high aesthetic quality.
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Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
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4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Pond Pine

Pinus serotina

FACW-Long narrow needles 6-20 cm long in fascicles of 3 but also 2 or 4; distinctive relatively short, ovoid, compact, tight, egg-shaped unopened cone; typically forms sucker sprouts, giving tree "fuzzy" appearance; reddish brown bark, breaking into narrow, laminated plates.



Titi

Cyrilla racemiflora

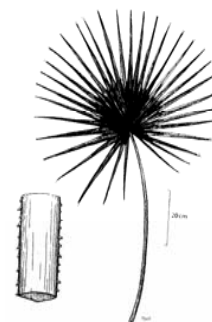
FAC- Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Gallberry

Ilex glabra

UPL-Evergreen shrub, alternate leathery leaves, with 2-3 crenate teeth along leaf margin toward the tip, lower surface has scattered reddish, punctate glands. Black berry-like fruit persistent into winter.



Saw palmetto

Serenoa repens

FACU*-Small fan palm growing in clumps often 6m or more wide, main stem usually underground; palmate leaves 0.6-0.9 m across attached by sharply saw-toothed petioles (~0.6 m long).



Black titi

Cliftonia monophylla

FACW-Evergreen shrub or small tree to 30 ft; smooth bark, gray to grayish-brown; simple alternate leaves, evergreen, short-stalked to sessile; flowers white to pinkish in short racemes, clustered; winged fruits.



Deer tongue, vanilla plant

Carphephorus odoratissimus

FAC-Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

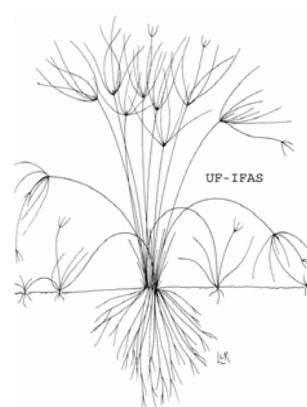
OBL, except *S. minor* (FACW)-Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Broomsedge

Andropogon virginicus

FAC-Large, tufted perennial grass to 2 m tall, usually with green or blue-green, chalky stems; nodes and sheaths smooth; flowers in racemes with 2-5 branches.



Spikerush

Eleocharis baldwinii

OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Wire grass

Aristida stricta

FAC-Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.

623 Atlantic White Cedar

FLUCCS Description

In this community, *Chamaecyparis thyoides* (Atlantic white cedar) is the indicator species although it may not always be the most abundant. Common associates include *Acer rubrum* (red maple), *Cliftonia monophylla* (black titi), *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweetbay), *Nyssa sylvatica* (swamp tupelo or blackgum), *Persea borbonia* (red bay), *Pinus elliottii* (slash pine), and *Taxodium* spp. (cypress).

Atlantic White Cedar (synonyms: Bottomland Forests, Freshwater Tidal Forests, Swamp Hardwoods) - Found throughout the Atlantic Coastal Plain.

Vegetation: Typical plants include *Chamaecyparis thyoides* Atlantic white cedar along with *Acer rubrum* (red maple), *Carpinus caroliniana* (American hornbeam), *Carya aquatica* (water hickory), *Cliftonia monophylla* (black titi), *Cornus amomum* (swamp dogwood or silky dogwood), *C. foemina* (stiffcornel dogwood), *Fagus grandifolia* (American beech), *Gordonia lasianthus* (loblolly bay), *Ilex cassine* (dahoon holly), *Liquidambar styraciflua* (sweetgum), *Magnolia grandiflora* (southern magnolia), *M. virginiana* (sweetbay), *Myrica cerifera* (wax myrtle), *Nyssa sylvatica* (swamp tupelo or blackgum), *Persea borbonia* (red bay), *Pinus elliottii* (slash pine), *P. glabra* (spruce pine), *P. taeda* (loblolly pine), *Quercus laurifolia* (diamond-leaf oak), *Q. nigra* (water oak), *Q. virginiana* (live oak), *Sabal palmetto* (cabbage palm), *Taxodium* spp. (cypress), and *Ulmus americana* var. *floridana* (Florida elm). Shrubs, vines, grasses and herbaceous plants grow profusely where sunlight penetrates the canopy. These include: *Anisostichus capreolata* (crossvine), *Cephalanthus occidentalis* (button bush), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern), *Saururus cernuus* (lizard's tail), *Smilax* spp. (greenbrier), *Tillandsia* spp. (wild pine), and *Toxicodendron radicans* (poison ivy). The species composition of Atlantic White Cedar frequently overlaps with 611 Bay Swamps, 613 Gum Swamps, 615 Stream and Lake Swamps, and 617 Mixed Wetland Hardwoods.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Glaucomys volans* (Southern flying squirrel), *Lynx rufus* (bobcat), *Mustela vison* (mink), *Odocoileus virginianus* (white-tailed deer), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), *Sylvilagus palustris* (marsh rabbit), and *Urocyon cinereoargenteus* (gray fox).

Birds – *Aix sponsa* (wood duck), *Archilochus colubris* (ruby-throated hummingbird), *Bombycilla cedrorum* (cedar waxwing), *Bubo virginianus* (great-horned owl), *Buteo jamaicensis* (red-tailed hawk), *Catharus guttatus* (hermit thrush), *Coccyzus americanus* (yellow-billed cuckoo), *Dendroica dominica* (yellow-throated warbler), *Dryocopus pileatus* (pileated woodpecker), *Empidonax virescens* (acadian flycatcher), *Meleagris gallopavo* (wild turkey), and *Otus asio* (Eastern screech-owl).

Herpetofauna – *Agkistrodon piscivorus* (cottonmouth snake), *Ambystoma opacum* (marbled salamander), *A. talpoideum* (mole salamander), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Diadophis punctatus* (ring-necked snake), *Elaphe obsoleta spiloides* (gray rat snake), *Eumeces fasciatus* (five-lined skink), and *Lampropeltis getulus* (Eastern king snake).

Landscape Location: In Florida, common on perennially moist soils throughout the Atlantic Coastal Plain where neither flooding nor fire is frequent. It may be found bordering rivers, near the mouths of rivers or in basins which are either inundated or saturated part of the year. They may also occur within floodplains near the mouths of rivers just inland from mangroves or salt marshes.

Soils: May be a mixture of clay and organic materials, or highly organic and level or nearly level alluvial soils. Typically poorly drained and dark colored with coarse to medium textured surfaces underlain by finer textured material.

Fire Interval: Atlantic white cedar trees are neither shade nor fire tolerant but are rapid colonizers and may occasionally dominate shallow peat swamps, perhaps replacing bay trees such as *Magnolia virginiana* (sweetbay) and *Gordonia lasianthus* (loblolly bay) after a fire but relinquishing dominance to bays in the absence of fire. The canopy is dense and closed, except during winter in areas where deciduous trees predominate. Thus, air movement and light penetration are generally low, making the humidity high and relatively constant, conditions that are not conducive to fire.

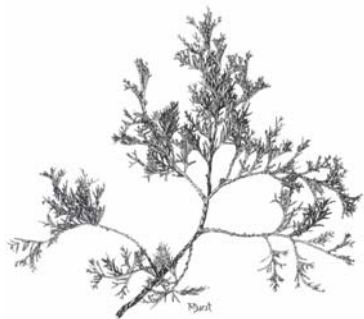
Hydrology: High water table, with inundation only during extreme floods or exceptionally heavy rains. When infrequent flooding occurs, there is a rapid rise and fall in floodwater. There is little or no inundation in this community during the growing season. The community is extremely vulnerable to hydrological modifications, saltwater intrusion, and clearcut logging. Changes to the water cycle may be caused by channelization, drainage and impoundment.

Functions:

- Receiving body for floodwaters, sediments, pollutants, and nutrients, assimilating them into the system through redistribution.
- Valuable recreation and scenic system with high aesthetic quality.
- Provides food and cover for wildlife species due to dense vegetation as well as wildlife corridors between developed areas for wildlife.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Atlantic White Cedar

Chamaecyparis thyoides

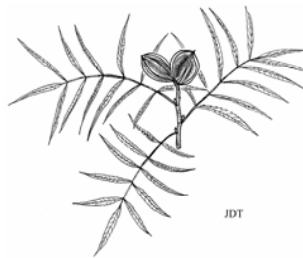
OBL-Evergreen canopy tree, "Christmas tree" shaped when young, with branchlets of individual twigs fan-like in a single plane. Twigs are not prickly. Found in NW Florida.



American hornbeam

Carpinus caroliniana

FACW-Small tree with fluted trunk ("flexed muscle"); bark gray, smoothish and thin; alternate leaves with parallel veins, doubly serrate margins, rough upper surface.



Water Hickory

Carya aquatica

OBL - thin, compound leaves, 7 to 17 slender scythe shaped leaflets, coarsely toothed on the margin, dark green above and brownish and hairy along the veins beneath. Fruit usually clustered, one and one-quarter inches long, angled and compressed.



Red Maple

Acer rubrum

FACW- Opposite simple leaves, deciduous, palmately 3-5 lobed with acute sinuses. Petioles red or reddish-green



Black titi

Cliftonia monophylla

FACW-Evergreen shrub or small tree to 30 ft; smooth bark, gray to grayish-brown; simple alternate leaves, evergreen, short-stalked to sessile; flowers white to pinkish in short racemes, clustered; winged fruits.



Stiff cornel dogwood

Cornus foemina

FACW-Deciduous; generally encountered as a shrub, often multi-stemmed and/or colonial; can be small tree to 8 m tall; pointed opposite leaves, upper surface on non-terminal mature leaves smooth, fewer veins and smaller leaves than other dogwood species; arching, ascending branches with white pith.



Loblolly bay

Gordonia lasianthus

FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Florida Elm

Ulmus americana var. floridana

FACW-Tall tree up to 30m, vase shaped in outline; alternate deciduous leaves, elliptic, doubly saw-toothed blades with prominent parallel lateral veins, leaf base asymmetrical with surface rough.



Water Oak

Quercus nigra

FACW- Deciduous tree with alternate, spatulate to broadly 3 lobed leaves with tufts of hairs on lower leaf surface in most major vein axils.



Spruce Pine

Pinus glabra

FACW-Narrow needles 2-10 cm long in fascicles of 2, dark green and slightly twisted; very tight hard, smooth gray bark; twigs smooth and without scales or flakiness.



Slash Pine

Pinus elliotii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Loblolly Pine

Pinus taeda

FAC-Narrow needles 8-22 cm long; small, narrow cones to 12 cm long with very sharp prickles; branch tips very narrow.



Lizard's tail

Saururus cernuus

OBL-Erect perennial herb with zigzag stem; alternate heart shaped leaves; white flowers (spring to early summer) in clusters, bottlebrush-like, curving downward.



Cinnamon fern

Osmunda cinnamomea

FACW - Rhizomatous fern, clustered, deciduous, pinnately compound, alternating leaflets with tufts of orange hair at the base.



Royal Fern

Osmunda regalis

OBL - clustered, bipinnately compound fronds with oblong, alternate, stalked leaflets with rounded bases and finely toothed margins; sporangia on stalked structures from upper portion of some leaves; black fibrous roots may form a mass up to 60 cm tall.

This list is not intended to be all inclusive.

624 Cypress-Pine-Cabbage Palm

FLUCCS Description

This community includes *Taxodium* spp. (cypress), *Pinus* spp. (pine), and/or *Sabal palmetto* (cabbage palm) in combinations in which no species achieves dominance. Although not strictly a wetlands community, it forms a transition between moist upland and hydric sites.

Cypress-Pine-Cabbage Palm (synonyms: Wet Flatwoods, Cabbage Palm Flatwoods) - Well-developed forests usually found throughout south and central Florida. This community has a relatively open-canopy of scattered *Pinus* spp. (pine trees) and/or *Sabal palmetto* (cabbage palms) with either a shrubby understory or a ground cover of hydrophytic grasses.

Vegetation: *Pinus elliotii* (slash pine), *P. serotina* (pond pine), *P. taeda* (loblolly pine), *Sabal palmetto* (cabbage palm), and *Taxodium* spp. (cypress) are typical along with *Acer rubrum* (red maple), *Ampelopsis arborea* (peppervine), *Befaria racemosa* (tar flower), *Berchemia scandens* (rattanvine), *Carphephorus odoratissimus* (deer tongue), *Carpinus caroliniana* (American hornbeam), *Celtis* spp. (hackberry), *Desmodium incanum* (creeping beggarweed), *Eleocharis* spp. (spikerush), *Ilex cassine* (dahoon holly), *Gelsemium* spp. (yellow Jessamine), *Juniperus virginiana* (red cedar), *Liatris* spp. (gay feather), *Liquidambar styraciflua* (sweetgum), *Magnolia grandiflora* (southern magnolia), *M. virginiana* (sweetbay), *Myrica cerifera* (wax myrtle), *Nyssa aquatica* (water tupelo), *N. sylvatica* (swamp tupelo or blackgum), *Myrsine guianensis* (myrsine), *Osmunda regalis* (royal fern), *Parthenocissus quinquefolia* (Virginia creeper), *Persea palustris* (swamp bay), *Quercus laurifolia* (diamond-leaf oak), *Q. michauxii* (swamp chestnut oak), *Q. nigra* (water oak), *Rhapidophyllum hystrix* (needle palm), *Rhynchospora* spp. (beakrush), *Sabal minor* (bluestem palmetto), *Serenoa repens* (saw palmetto), *Smilax* spp. (greenbriar), *Sorghastrum secundum* (lopsided Indiangrass), *Toxicodendron radicans* (poison ivy), *Ulmus americana* var. *floridana* (Florida elm), *Urena lobata* (Caesarweed), and *Viburnum obovatum* (Walter viburnum). The species composition of Cypress-Pine-Cabbage Palm forests frequently overlaps with 622 Pond Pine Forests, 625 Hydric Pine Flatwoods, and 626 Hydric Pine Savannah.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sciurus carolinensis* (gray squirrel), *Sigmodon hispidus* (cotton rat), and *Sylvilagus floridanus* (cottontail rabbit).

Birds – *Buteo lineatus* (red-shouldered hawk), *Colinus virginianus* (northern bobwhite), flycatchers (ex. *Myiarchus crinitus* – great-crested flycatcher), and warblers (ex. *Protonotaria citrea* - prothonotary warbler).

Herpetofauna – *Acris gryllus* (Southern cricket frog), *Anolis carolinensis* (green anole), *Bufo guericus* (oak toad), *Coluber constrictor priapus* (Southern black racer), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Pseudacris* sp. (chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: May be found on relatively flat, poorly drained terrain, such as next to coastal areas, major drainage ways and lakes; or interspersed within smaller communities of wetland types. They may also be found in extensive forests covering lowlands just inland of coastal communities.

Soils: Nearly level, poorly to somewhat poorly drained sands. Surface and subsurface layers may be coarse textured. This community tends to occur on more circumneutral sands (pH 6.0 - 7.5) underlain by marl or shell beds or it may be on low, flat, wet sites where limestone may be near the surface and frequently outcrops.

Fire Interval: Fire is important in the control of hardwoods, and many plant species typical of this community are adapted to fire and depend on it for their survival. Fire frequency can be anywhere between 5-25 years.

Hydrology: The normal length of time of water standing above the soil surface is seldom over 60 days per year. If the water table is lowered, this community will gradually change to mesic conditions. If the community is flooded, many trees will die and eventually be replaced by more hydrophytic species. The primary sources of water are groundwater seepage and rainfall, and the soil retains water for at least six months of the year.

Functions:

- Provides food (such as palm and palmetto fruit, pine mast, and acorns from associated oaks) and cover to many species. Legumes and grasses furnish good food sources to quail and other small birds.
- Well-suited habitat for deer and turkey and offers refuges to migrating birds during winter months.
- Undisturbed areas provide escape cover and travel routes for most forms of wildlife.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Slash Pine

Pinus elliottii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Loblolly Pine

Pinus taeda

FAC-Narrow needles 8-22 cm long; small, narrow cones to 12 cm long with very sharp prickles; branch tips very narrow.



Pond Pine

Pinus serotina

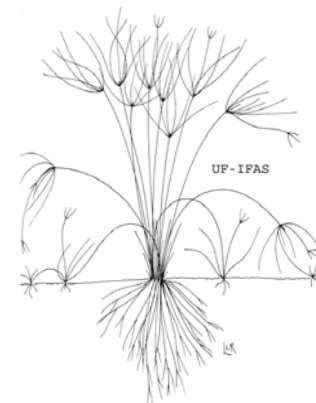
FACW-Long narrow needles 6-20 cm long in fascicles of 3 but also 2 or 4; distinctive relatively short, ovoid, compact, tight, egg-shaped unopened cone; typically forms sucker sprouts, giving tree "fuzzy" appearance; reddish brown bark, breaking into narrow, laminated plates.



Cabbage palm

Sabal palmetto

FAC-Palm tree with evergreen, fan shaped leaves, to 30 m; trunk partially or completely covered by the bases of the petioles of broken off dead leaves.



Spikerush

Eleocharis baldwinii

OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Bald Cypress

Taxodium distichum

OBL-Deciduous coniferous canopy tree with soft, feather-like foliage. Base of the trunk is often swollen and buttressed with knees present.



American hornbeam

Carpinus caroliniana

FACW-Small tree with fluted trunk ("flexed muscle"); bark gray, smoothish and thin; alternate leaves with parallel veins, doubly serrate margins, rough upper surface.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Fascicled beakrush

Rhynchospora fascicularis

FACW-Clumped, leafy herb, with closed leaf sheaths and reduced flowers in terminal head; achene smooth with no bristles at the base.



Deer tongue, vanilla plant

Carphephorus odoratissimus

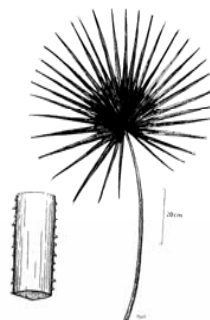
FAC-Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Dahoon Holly

Ilex cassine

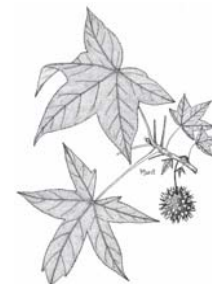
OBL-Evergreen shrub, smooth gray bark, alternate leathery leaves of variable shape and entire margins, often with few short spines, bright red to orange red drupe fruit, and ascending branches.



Saw palmetto

Serenoa repens

FACU*-Small fan palm growing in clumps often 6m or more wide, main stem usually underground; palmate leaves 0.6-0.9 m across attached by sharply saw-toothed petioles (~0.6 m long).



Sweet gum, Red gum

Liquidambar styraciflua

FACW-Deciduous canopy tree to 37 m tall; alternate, star-shaped palmately veined leaves with 5 (rarely 7) pointed lobes, margins toothed; hard, spiny, round fruit capsule; thick, stiff branches, twigs with corky wings/warts; gray bark deeply vertically furrowed.

This list is not intended to be all inclusive.

625 Hydric Pine Flatwoods

FLUCCS Description

This community is a forest with a sparse to moderate canopy of slash pine. The understory is grasses, wiregrass, forbs, and at times with sparse saw palmetto.

Hydric Pine Flatwoods (synonyms: Wet Flatwoods, Low Flatwoods, Moist Pine Barren, Hydric Flatwoods, Pocosin, Flatwoods) - Forest with a canopy of *Pinus elliotii* (slash pine) on flat, poorly drained land.

Vegetation: Typical plants include a canopy of *Magnolia virginiana* (sweetbay), *Pinus elliotii* (slash pine), and *P. serotina* (pond pine), with an extremely diverse groundcover including *Aristida* spp. (wiregrass), *Carphephorus odoratissimus* (deer tongue), *Lachnocaulon* spp. (bog buttons), *Rhexia* spp. (meadow-beauty), *Xyris* spp. (yellow-eyed grass), and carnivorous plants such as *Drosera* spp. (sundews), *Pinguicula* spp. (butterworts), and *Sarracenia* spp. (pitcher plants). Typical shrubs include *Ilex glabra* (gallberry), *I. cassine* (dahoon holly), *Lyonia lucida* (fetterbush), *Myrica cerifera* (wax myrtle), *Rhus copallina* (shining sumac), *Serenoa repens* (saw palmetto), and *Vaccinium arboreum* (sparkleberry). Where fire has been suppressed, shrubs and trees like *Cyrilla racemiflora* (titi), *Ilex coriacea* (big gallberry), *I. glabra* (gallberry), *I. myrtifolia* (myrtle-leaved holly), *Magnolia virginiana* (sweet bay), *Nyssa sylvatica* (swamp tupelo or black gum), and *Persea palustris* (swamp bay) become dense and the groundcover disappears. The species composition of Hydric Pine Flatwoods frequently overlaps with 622 Pond Pine Forests, 624 Cypress-Pine-Cabbage Palm Forests, 626 Hydric Pine Savannah, and 627 Slash Pine Swamp forest.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sciurus niger* (fox squirrel), *S. carolinensis* (gray squirrel), *Sigmodon hispidus* (cotton rat), and *Sylvilagus floridanus* (cottontail rabbit).

Birds – *Buteo lineatus* (red-shouldered hawk) and *Colinus virginianus* (Northern bobwhite), red cockaded woodpecker

Herpetofauna – *Acris gryllus* (Southern cricket frog), *Ambystoma cingulatum* (flatwoods salamander), *Bufo guericus* (oak toad), *Coluber constrictor priapus* (Southern black racer), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Limnaeodius ocularis* (little grass frog), *Pseudacris ornate* (Southern chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: Hydric Pine Flatwoods are common throughout Florida, though the species composition may vary slightly between north and south Florida. They are found on nearly level land and are typically interspersed with smaller communities of other types, especially wetlands.

Soils: Typically consist of less than 1 m (1-3 ft) acidic sands generally overlying an organic hardpan or clay layer.

Fire Interval: Fire is an important factor in these communities, with nearly all plants and animals adapted to periodic fires, and several species dependent on fires for their

continued existence. Natural fires probably occurred every 3-10 years during pre-Columbian times. Without relatively frequent fires, these flatwoods succeed into hardwood dominated forests characterized by a closed canopy that essentially eliminates the ground cover herbs and shrubs. Variation in community structure is affected by fire frequency. As the length time between fires increases, the shrub layers becomes more developed, and the accumulation of pine needles may result in a catastrophic canopy fire.

Where fires are frequent, the subcanopy is sparse or absent and the groundcover is a diverse mix of grasses and herbs described as a wet prairie with pines. The longer fire is excluded, the more wet flatwoods may approach bay swamps, on flat, poorly drained land.

Hydrology: Underlain by a hardpan, which substantially reduces the percolation of water. During the rainy season, flatwoods may be inundated for one or more months per year. During the dry season, the hardpan may prevent roots of certain plant species to penetrate and reach the groundwater causing many plants to be stressed due to water saturation during the wet season and drought during the dry season.

Functions:

- Important habitats for wildlife.
- Important habitat for a diverse array of herbaceous species.
- Provides excellent recreational and educational opportunities.



North Florida flatwoods in Apalachicola National Forest, Wakulla County. (RF)

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Slash Pine

Pinus elliottii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Pond Pine

Pinus serotina

FACW-Long narrow needles 6-20 cm long in fascicles of 3 but also 2 or 4; distinctive relatively short, ovoid, compact, tight, egg-shaped unopened cone; typically forms sucker sprouts, giving tree "fuzzy" appearance; reddish brown bark, breaking into narrow, laminated plates.



Wire grass

Aristida stricta

FAC-Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.



Deer tongue, vanilla plant

Carphephorus odoratissimus

FAC-Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Gallberry

Ilex glabra

UPL-Evergreen shrub, alternate leathery leaves, with 2-3 crenate teeth along leaf margin toward the tip, lower surface has scattered reddish, punctate glands. Black berry-like fruit persistent into winter.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

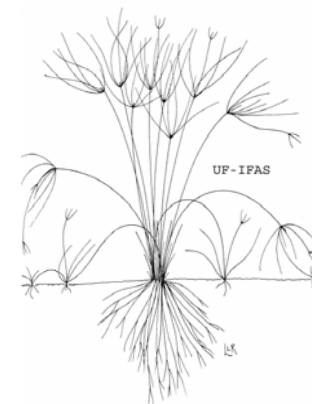
OBL, except *S. minor* (FACW)-Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Dahoon Holly

Ilex cassine

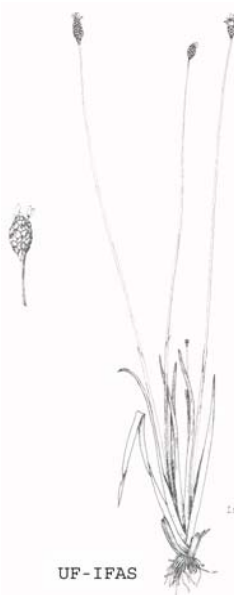
OBL-Evergreen shrub, smooth gray bark, alternate leathery leaves of variable shape and entire margins, often with few short spines, bright red to orange red drupe fruit, and ascending branches.



Spikerush

Eleocharis baldwinii

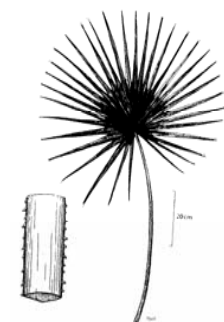
OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Yellow-Eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)-Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.



Saw palmetto

Serenoa repens

FACU*-Small fan palm growing in clumps often 6m or more wide, main stem usually underground; palmate leaves 0.6-0.9 m across attached by sharply saw-toothed petioles (~0.6 m long).

626 Hydric Pine Savanna

FLUCCS Description

This community is an open forest with a sparse canopy of *Pinus elliottii* (slash pine) and/or *P. palustris* (longleaf pine) with a ground cover of grasses, forbs, and a sparse understory of wetland shrubs.

Hydric Pine Savanna (synonyms: Wet Flatwoods, Low Flatwoods, Moist Pine Barren, Hydric Flatwoods, Pocosin or Flatwoods) - Open canopy of scattered *Pinus elliottii* (slash pine) and/or *P. palustris* (longleaf pine) on flat, poorly drained land.

Vegetation: Dominant plants include *Pinus elliottii* (slash pine) and/or *P. palustris* (longleaf pine) in the canopy with a diverse understory of *Andropogon* spp. (bluestem), *Aristida* spp. (wiregrass), *Lachnocaulon* spp. (bog buttons), *Rhexia* spp. (meadow-beauty), and *Xyris* spp. (yellow-eyed grass). Other typical plants include: *Carphephorus odoratissimus* (deer tongue), *Cyrilla racemiflora* (titi), *Desmodium incanum* (creeping beggarweed), *Drosera* spp. (sundews), *Eleocharis* spp. (spikerush), *Eupatorium capillifolium* (dogfennel), *Gaylussacia dumosa* (dwarf huckleberry), *Ilex glabra* (gallberry), *Liatris* spp. (gay feather), *Magnolia virginiana* (sweetbay), *Pinguicula* spp. (butterworts), *Quercus virginiana* (live oak), *Rhynchospora* spp. (beakrush), *Sarracenia* spp. (pitcher plants), *Serenoa repens* (saw palmetto), *Smilax* spp. (greenbrier), and a variety of sedges (Cyperaceae) and grasses (Poaceae). Where fire has been suppressed, shrubs and trees like *Cyrilla racemiflora* (titi), *Ilex coriacea* (big gallberry), *I. glabra* (gallberry), *I. myrtifolia* (myrtle-leaved holly), *Magnolia virginiana* (sweet bay), *Nyssa sylvatica* (swamp tupelo or black gum), and *Persea palustris* (swamp bay) may become dense and the herbaceous groundcover is shaded out. In north Florida there is higher pine tree density which leads to a reduced open appearance and less groundcover. The species composition of Hydric Pine Savannas frequently overlaps with 624 Cypress-Pine-Cabbage Palm Forests, 625 Hydric Pine Flatwoods, and 627 Slash Pine Swamp Forests.

Wildlife:

Mammals – *Dasypus novemcinctus* (armadillo), *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sigmodon hispidus* (cotton rat), and *Sylvilagus floridanus* (cottontail rabbit).

Birds – *Buteo lineatus* (red-shouldered hawk) and *Colinus virginianus* (Northern bobwhite), *Dendroica dominica* (yellow-throated warbler), *Dendroica pinus* (pine warblers), *Dryocopus pileatus* (pileated woodpecker), *Melanerpes carolinus* (red-bellied woodpecker), *Picoides borealis* (red cockaded woodpecker), *Pipilo erythrophthalmus* (rufous-sided towhee), *Sitta pusilla* (brown-headed nuthatch), and *Sturnella magna* (Eastern meadowlark).

Herpetofauna – *Acris gryllus* (Southern cricket frog), *Bufo guericus* (oak toad), *Coluber constrictor priapus* (Southern black racer), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Pseudacris ornate* (Southern chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: Found on nearly level land with gradual water movement to and through the natural drainage ways, swamps, marshes, and ponds associated with this community.

Soils: Typically consist of nearly level, deep, acidic, generally poorly drained, coarse textured organic or clay soils.

Fire Interval: Fire is an important factor in these communities, with nearly all plants and animals adapted to periodic fires, and several species dependent on fires for their continued existence. Natural fires probably occurred every 3-10 years during pre-Columbian times. Without relatively frequent fires, these flatwoods succeed into hardwood dominated forests characterized by a closed canopy that essentially eliminates the ground cover herbs and shrubs. Variation in community structure is affected by fire frequency. As the length time between fires increases, the shrub layers becomes more developed, and the accumulation of pine needles may result in a catastrophic canopy fire. Where fires are frequent, the subcanopy is sparse or absent and the groundcover is a diverse mix of grasses and herbs described as a wet prairie with pines. The longer fire is excluded, the more wet flatwoods may approach bay swamps, on flat, poorly drained land.

Hydrology: During the rainy season, Hydric Pine Savannas may be inundated for one or more months per year. During the dry season, the hardpan may prevent roots of certain plant species to penetrate and reach the groundwater causing many plants to be stressed due to water saturation during the wet season and drought during the dry season.

Functions:

- Valuable for native forage production and as rangeland, which, with proper management, may lead to a greater diversity in grasses, in turn increasing the richness and abundance of wildlife.
- Important as a wildlife buffer zone between urban areas on better drained soils.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Longleaf Pine

Pinus palustris

FACU-Long narrow needles to 30 cm always in fascicles of 3; extremely large cones to 25 cm long; branch tips silvery and very broad.

Slash Pine

Pinus elliottii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Broomsedge

Andropogon virginicus

FAC-Large, tufted perennial grass to 2 m tall, usually with green or blue-green, chalky stems; nodes and sheaths smooth; flowers in racemes with 2-5 branches.



Wire grass

Aristida stricta

FAC-Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.



Deer tongue, vanilla plant

Carphephorus odoratissimus

FAC-Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Gallberry

Ilex glabra

UPL-Evergreen shrub, alternate leathery leaves, with 2-3 crenate teeth along leaf margin toward the tip, lower surface has scattered reddish, punctate glands. Black berry-like fruit persistent into winter.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

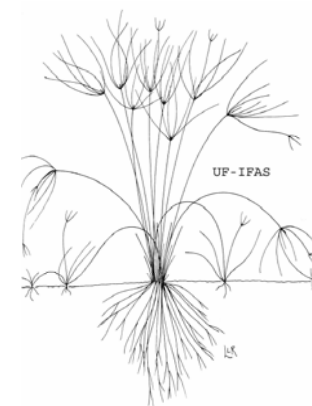
OBL, except *S. minor* (FACW)-Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Spiked gayfeather

Liatris spicata

FAC- Perennial herb to 2.5 m, with leafy unbranched stems arising from a corm; smooth stems and leaves; flowers in long narrow cylinders, rose purple, 5-18 per head.



Spikerush

Eleocharis baldwinii

OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Yellow-Eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)-Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.



Titi

Cyrilla racemiflora

FAC- Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.

627 Slash Pine Swamp Forest

FLUCCS Description

This community is typically a swamp or strand dominated by *Pinus elliottii* (slash pine), also *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweet bay), *Persea palustris* (swamp bay), *Nyssa sylvatica* (swamp tupelo or black gum), and *Taxodium ascendens* (pond cypress), and usually occur as a depression feature in the landscape.

Slash Pine Swamp Forest (synonyms: Wet Flatwoods, Low Flatwoods, Moist Pine Barren, Hydric Flatwoods, Pocosin, Flatwoods) - Domed swamps or strands with a canopy of *Pinus elliottii* (slash pine) on depressional, poorly drained land.

Vegetation: Typical plants include *Pinus elliottii* (slash pine), with a mixed canopy including *Gordonia lasianthus* (loblolly bay), *Magnolia virginiana* (sweet bay), *Nyssa sylvatica* (swamp tupelo or black gum), *Persea palustris* (swamp bay), *Taxodium ascendens* (pond cypress), and an understory including *Aristida* spp. (wiregrass), *Lachnocaulon* spp. (bog buttons), *Rhexia* spp. (meadow-beauty), *Xyris* spp. (yellow-eyed grass), and carnivorous species like *Drosera* spp. (sundews), *Pinguicula* spp. (butterworts), and *Sarracenia* spp. (pitcher plants). Other plants include *Andropogon* spp. (bluestem), *Carphephorus odoratissimus* (deer tongue), *Cyrilla racemiflora* (titi), *Desmodium incanum* (creeping beggarweed), *Eleocharis* spp. (spikerush), *Eupatorium capillifolium* (dog fennel), *Ilex glabra* (gallberry), *Liatris* spp. (gay feather), *Rhynchospora* spp. (beakrush), *Serenoa repens* (saw palmetto), *Smilax* spp. (greenbrier), and grasses (Poaceae) and sedges (Cyperaceae). The species composition of Slash Pine Swamp Forests frequently overlaps with 624 Cypress-Pine-Cabbage Palm Forests, 625 Hydric Pine Flatwoods, and 626 Hydric Pine Savanna.

Wildlife:

Mammals – *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sigmondon hispidus* (cotton rat), and *Sylvilagus floridanus* (cottontail rabbit).

Birds – *Buteo lineatus* (red-shouldered hawk) and *Colinus virginianus* (Northern bobwhite).

Herpetofauna – *Acris gryllus* (Southern cricket frog), *Bufo guercicus* (oak toad), *Coluber constrictor priapus* (Southern black racer), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Pseudacris ornate* (Southern chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: Found in depressions scattered throughout nearly level land, with associated communities of flatwoods, swamps, and marshes.

Soils: Typically consist of less than 1 m (1-3 ft) of acidic sands generally overlying an organic hardpan or clay layer.

Fire Interval: Adapted to fire though it will burn less frequently than 625 Hydric Pine Flatwoods due to a longer hydroperiod.

Hydrology: Because this community occurs in depression features in the landscape, the hydroperiod is longer than 625 Hydric Pine Flatwoods. Though the normal hydroperiod is seldom over 60 days per year.

Functions:

- Important habitats for wildlife.
- Important habitat for a diverse array of herbaceous species.
- Provides excellent recreational and educational opportunities.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Slash Pine

Pinus elliottii

UPL-Long narrow needles 10-30 cm in fascicles of 2-3; male cones 3-8 cm, deep purple; female cones 9-15 cm, 8-9 cm broad at base, not painful to handle; mature bark dark gray to reddish brown, can be orange, in broad, flat laminated plates.



Loblolly bay

Gordonia lasianthus

FACW-Evergreen tree, gray bark, leaves oblong, long-elliptic or ovate-elliptic, 6-15 cm long, glabrous dark green with blunt toothed margins.



Sweetbay

Magnolia virginiana

OBL-Evergreen tree, alternate leathery leaves, light gray or silvery-white underneath; bark smooth and light gray; fragrant showy flowers in spring.



Swamp Tupelo

Nyssa sylvatica

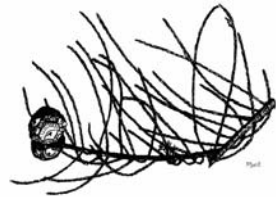
OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Swamp bay

Persea palustris

OBL-Evergreen tree or large shrub; simple alternate leaves, aromatic when crushed and often having many insect galls; underside of leaves with shaggy pubescent, more apparent along midrib and major lateral veins.



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

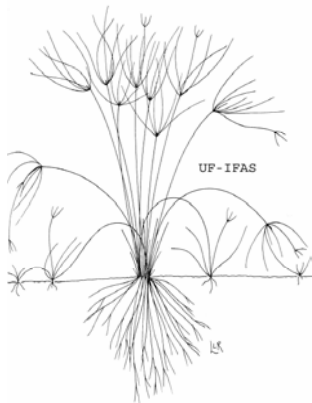
OBL, except *S. minor* (FACW)-Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Broomsedge

Andropogon virginicus

FAC-Large, tufted perennial grass to 2 m tall, usually with green or blue-green, chalky stems; nodes and sheaths smooth; flowers in racemes with 2-5 branches.



Spikerush

Eleocharis baldwinii

OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Titi

Cyrilla racemiflora

FAC- Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Deer tongue, vanilla plant

Carphephorus odoratissimus

FAC-Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Yellow-Eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)-Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.



Wire grass

Aristida stricta

FAC-Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.

631 Wetland Scrub

FLUCCS Description

This community is associated with topographic depressions and poorly drained soil. Associated species include *Nyssa sylvatica* (swamp tupelo or black gum), *Salix* spp. (willow), *Taxodium ascendens* (pond cypress), and other low scrub with no dominate species. The Loxahatchee Slough area is an example of this classification.

Wetland Scrubs (synonyms Shrub Bog, Pocosin, Evergreen Shrub Bog, Wet Scrub/Shrub) - Communities composed of a variety of shrub species, occurring throughout Florida.

Vegetation: Typical vegetation includes *Cyrilla racemiflora* (titi), *Ilex coriacea* (large gallberry), *I. myrtifolia* (myrtle-leaved holly), *Lyonia lucida* (fetterbush), *Nyssa sylvatica* (swamp tupelo or black gum), *Pinus serotina* (pond pine), *Salix* spp. (willow), *Smilax* spp. (greenbrier), and *Taxodium ascendens* (pond cypress). The species composition of Wetland Scrub frequently overlaps with 611 Bay Swamps and 614 Titi Swamps, and 625 Hydric Pine Flatwoods.

Wildlife:

Mammals – Many mammals, including *Ursus americanus floridanus* (black bears)^T, use shrub bogs for cover.

Herpetofauna – *Agkistrodon piscivorus piscivorus* (cottonmouth snake), *Eurycea quadridigitata* (dwarf salamander), *Hyla squirella* (squirrel treefrog), *Limnaeodactylus* (little grass frog), and *Nerodia fasciata* (banded water snake).

Landscape Location: Occur within pine flatwoods, perched on hillsides, or around lakeshores and in depression swamps, ponds and sinkholes.

Soils: Characterized by a deep acidic peat substrate that has accumulated in a depression.

Fire Interval: Fire frequency is variable. In shrub dominated systems fires can occur every 3-8 years, while in tree dominated systems fires may occur every 50-100 years.

Hydrology: Wetland scrub communities in topographic depressions maintain moisture by capillary action through the underlying deep peat; soils are usually saturated or inundated. Scrub communities located on slopes derive their waters from seepage from upstream ecosystems.

Functions:

- Provide cover and forage for a variety of wildlife species.
- Serve as fire buffer between pine dominated communities and other wetlands.

^T Listed as Threatened by FFWCC

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.

4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Titi

Cyrilla racemiflora

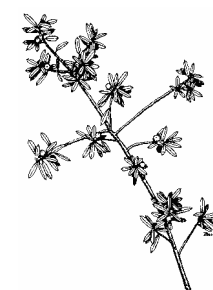
FAC- Shrub or small tree to 30 ft; simple alternate leaves of variable size, turning bright orange, red or yellow before falling; flowers in clustered racemes, 2-15 cm; brown fruit for most of the year.



Large Gallberry

Ilex coriacea

FACW- Evergreen shrub, alternate leathery, elliptic to oval leaves with scattered punctate glands on lower surface; bristle-like marginal teeth that frequently diverge away from margin; found in W and N Florida, and southward to the central peninsula.



Myrtle-Leaved Holly

Ilex myrtifolia

OBL-Evergreen shrub, alternate, small, leathery leaves with narrow spine tipped and red fruit close to stem. Bark has corky thickenings, especially on lower trunk; perpendicular branches.



Fetterbush

Lyonia lucida

FACW-Evergreen shrub; simple alternate leathery leaves with distinct vein paralleling the leaf margin; flowers reddish to deep pink.



Swamp Tupelo

Nyssa sylvatica

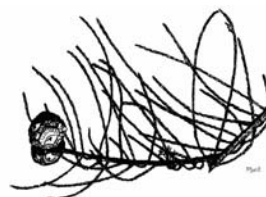
OBL-Large tree, often with buttressed trunk and swollen base; leaves alternate, simple, 2-5" long, 1-3" broad, mostly obovate and oval, margin entire, dark green and lustrous above, paler with silky hairs on lower surface, often purple spotted by late summer or fall.



Coastal Plain Willow

Salix caroliniana

OBL - Deciduous, stalked, alternate, usually lance-shaped leaves with toothed margins, whitish-glaucous beneath mature leaves; flowers unisexual, male and female on separate plants in dense catkins; seeds with a cluster of cottony white hairs



Pond Cypress

Taxodium ascendens

OBL-Deciduous coniferous canopy tree with alternate, spirally arranged, narrowly linear "needle-like" leaves, appressed to branchlets; base of the trunk is often swollen and buttressed, knees often present.

This list is not intended to be all inclusive.

641 Freshwater Marshes

FLUCCS Description

Communities are characterized by having one or more of the following species predominate: *Cladium jamaicensis* (sawgrass), *Eleocharis* spp. (spikerush), *Eupatorium capillifolium* (dogfennel), *Juncus effusus* (needlerush), *Panicum hemitomon* (maidencane), *P. virgatum* (switchgrass), *Phragmites australis* (common reed), *Sagittaria* sp. (arrowhead), *Scirpus americanus* (chairmaker's bulrush), *S. validus* (softstem bulrush), *S. robustus* (sturdy bulrush), *Spartina bakeri* (cordgrass), *Thalia dealbata* (powdery alligator-flag or arrowroot), *T. geniculata* (bent alligator-flag or fire flag or arrowroot), *Typha angustifolia* (narrowleaf cattail), *T. domingensis* (southern cattail), *T. latifolia* (broadleaf cattail), or *Zizaniopsis miliacea* (giant cutgrass). If the community is 66% or more dominated by a single species by cover, one of the following Level IV classifications will be employed.

6411 Sawgrass – *Cladium jamaicensis*

6412 Cattail – *Typha* spp.

6413 Spike Rush – *Eleocharis* spp.

6414 Maidencane – *Panicum hemitomon*

6415 Dog fennel and low marsh grasses – *Eupatorium capillifolium*

6416 Arrowroot – *Thalia* spp.

6417 Freshwater Marsh with shrubs, brush, and vines

6418 Giant Cutgrass – *Zizaniopsis miliacea*

Freshwater Marshes (synonyms: Prairie, Depression Marsh, Basin Marsh, Flatwoods Pond, Ephemeral Pond) - Occur throughout Florida and are composed of a variety of herbaceous species. Individual communities vary widely in size, from less than an acre to thousands of acres. Larger expanses occur most often in south Florida.

Vegetation: Typical plants of larger basin marshes include *Baccharis* spp. (saltbush), *Bidens bipinnata* (Spanish needle), *Cephalanthus occidentalis* (buttonbush), *Eleocharis* spp. (spikerush), *Eupatorium capillifolium* (dog fennel), *Hydrochloa carolinensis* (southern watergrass), *Hydrocotyle* spp. (pennywort), *Juncus effusus* (soft rush), *Lachnanthes carolina* (redroot), *Leersia* spp. (cutgrass), *Ludwigia repens* (water primrose), *Nelumbo lutea* (American lotus), *Panicum* spp. (panicum), *Phragmites australis* (common reed), *Polygonum* spp. (knotweed), *Sagittaria* spp. (arrowhead), *Salix caroliniana* (coastal plain willow), and *Sambucus canadensis* (elderberry). Shallow isolated depression marshes are often dominated by *Cephalanthus occidentalis* (buttonbush), *Eleocharis* spp. (spikerush), *Hypericum* spp. (St. John's wort), *Ludwigia repens* (swamp primrose), *Myrica cerifera* (wax myrtle), *Panicum hemitomon* (maidencane), *Pontederia cordata* (pickerelweed), *Sagittaria* spp. (arrowheads), *Salix* spp. (willow), *Sanguinaria canadensis* (bloodroot), *Thalia geniculata* (fire flag), *Utricularia* spp. (bladderwort), *Woodwardia* spp. (chainfern), and *Xyris* spp. (yellow-eyed grass). The species composition of Freshwater Marshes often overlaps with 643 Wet Prairies, 644 Emergent Aquatic Vegetation, and 646 Treeless Hydric Savanna.

Wildlife: Larger and more permanent marshes have a different assemblage of species than those found in smaller depressions. Typical wildlife in larger basin marshes include:

Birds – *Ardea herodias* (great blue heron), *Casmerodius albus* (great egret), *Circus cyaneus* (northern harrier), *Egretta caerulea* (little blue heron)^{SSC}, *E. thula* (snowy egret)^{SSC}, *E. tricolor* (tricolored heron)^{SSC}, and *Haliaeetus leucocephalus* (bald eagle)^T.

Herpetofauna – *Acris gryllus* (southern cricket frog), *Alligator mississippiensis* (alligator)^{SSC}, *Amphiuma means* (two-toed amphiuma), *Farancia abacura* (mud snake), *Hyla cinerea* (green tree frog), *Nerodia cyclopion* (green water snake), *N. fasciata* (banded water snake), *Rana catesbeiana* (bullfrog), *R. gylio* (pig frog), *R. utricularia* (southern leopard frog), *Regina alleni* (striped swamp snake), *Seminatrix pygaea* (black swamp snake), *Siren intermedia* (lesser siren), and *S. lacertina* (greater siren).

Shallow depression marshes void of predatory fish are extremely important for several amphibian species that depend on seasonal wetlands for successful reproduction and provide breeding or foraging habitat for:

Birds – *Eudocimus albus* (white ibis)^{SSC}, *Grus canadensis* (sandhill crane)^T, and *Mycteria americana* (wood stork)^E.

Herpetofauna – *Ambystoma cingulatum* (flatwoods salamander)^{SSC}, *A. talpoideum* (mole salamander), *A. tigrinum* (tiger salamander), *Bufo guercicus* (oak toad), *Eurycea quadridigitata* (dwarf salamander), *Gastrophryne carolinensis* (eastern narrowmouth toad), *Hyla femoratus* (pinewoods treefrog), *H. gratiosa* (barking treefrog), *H. squirella* (squirrel treefrog), *Limnaeodius ocularis* (little grass frog), *Notophthalmus perstriatus* (striped newt), *Pseudacris ornata* (southern chorus frog), *Rana capito* (gopher frog)^{SSC}, and *Scaphiopus holbrookii holbrookii* (eastern spadefoot toad).

Landscape Location: Occur scattered throughout upland ecosystems, typically in karst regions within conical depressions in the landscape. Larger basin marshes occur in depressions from former shallow lakes that became filled with sediments from the surrounding landscape and peat accumulation from the vegetation.

Soils: Larger basin marshes typically have acidic peat soils, whereas shallow depression marshes are characterized by acidic sandy soils with peat accumulation towards the center of the depression.

Fire Interval: Fire is extremely important in restricting shrub invasion. When a marsh is dominated by herbaceous vegetation the fire frequency can be every 1-3 years, whereas the presence of shrubs such as willow and buttonbush is indicative of fire frequencies of 3-10 years. Severe fires can consume the peat and create a pond or lake.

Hydrology: Deeper basin marshes are inundated for approximately 200 days per year, whereas shallow depression marshes may be flooded between 50-200 days per year. Shortened periods of flooding may result in the invasion of shrub species and mesophytic vegetation, while longer periods of flooding may result in shallow lake systems. Drainage and overuse of groundwater that lowers the water table may threaten many shallow marshes.

Functions:

- Water storage during droughts and reduction of water flow during floods.
- Nutrient assimilation, improving water quality before water enters rivers and lakes.
- Ephemeral marshes are essential breeding grounds for many species of amphibians.
- Important wildlife habitat, especially as wintering habitat for wading birds.

^E Listed as Endangered by Florida Fish and Wildlife Conservation Commission

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

^{SCC} Listed as Species of Special Concern by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. *Florida's Endangered Species, Threatened Species, And Species of Special Concern*. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. *Guide to Natural Communities of Florida*. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. *Ecosystems of Florida*. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. *26 Ecological Communities of Florida*. United States Department of Agriculture, Washington, D.C., USA.



Lance-leaf Arrowhead

Sagittaria lancifolia

OBL-Perennial herb in tufts; basal leaves in submersed, floating, or emersed form; leaves lance shaped; flowers with 3 white petals, 3 green sepals; in whorls of 3 on slender stalk.



Common Reed

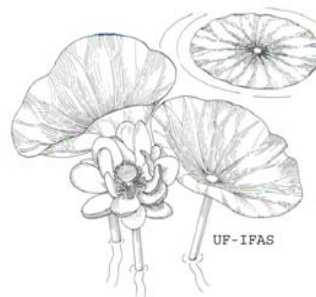
Phragmites australis

OBL-Erect perennial reed to 4m tall, with thick, deep rhizomes and stolons; blades flat, broad and long; panicle large, bending at tip with ring of hairs just below.

Southern Watergrass

Hydrochloa carolinensis

OBL-Perennial grass, stems floating in water or erect in mud, rooting at nodes, up to 20 cm; sheaths glabrous with hairs at junction of sheath and blade; often white at base.



American Lotus

Nelumbo lutea

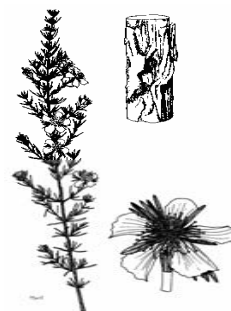
OBL-Perennial, large round bluish-green alternate leaves on long stout petioles attached at center; large yellow showy flowers solitary on long stalks; cone-shaped fruit with many



Saltbush

Baccharis halimifolia

FAC-Evergreen shrub, alternate leaves with irregular toothed margins; flowers in fall, in numerous, small, greenish-yellow heads.



Marsh St. John's Wort

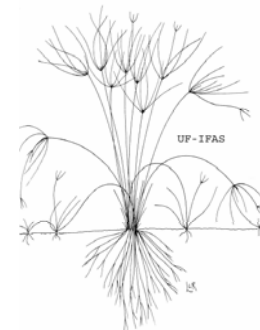
Hypericum fasciculatum

OBL-Perhaps the most common *Hypericum* spp. in Florida; erect, multi-branched shrub typically to 1.5 m; very loose, corky, cinnamon to gray bark; revolute needle-like leaves to 2.6 cm long; yellow flower with 5 petals; light brown ovate-conic capsule.

Wild Water-Pepper

Polygonum hydropiperoides

OBL-Herb to 1.5m, alternate leaves swollen at nodes and papery tubes sheathing stems at nodes; most species with narrow, lance-shaped leaves, little or no petiole; flowers in spike-like clusters with petal like sepals.



Spikerush

Eleocharis baldwinii

OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Pennywort

Hydrocotyle spp.

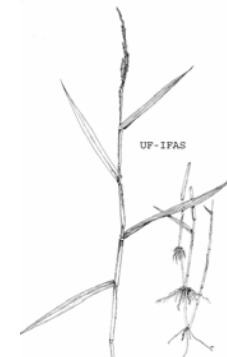
FACW (except *Hydrocotyle ranunculoides* OBL) - perennial herb with spreading stems, rounded to slightly oval, leathery, bright green, leaves on long petioles attached at center, with tiny flowers on long stalks.



Soft Rush

Juncus effusus

OBL- grass-like herb, clump forming, stems round and usually unbranched; leaves with open basal sheaths, blades narrow and flat; inflorescence terminal with dense flower clusters; 3sided capsule with many tiny seeds.



Maidencane

Panicum hemitomon

OBL- tall erect stems with leaves held by loose sheaths; extensive rhizomes with fibrous roots at nodes; ligule membranous and ciliate, 0.5 to 1 mm; leaf blades 10-25 cm. Typically found in dense stands in shallow areas.

This list is not intended to be all inclusive.

642 Saltwater Marshes

FLUCCS Description

This community occurs along both the Atlantic and Gulf Coasts of Florida and consists of non-woody, salt-tolerant plants in intertidal zones. The extent of a marsh complex and the vegetation composition will vary as a result of soils, relief, tidal range and duration, salinity, and wave energy. The primary productivity of salt marshes is among the highest of any ecosystem on earth.

Saltwater Marshes – Tidal driven system divided by natural tidal channels and characterized by herbaceous vegetation such as grasses, rushes, and sedges.

Vegetation: Below mean high water, the dominant species are *Juncus roemerianus* (black needlerush) and *Spartina alterniflora* (smooth cordgrass). At or just above mean high water, the most common species are *Batis maritima* (saltwort), *Borrchia arborescens* (sea oxeye), *Limonium carolinianum* (sea-lavender), *Salicornia* spp. (glassworts), and *Sesuvium portulacastrum* (shoreline seapurslane). Above mean high water, common species include *Baccharis halimifolia* (saltbush), *Distichlis spicata* (saltgrass), *Fimbristylis* spp. (saltmarsh fringe rush), *Iva frutescens* (marsh elder), *Spartina cynosuroides* (big cordgrass), *S. patens* (marshhay cordgrass or saltmeadow cordgrass), *S. spartinea*, (gulf cordgrass), *Solidago sempervirens* (seaside goldenrod), and *Sporobolus virginicus* (dropseed). In addition to vascular plants, algae (found as aufwuchs on stems of cordgrass and as mats on the mud surface), diatoms, and phytoplankton are important components of the marsh and its tidal creeks.

Wildlife: The fluctuations of salinity and water levels along the interface of land and water result in a separation of wildlife utilization of a saltmarsh. Land-based transients found along the marsh edge include *Oryzomys palustris* (rice rat), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), and *Sylvilagus palustris* (marsh rabbit). Water-based species, found in or near the tidal creeks, include *Callinectes sapidus* (blue crab), oysters (ex. *Crassostrea virginica* – *American oyster*), shrimp (ex. *Thalassinidea* – burrowing shrimp), and many species of fish and juvenile fish that provide food for predatory fish (ex. *Megalops atlanticus* – tarpon; *Cynoscion* sp. – seatrout; *Sciaenops ocellatus* – red drum; *Centropomus undecimalis* - snook^{SSC}), wading birds, and dolphin. *Ardea herodias* (great-blue heron), *Butorides striatus* (green-backed heron), *Casmerodius albus* (great egret), *Egretta thula* (snowy egret), and *Egretta tricolor* (tricolor heron) are common birds, along with *Ammodramus maritimus* (seaside sparrows), *Cistothorus palustris* (marsh wrens), and *Rallus longirostris* (clapper rail). *Littorina irrorata* (salt marsh periwinkle), *Sesarma cinereum* (marsh crab), *Trivia pediculus* (coffee bean trivia snail), and *Uca* spp. (fiddler crabs), are just a few of the typical invertebrates, which also include polychaetes (segmented worms), Unionidae family (mussels), arachnids (spiders), and abundant insects, such as *Aedes sollicitans* (salt-marsh mosquitoes), Chironomidae and *Diptera* spp. (midges), and various species of grazers. *Malaclemys terrapin* (diamondback terrapin) and *Nerodia clarkii* (saltmarsh snake) are the only reptile residents, although other species of turtles, snakes, and frogs may visit.

Landscape Location: Typically located between coastal upland communities and the open water in areas of relatively low wave energy (ie, behind barrier islands) or along the banks of tidal rivers; can also be found within in mangrove communities at or above mean high water.

Soils: Generally level and very poorly drained. Soil texture can range from muck to sandy clay loams to sands, underlain by loamy sand to organic soils, underlain by clay or sand, or are clayey throughout. May have a high sulfur content.

Fire Interval: Salt marshes generally do not support fire, but can carry one that has started in adjacent upland community.

Hydrology: Reflects the tidal pattern (frequency, amplitude, and duration) of the waters on which the marsh is located and the elevation of the salt marsh. High marsh systems have the least frequent tidal inundation and can develop salt pans or barrens where most vascular plants can not tolerate the elevated soil salinity, whereas the lower marsh is inundated nearly daily.

Functions:

- High rate of primary productivity.
- Sediment stabilization (protection from storm surge, erosion).
- Detrital export to estuaries.
- Nursery habitat for many commercially important fish and shellfish.
- Habitat for large number of both transient and resident fish and wildlife species.

^{SSC}Listed as a Species of Special Concern by Florida Fish and Wildlife Conservation Commission

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.

643 Wet Prairies

FLUCCS Description

This community is composed predominately of grassy vegetation on hydric soils and is usually distinguished from marshes by having less water and shorter herbage. These communities will be predominated by one or more of the following species: *Cladium jamaicensis* (sawgrass), *Crinum americanum* (swamp lily or string-lily), *Eleocharis* spp. (spikerush), *Hymenocallis palmeri* (spider lily or alligator lily), *Hypericum* spp. (St. John's wort), *Panicum hemitomon* (maidencane), *Rhynchospora colorata* (whiteweed sedge or starrush whiteweed), other *Rhynchospora* spp. (beakrush), *Spartina bakeri* (sand cordgrass), *S. patens* (marshhay cordgrass or saltmeadow cordgrass), and/or *Xyris* spp. (yellow-eyed grass).

Wet Prairies (synonyms: Sand Marsh, Savanna, Pitcher Plant Bogs) - Treeless plains with a diverse ground cover of grasses and herbs. Pitcher plant prairies occur primarily in north Florida

Vegetation: Typical plants include *Aristida* spp. (wiregrass), *Ctenium aromaticum* (toothache grass), *Eleocharis* spp. (spikerush), *Panicum hemitomon* (maidencane), and *Rhynchospora* spp. (beakrush). Other typical plants include *Aletris* spp. (stargrass), *Coreopsis* spp. (tickseed), *Drosera* spp. (sundews), *Eriocaulon* spp. (hatpins), *Helenium* spp. (sneezeweed), *Helianthus* spp. (sunflower), *Hypericum* spp. (St. John's wort), *Myrica cerifera* (wax myrtle), *Panicum* spp. (grasses), *Rhexia* spp. (meadowbeauty), *Rhynchospora colorata* (whiteweed sedge or starrush whiteweed), *Rudbeckia hirta* (black-eyed susan), *Sabatia* spp. (marsh pinks), *Sarracenia* spp. (pitcher plants), *Verbesina chapmanii* (crownbeard), and *Xyris* spp. (yellow-eyed grass). The species composition of Wet Prairies often overlaps with 625 Hydric Pine Flatwoods, 626 Hydric Pine Savanna, 641 Freshwater Marshes, 644 Emergent Aquatic Vegetation, and 646 Treeless Hydric Savanna.

Wildlife:

Mammals – *Dasypus novemcinctus* (armadillo), *Odontocoleus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sigmodon hispidus* (cotton rat), and *Sylvilagus palustris* (marsh rabbit).

Birds – *Agelaius phoeniceus* (red-winged blackbird), *Charadrius vociferus* (killdeer), *Circus cyaneus* (northern harrier), *Cistothorus palustris* (long-billed marsh wren), *Falco sparverius* (kestrel), and *Polyborus plancus* (caracara).

Herpetofauna – *Acris gryllus* (southern cricket frog), *Agkistrodon piscivorus piscivorus* (cottonmouth snake), *Coluber constrictor priapus* (southern black racer), *Diadophis punctatus* (ring-necked snake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Limnaeodius ocularis* (little grass frog), *Micrurus fulvius* (coral snake), *Pseudacris ornata* (southern chorus frog), *Sistrurus miliarius* (pygmy rattlesnake), *Storeria dekayi viciata* (Florida brown snake)^T, and *Thamnophis sirtalis sirtalis* (garter snake).

Landscape Location: Occupy low, generally flat areas or seepage hillsides on poorly drained terrain.

Soils: Typically acidic sands with clay and organic components.

Fire Interval: Usually burn every 2-4 years, which prevents invasion by shrub species such as *Myrica cerifera* (wax myrtle).

Hydrology: Variable range of hydrologic conditions (when the community is inundated or saturated) from 50-100 days per year. Hydrologic disturbance may lead to invasion by shrub species. In south Florida *Melaleuca quinquenervia* (melaleuca), invasions pose a serious threat to Wet Prairies.

Functions:

- Valuable water storage areas during droughts.
- Nutrient assimilation and sediment deposition for improved water quality.
- High aesthetic and recreational value.

^T Listed as Threatened by Florida Fish and Wildlife Conservation Commission

Main Sources:

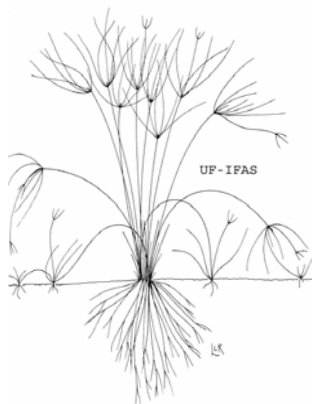
1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Wire grass

Aristida stricta

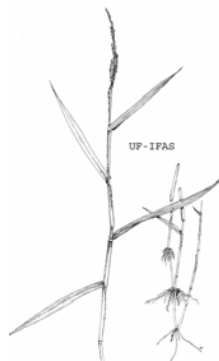
FAC-Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.



Spikerush

Eleocharis baldwinii

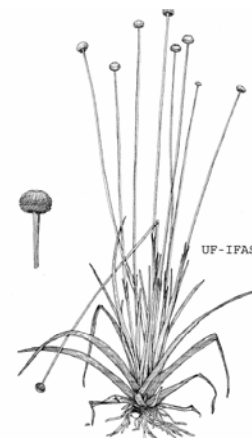
OBL-Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Maidencane

Panicum hemitomon

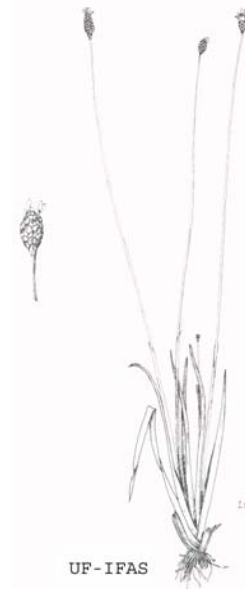
OBL- tall erect stems with leaves held by loose sheaths; extensive rhizomes with fibrous roots at nodes; ligule membranous and ciliate, 0.5 to 1 mm; leaf blades 10-25 cm. Typically found in dense stands in shallow areas.



Ten-angled pipewort

Eriocaulon decangulare

OBL-Largest *Eriocaulon* species in Florida; leaves erect, firm, 10-40 cm; sheaths loose, shorter than leaves; heads white, hard, 1-2 cm broad; several scapes per tuft, 30-100 cm long, twisted with 8-12 ridges; involucre bracts straw-colored, white hairs near tips.



Yellow-Eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)-Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.



Marsh St. John's Wort

Hypericum fasciculatum.

OBL-Perhaps the most common *Hypericum* spp. in Florida; erect, multi-branched shrub typically to 1.5 m; very loose, corky, cinnamon to gray bark; revolute needle-like leaves to 2.6 cm long; yellow flower with 5 petals; light brown ovate-conic capsule.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

OBL, except *S. minor* (FACW)-Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Wax Myrtle

Myrica cerifera

FAC-Evergreen shrub, gray bark, alternate leaves, aromatic, with teeth on margins, surface rough; from a distance leaves appear brownish yellow.



Fascicled beakrush

Rhynchospora fascicularis

FACW-Clumped, leafy herb, with closed leaf sheaths and reduced flowers in terminal head; achene smooth with no bristles at the base.

644 Emergent Aquatic Vegetation

FLUCCS Description

This community of wetland plant species includes both floating vegetation and vegetation which is found either partially or completely above the water surface.

Level IV classifications include:

- 6441 Water Lettuce - *Pistia stratiotes*
- 6442 Spatterdock - *Nuphar* spp.
- 6443 Water Hyacinth - *Eichhornia* spp.
- 6444 Duck Weed - *Lemna* spp.
- 6445 Water Lily - *Nymphaeaceae*

Emergent Aquatic Vegetation (synonyms: Freshwater Marsh, Wet Prairie, Floodplain Marsh) - Characterized by floating vegetation such as *Nymphaea* spp. (water lily) and *Nuphar* spp. (spatterdock). They are very similar to 641 Freshwater Marshes and 643 Wet Prairies.

Vegetation: Typical plants include *Nymphaea* spp. (water lily) and *Nuphar* spp. (spatterdock) accompanied by *Eriocaulon* spp. (hatpins), *Nelumbo lutea* (American lotus), and *Xyris* spp. (yellow-eyed grass), and other species that are adapted to generally higher water levels such as *Pontederia cordata* (pickerelweed) and *Sagittaria* spp. (arrowheads). The species composition of Emergent Aquatic Vegetation communities often overlaps with 641 Freshwater Marshes, and 643 Wet Prairies.

Wildlife:

Mammals – *Lutra canadensis* (river otter) and *Procyon lotor* (raccoon).

Birds – *Ardea herodias* (great blue heron), *Casmerodius albus* (great egret), *Circus cyaneus* (northern harrier), *Egretta caerulea* (little blue heron)^{SSC}, *E. thula* (snowy egret)^{SSC}, *E. tricolor* (tricolored heron)^{SSC}, *Grus canadensis* (sandhill crane)^T, *Haliaeetus leucocephalus* (bald eagle)^T, *Nycticorax nycticorax* (black-crowned night-heron), and *Nyctanassa violacea* (yellow-crowned night-heron)

Herpetofauna – *Acris gryllus* (southern cricket frog), *Alligator mississippiensis* (alligator)^{SSC}, *Amphiuma means* (two-toed amphiuma), *Farancia abacura* (mud snake), *Hyla cinerea* (green tree frog), *Nerodia cyclopion* (green water snake), *N. fasciata* (banded water snake), *Rana catesbeiana* (bullfrog), *R. gyllo* (pig frog), *R. utricularia* (southern leopard frog), *Regina alleni* (striped swamp snake), *Seminatrix pygaea* (black swamp snake), *Siren intermedia* (lesser siren), and *S. lacertina* (greater siren).

Landscape Location: These communities may be found throughout Florida bordering rivers or in larger basins.

Soils: Typically sandy with considerable peat accumulation. Alluvial sands are found in floodplain areas.

Fire Interval: Rarely host fires due to inundation or saturation.

Hydrology: The hydroperiod is approximately 250 days per year, with the ground being saturated for most of the year.

Functions:

- Valuable water storage areas during droughts.
- Nutrient assimilation and sediment deposition to improve water quality.

- High aesthetic and recreational value.

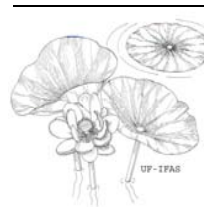
^{SSC} Listed as Species of Special Concern by FFWCC

^E Listed as Endangered by FFWCC

^T Listed as Threatened by FFWCC

Main Sources:

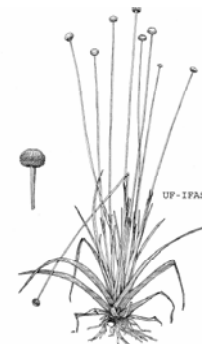
1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L. and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



American Lotus

Nelumbo lutea

OBL-Perennial, large round bluish-green alternate leaves on long stout petioles attached at center; large yellow showy flowers solitary on long stalks; cone-shaped fruit with many nutlets.



Ten-angled pipewort

Eriocaulon decangulare

OBL-Largest *Eriocaulon* species in Florida; leaves erect, firm, 10-40 cm; sheaths loose, shorter than leaves; heads white, hard, 1-2 cm broad; several scapes per tuft, 30-100 cm long, twisted with 8-12 ridges; involucre bracts straw-colored, white hairs near tips.



Lance-leaf Arrowhead

Sagittaria lancifolia

OBL-Perennial herb in tufts; basal leaves in submersed, floating, or emersed form; leaves lance shaped; flowers with 3 white petals, 3 green sepals; in whorls of 3 on slender stalk.



Pickerelweed

Pontederia cordata

OBL-Tall colonial, perennial herb; leaves basal, long petioles, to 1 m tall, erect heart- to lance-shaped; showy blue to purple flowers with yellow markings in spikes at ends of elongated stems. Spikes may be all white, rarely.



Yellow-eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)-Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.

This list is not intended to be all inclusive.

645 Submergent Aquatic Vegetation

FLUCCS Description

This community is composed of those aquatic species or communities found growing completely below the surface of the water. Level IV classifications include:

6451 Hydrilla - *Hydrilla verticillata*

Submergent Aquatic Vegetation (synonyms: Floodplain Lake, Swamp Lake) - Characterized by aquatic species growing below the water surface in shallow open water areas.

Vegetation: Typical submerged vegetation of Florida includes *Cabomba aquatica* (fanwort), *Ceratophyllum demersum* (coontail), *Chara* spp. (muskgrass), *Mayaca fluviatilis* (bog moss), *Micranthemum* spp. (baby tears), *Potamogeton* spp. (pondweed), *Utricularia* spp. (bladderwort). Several exotic plants may also occur, including *Egeria densa* (common waterweed), *Hydrilla verticillata* (hydrilla), *Lagarosiphon* spp. (African elodea), and *Myriophyllum aquaticum* (parrot- feather).

Wildlife:

Mammals – *Castor canadensis* (beaver) and *Lutra canadensis* (river otter).

Birds – *Ardea herodias* (great blue heron), *Butorides striatus* (green-backed heron), *Casmerodius albus* (great egret), *Ceryle alcyon* (kingfisher), *Egretta caerulea* (little blue heron)^{SCC}, *E. thula* (snowy egret)^{SCC}, *Eudocimus albus* (white ibis)^{SCC}, and *Mycteria americana* (wood stork)^E.

Herpetofauna – *Acris gryllus* (southern cricket frog), *Agkistrodon piscivorus piscivorus* (cottonmouth snake), *Alligator mississippiensis* (alligator)^{SCC}, *Ambystoma talpoideum* (mole salamander), *Amphiuma means* (two-toed amphiuma), *Apalone* sp. (Florida softshell turtle), *Farancia abacura* (mud snake), *Kinosternon* sp. (eastern mud turtle), *Necturus alabamensis* (Alabama waterdog), *Nerodia erythrogaster* (red-bellied water snake), *N. fasciata* (banded water snake), *N. taxispilota* (brown water snake), *Pseudemys floridana* (Florida cooter), *Rana catesbeiana* (bullfrog), *R. gyllo* (pig frog), *R. heckscheri* (river frog), *R. utricularia* (southern leopard frog), *Shelydra serpentina* (snapping turtle), *Siren intermedia* (lesser siren), *Siren lacertina* (greater siren), *Sternotherus odoratus* (stinkpot), and *Trachemys scripta scripta* (yellow-bellied turtle).

Fish and Other Aquatic Species – *Amia calva* (bowfin), *Aphredoderus sayanus* (pirate perch), *Centrarchus macropterus* (flier), *Enneacanthus gloriosus* (blue spotted sunfish), *Erimyzon sucetta* (lake chubsucker), *Esox americanus americanus* (redfin pickerel), *Etheostoma fusiforme* (swamp darter), *Fundulus chrysotus* (golden topminnow), *Gambusia affinis* (mosquito fish), *Ictalurus nebulosus* (brown bullhead), *Lepisosteus platyrhinchus* (Florida gar), *Lepomis macrochirus* (bluegill), *Leptolucania ommata* (pygmy killifish), *Micropterus salmoides* (largemouth bass), *Notemigonus crysoleucas* (golden shiner), *Notropis maculatus* (taillight shiner), and *Noturus gyrinus* (tadpole madtom).

Landscape Location: Found throughout Florida as shallow open water zones surrounded by basin or floodplain swamps.

Soils: Typically composed of peat, sands, and alluvial clays.

Fire Interval: Submergent Aquatic Vegetation communities rarely burn as the surface is usually inundated or saturated for most of the year.

Hydrology: These communities are generally permanent water bodies with high water level fluctuations. Dry conditions during droughts are not uncommon.

Functions:

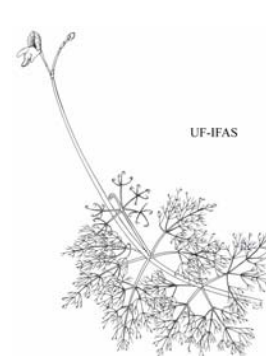
- Valuable water storage areas.
- Nutrient assimilation and sediment deposition to improve water quality.
- High aesthetic and recreational value.
- Important breeding areas for many amphibians, and consequently they are also important feeding areas for wading birds, ducks and reptiles.
- Important nursery for many fish species.

^{SCC} Listed as Species of Special Concern by FFWCC

^E Listed as Endangered by FFWCC

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Bladderwort

Utricularia purpurea

OBL-Small carnivorous aquatic or semi-aquatic herb usually in mats or colonies; leaves absent; tiny urn like bladders on stems, often leaf like; small purple flowers 6-25 mm across produced just above water, conspicuous because of location and abundance.



Bladderwort

Utricularia radiata

OBL-Small carnivorous aquatic or semi-aquatic herb usually in mats or colonies; leaves absent; tiny urn like bladders on stems, often leaf like; small yellow flowers 6-25 mm across produced just above water, conspicuous because of location and abundance.

646 Treeless Hydric Savanna

FLUCCS Description

This community is typically dominated by *Aristida* spp. (wiregrass) or *Panicum abscissum* (cutthroat grass) along with wetland plant associates. This is a treeless variant of class 626 Hydric Pine Savanna.

Treeless Hydric Savanna (synonyms: Wet Flatwoods, Low Flatwoods, Moist Pine Barren, Hydric Flatwoods, Pocosin, Flatwoods) - Very similar to 626 Hydric Pine Savanna, though they lack tree cover. They usually occur on flat, poorly drained land.

Vegetation: Dominant plants include *Andropogon* spp. (bluestem), *Aristida* spp. (wiregrass), *Lachnocaulon* spp. (bog buttons), *Rhexia* spp. (meadow-beauty), and *Xyris* spp. (yellow-eyed grass). Other typical plants include: *Carphephorus odoratissimus* (deer tongue), *Desmodium incanum* (creeping beggarweed), *Drosera* spp. (sundews), *Eleocharis* spp. (spikerush), *Eupatorium capillifolium* (dog fennel), *Liatis* spp. (gay feather), *Pinguicula* spp. (butterworts), *Rhynchospora* spp. (beakrush), *Sarracenia* spp. (pitcher plants), *Smilax* spp. (greenbrier), and grasses (Poaceae) and sedges (Cyperaceae). The species composition of Treeless Hydric Savannas frequently overlaps with 624 Cypress-Pine-Cabbage Palm, 625 Hydric Pine Flatwoods, 626 Hydric Pine Savannas, and 627 Slash Pine Swamp Forest.

Wildlife:

Mammals – *Dasypus novemcinctus* (armadillo), *Didelphis virginiana* (opossum), *Lynx rufus* (bobcat), *Mephitis mephitis* (striped skunk), *Odocoileus virginianus* (white-tailed deer), *Peromyscus gossypinus* (cotton mouse), *Procyon lotor* (raccoon), *Sigmodon hispidus* (cotton rat), and *Sylvilagus floridanus* (cottontail rabbit).

Birds – *Buteo lineatus* (red-shouldered hawk) and *Colinus virginianus* (Northern bobwhite), *Dendroica dominica* (yellow-throated warbler), *Dendroica pinus* (pine warblers), *Dryocopus pileatus* (pileated woodpecker), *Melanerpes carolinus* (red-bellied woodpecker), *Pipilo erythrophthalmus* (rufous-sided towhee), *Sitta pusilla* (brown-headed nuthatch), and *Sturnella magna* (Eastern meadowlark).

Herpetofauna – *Acris gryllus* (Southern cricket frog), *Bufo guercicus* (oak toad), *Coluber constrictor priapus* (Southern black racer), *Crotalus adamanteus* (Eastern diamondback rattlesnake), *Elaphe obsoleta quadrivittata* (yellow rat snake), *Pseudacris ornate* (Southern chorus frog), and *Sistrurus miliarius* (pygmy rattlesnake).

Landscape Location: Found on nearly level land with gradual water movement to and through the natural drainage ways, swamps, marshes and ponds associated with this community.

Soils: Typically deep, acidic, generally poorly drained, usually coarse textured organic or clay soils.

Fire Interval: Fire is an important factor in these communities, with nearly all plants and animals adapted to periodic fires, and several species dependent on fires for their continued existence. Fires occur every 3-10 years. Without relatively frequent fires treeless savannas succeed into hardwood dominated forests.

Hydrology: During the rainy season, Treeless Hydric Savannas may be inundated for 1 or more months per year.

Functions:

- Valuable water storage areas.
- Nutrient assimilation and sediment deposition to improve water quality.
- High aesthetic and recreational value.

Main Sources:

1. Florida Fish and Wildlife Conservation Commission. 2004. Florida's Endangered Species, Threatened Species, And Species of Special Concern. Last accessed 7/10/04. Found at: <http://wildflorida.org/imperiled/pdf/Endangered-Threatened-Special-Concern-2004.pdf>.
2. Florida Natural Areas Inventory and Department of Natural Resources. 1990. Guide to Natural Communities of Florida. Last accessed 2/04. Found at: http://www.fnai.org/PDF/Natural_Communities_Guide.pdf.
3. Myers, R.L and J.J. Ewel, eds. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, USA.
4. Soil Conservation Service. 1984. 26 Ecological Communities of Florida. United States Department of Agriculture, Washington, D.C., USA.



Broomsedge

Andropogon virginicus

FAC—Large, tufted perennial grass to 2 m tall, usually with green or blue-green, chalky stems; nodes and sheaths smooth; flowers in racemes with 2-5 branches.



Wire grass

Aristida stricta

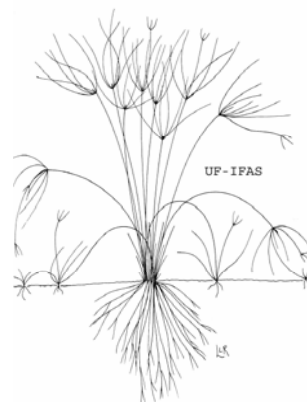
FAC—Densely tufted, wiry perennial to 1 m tall; stiffly erect stems; round leaf blades (2 mm wide, 64 cm long), pubescent with long hairs at base, extruding from rolled blade (may be obscured in wet specimens), sheaths pubescent above; panicles narrow and 12-32 cm long, branches appressed.



Deer tongue, vanilla plant

Carphephorus odoratissimus

FAC—Tall perennial herb with a single, erect, hairless stem; leaves in a basal rosette large, vanilla or tobacco odor when crushed; flowers in numerous small heads, pink or purple corollas, late summer-fall.



Spikerush

Eleocharis baldwinii

OBL—Tufted, often forming large clumps or mats; usually rooted and emergent; leaves reduced to bladeless sheaths; flowers in single terminal spikes.



Spiked gayfeather

Liatris spicata

FAC— Perennial herb to 2.5 m, with leafy unbranched stems arising from a corm; smooth stems and leaves; flowers in long narrow cylinders, rose purple, 5-18 per head.



Fascicled beakrush

Rhynchospora fascicularis

FACW—Clumped, leafy herb, with closed leaf sheaths and reduced flowers in terminal head; achene smooth with no bristles at the base.



Pitcher-plant

Sarracenia spp. (image *S. rubra*)

OBL, except *S. minor* (FACW)— Perennial insectivorous herb with erect or sprawling leaves to 9 dm long, resembling pitchers that contain water; fruit is a 5-part capsule with many tiny seeds.



Bamboo-vine, Blaspheme-vine

Smilax laurifolia

OBL*—High-climbing evergreen woody vine, tough and wiry, sometimes forming dense thickets; stems green, round in cross-section, usually very spiny but sometimes almost spineless; spines stiff, green, round at base; leaves leathery, oblong to oblong-lanceolate, 6-20 cm long with thick midrib, apex pointed.



Yellow-Eyed Grass

Xyris spp.

OBL (except *X. caroliniana* and *X. jupicai*, FACW)—Annual or perennial grass like herbs growing singly or in clumps, 4-150 cm tall; basal, iris-like leaves; flowers with 3 yellow (some species white) petals from cone like spikes of hard or leathery overlapping spiraled bracts on sheathed scape.

This list is not intended to be all inclusive.

Section Divider

UMAM Scoring Worksheet ~ Location and Landscape Support

Guidance: *This worksheet is only a summary and is not intended to replace the rule. The rule should be used to resolve any question or dispute.*

	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
Location and Landscape Support	full opportunity to perform beneficial functions at optimal level	opportunity to perform beneficial functions is limited to 70% of optimal ecological value	opportunity to perform beneficial functions is limited to 40% of optimal ecological value	provides no habitat support or opportunity to provide benefits to fish and wildlife
a. Support to wildlife by outside habitats	full range of habitats needed to support all wildlife species	optimal support for most, but not all wildlife species	fail to provide support for some, or minimal support for many wildlife species	no habitat support for wildlife
b. Invasive exotics or other invasive plant species in proximity of the assessment area	not present	present but cover is minimal and has minimal adverse effects	majority of plant cover consists of invasive exotics that adversely affect functions	predominance of plant cover consists of invasive exotics so that little or no function is provided
c. Wildlife access to and from outside – distance and barriers	not limited by distance or barriers	partially limited by distance or barriers	substantially limited by distance or barriers	precluded by distance or barriers
d. Functions that benefit fish & wildlife downstream – distance or barriers	not limited by distance or barriers	somewhat limited by distance or barriers that reduce opportunity to provide benefits	limited by distance or barriers that substantially reduce opportunity to provide benefits	functions not present
e. Impacts of land uses outside assessment area to fish and wildlife	no adverse impacts on wildlife	minimal adverse impacts on wildlife	significant adverse impacts on wildlife	severe adverse impacts on wildlife
f. Benefits to downstream or other hydrologically connected areas	opportunity is not limited by hydrologic impediments or flow restrictions	limited by hydrologic impediments or flow restrictions so that benefits are provided with lesser freq. or magnitude	limited by hydrologic impediments so that benefits are rarely provided or are provided at greatly reduced levels	no opportunity to provide benefits due to hydrologic impediments or flow restrictions
g. Benefits to downstream habitats from discharges	downstream habitats are critically or solely dependent on discharges	downstream habitats derive significant benefits from discharges	downstream habitats derive minimal benefits from discharges	downstream habitats derive negligible or no benefits from discharges
h. Protection of wetland functions by upland mitigation assessment areas	optimal protection of wetland functions	significant, but suboptimal, protection of wetland functions	minimal protection to wetland functions	no protection of wetland function

UMAM Scoring Worksheet ~ Water Environment

[Back](#)

	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
Water Environment	hydrology and water quality fully supports functions and provides benefits to fish and wildlife at optimal capacity	hydrology and water quality supports functions and provides benefits at 70% of optimal capacity	hydrology and water quality supports functions and provides benefits at 40% of optimal capacity	hydrology and water quality does not support functions and provides no benefits to fish and wildlife
a. Water levels and flows	appropriate	slightly higher or lower than appropriate	moderately higher or lower than appropriate	extreme degree of deviation
b. Water level indicators	distinct and consistent with expected	not as distinct or as consistent as expected	not distinct and not consistent with expected	not present or greatly inconsistent with expected hydrologic conditions
c. Soil moisture	appropriate with no evidence of soil desiccation, oxidation or subsidence	minimal soil oxidation or subsidence; soils are drier than expected	strong evidence of soil desiccation, oxidation or subsidence	strong evidence of substantial soil desiccation, oxidation or subsidence
d. Soil erosion or deposition	not atypical or indicative of altered flow rates	minor alteration in flow rates or points of discharge	atypical and indicative of alterations in flow rates or points of discharge	greatly atypical and indicative of greatly altered flow rates or points of discharge
e. Evidence of fire history	not atypical frequency or severity due to excessive dryness	fire frequency or severity may be more than expected	frequency or severity much more than expected, possibly due to dryness	great deviation from typical, due to extreme dryness
f. Vegetation - community zonation	appropriate in all strata	inappropriate in some strata	inappropriate in most strata	inappropriate in all strata
g. Vegetation – hydrologic stress	no signs of hydrologic stress such as excessive mortality, leaning or fallen tress, thinning canopy, insect damage or disease associated with hydrologic stress	slightly greater than normal mortality, leaning or fallen tress, thinning canopy, or signs of insect damage or disease associated with hydrologic stress	strong evidence of greater than normal mortality, leaning or fallen tress, thinning canopy, or signs of insect damage or disease associated with hydrologic stress	strong evidence of much greater than normal mortality, leaning or fallen tress, thinning of canopy, or signs of insect damage or disease associated with hydrologic stress
h. Use by animal species with specific hydrological requirements	consistent with expected hydrological conditions	less than expected	greatly reduced	lacking
i. Plant community composition – species tolerant of and associated with water quality degradation or flow alteration	Plant community composition is not characterized by species tolerant of and associated with water quality degradation or flow alteration	some species tolerant of and associated with water quality degradation or flow alteration	much of the community consists of species tolerant of and associated with water quality degradation or flow alteration	community consists predominantly of species tolerant of and associated with water quality degradation or flow alteration
j. Direct observation of standing water	no water quality degradation such as discoloration, turbidity, or oil sheen	slight water quality degradation such as discoloration, turbidity, or oil sheen	moderate water quality degradation such as discoloration, turbidity, or oil sheen	significant water quality degradation such as obvious discoloration, turbidity, or oil sheen
k. Existing water quality data	conditions are optimal for community type	slight deviation from normal, with minimal ecological effects	moderate deviation from normal, with expected ecological effects	large deviation from normal, with expected adverse ecological effects
l. Water depth, wave energy, currents and light penetration	optimal for community type	generally sufficient but expected to cause some changes in species, age classes and densities	not well suited for and expected to cause significant changes in species, age classes and densities	inappropriate for community type

UMAM Scoring Worksheet ~ Community Structure: *Terrestrial*

Community Structure	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
1. Vegetation and Structural Habitat	vegetation community and physical structure provide conditions which support an optimal level of function to benefit fish and wildlife	vegetation community and physical structure limited to 70% of optimal level of function to benefit fish and wildlife in Part I	vegetation community and physical structure limited to 40% of optimal level of function to benefit fish and wildlife in Part I	vegetation community and physical structure do not provide function to benefit fish and wildlife in Part I
I. Plant species in the canopy, shrub, or ground stratum	all or nearly all appropriate and desirable	majority appropriate and desirable	majority inappropriate or undesirable	no appropriate or desirable species
II. Invasive exotics or other invasive plant species	not present	present, but cover is minimal	majority of plant cover	high presence and cover
III. Regeneration & recruitment	normal and natural	near-normal	minimal evidence	no evidence
IV. Age & size distribution	typical of type of system with no deviation from normal patterns of succession or mortality	no indication of permanent deviation, but may have had temporary deviations or impacts to age and size distribution	atypical and indicative of permanent deviation from normal successional pattern, with greater than expected mortality	high percentage of dead and dying vegetation, with no typical age and size distribution
V. Density and quality of coarse woody debris, snag, den, and cavity	optimal structural habitat	slightly lower or slightly greater than normal quantity	not present or greater than normal because vegetation is dead or dying	not present or exist only because native vegetation is dead or dying
VI. Plant condition	good condition, with very little to no evidence of chlorotic or spindly growth or insect damage	generally good, with little evidence of chlorotic or spindly growth or insect damage	generally poor, with evidence of chlorotic or spindly growth or insect damage	overall very poor, with strong evidence of chlorotic or spindly growth or insect damage
VII. Land management practices	optimal for long term viability of plant community	generally appropriate some possible fire suppression or water control features that have caused a shift in plant community	partial removal or alteration of natural structure, or introduction or artificial features, such as furrow or ditches	removal or alteration of natural structure, or introduction or artificial features, such as furrow or ditches
VIII. Topographic features such as refugia ponds, creek channels, flats or hummocks	present and normal	slightly less than optimal	reduction in extent of topographic features from what is normal	lack of topographic features that are normal for the area being assessed
IX. Siltation or algal growth in submerged aquatic plant communities	no evidence	minor degree of siltation or algal growth	moderate degree of siltation or algal growth	high degree of siltation or algal growth
X. Upland mitigation area - level of habitat and support for fish and wildlife in the associated wetlands or surface waters	optimal level of habitat and life history support	high, but less than optimal level of habitat and life history support	moderate level of habitat and life history support	little or no habitat and life history support

UMAM Scoring Worksheet ~ Community Structure: *Benthic*

Community Structure	Optimal (10)	Moderate (7)	Minimal (4)	Not Present (0)
2. Benthic and Sessile Communities	benthic and sessile communities provide optimal support for all functions typical of the assessment area and provide optimal benefit to fish and wildlife	benthic and sessile communities provide functions at 70% of optimal level	benthic and sessile communities provide functions at 40% of optimal level	benthic and sessile communities do not support functions or provide benefits
I. Species number and diversity of benthic organisms	appropriate species number and diversity optimal for type of system	majority of species are appropriate with number and diversity slightly less than normal	appropriate species greatly decreased	lack of appropriate species, any appropriate species in poor condition
II. Non-native or inappropriate species	not present	represent a minority	majority	dominant
III. Regeneration, recruitment and age distribution	optimal	slightly less than expected	minimal	no indication
IV. Condition of appropriate species	good, with typical biomass	generally good	substantial number dying or in poor condition	not present
V. Structural features	typical with no evidence of past physical damage	typical, or with little evidence of past physical damage	atypical	structural integrity very low or non-existent, evidence or serious physical damage
VI. Topographic features such as relief, stability, and interstitial spaces (hardbottom and reef communities) or snags and coarse woody debris (riverine systems)	typical and optimal	slight deviation from expected	greatly reduced	lacking
VII. Spawning or nesting habitats	optimal	less than expected	few are available	none

Section Divider

62-345.500 Assessment and Scoring—Part II

- (1) Utilizing the frame of reference established in Part I, the information obtained under this part (Part II) must be used to determine the degree to which the assessment area provides the functions identified in Part I and the amount of function lost or gained by the project. Each impact assessment area and each mitigation assessment area must be assessed under two conditions.
 - (a) Current condition or, in the case of preservation mitigation, without preservation--For assessment areas where previous impacts that affect the current condition are temporary in nature, consideration will be given to the inherent functions of these areas relative to seasonal hydrologic changes, and expected vegetation regeneration and projected habitat functions if the use of the area were to remain unchanged. When evaluating impacts to a previously permitted mitigation site that has not achieved its intended function, the reviewing agency shall consider the functions the mitigation site was intended to offset and any delay or reduction in offsetting those functions that may be caused by the project. Previous construction or alteration undertaken in violation of Part IV, Chapter 373, F.S., or Sections 403.91-929, F.S. (1984 Supp.), as amended, or rule, order or permit adopted or issued thereunder, will not be considered as having diminished the condition and relative value of a wetland or surface water, when assigning a score under this part. When evaluating wetlands or other surface waters that are within an area that is subject to a recovery strategy pursuant to Rule 40D-80, F.A.C., impacts from water withdrawals will not be considered when assigning a score under this part.
 - (b) “With mitigation” or “with impact”--The “with mitigation” and “with impact” assessments are based on the reasonably expected outcome, which may represent an increase, decrease, or no change in value relative to current conditions. For the “with impact” and “with mitigation” assessments, the evaluator will assume that all other necessary regulatory authorizations required for the proposed project have been obtained and that construction will be consistent with such authorizations. The “with mitigation” assessment will be scored only when reasonable assurance has been provided that the proposed plan can be conducted.

62-345.500 Assessment and Scoring—Part II (continued)

- (2) Upland mitigation assessment areas shall be scored using the location and community structure indicators listed in subsection 62-345.500(6), F.A.C. Scoring of these indicators for the upland assessment areas shall be based on benefits provided to the fish and wildlife of the associated wetlands or other surface waters, considering the current or anticipated ecological value of those wetlands and other surface waters.
- (a) For upland preservation, the gain in ecological value is determined by the mathematical difference between the score of the upland assessment area with the proposed preservation measure and the upland assessment area without the proposed preservation measure. The resulting delta is then multiplied by the preservation adjustment factor contained in subsection 62-345.500(3), F.A.C.
 - (b) For upland enhancement or restoration, the value provided shall be determined by the mathematical difference between the score of the upland assessment area with the proposed restoration or enhancement measure and the current condition of the upland assessment area.
 - (c) For uplands proposed to be converted to wetlands or other surface waters through creation or restoration measures, the upland areas shall be scored as “zero” in their current condition. Only the “with mitigation” assessment shall be scored in accordance with the indicators listed in subsection 62-345.500(6), F.A.C.

62-345.500 Assessment and Scoring—Part II (continued)

- (3)(a) When assessing preservation, the “with mitigation” assessment shall consider the potential of the assessment area to perform current functions in the long term, considering the protection mechanism proposed, and the “without preservation” assessment shall evaluate the assessment area’s functions considering the extent and likelihood of what activities would occur if it were not preserved, the temporary or permanent effects of those activities, and the protection provided by existing easements, restrictive covenants, or state, federal, and local rules, ordinances and regulations. The gain in ecological value is determined by the mathematical difference between the Part II scores for the “with mitigation” and “without preservation” (the delta) multiplied by a preservation adjustment factor. The preservation adjustment factor shall be scored on a scale from 0 (no preservation value) to 1 (optimal preservation value), on one-tenth increments. The score shall be assigned based on the applicability and relative significance of the following considerations:
1. The extent to which proposed management activities within the preserve area promote natural ecological conditions such as fire patterns or the exclusion of invasive exotic species.
 2. The ecological and hydrological relationship between wetlands, other surface waters, and uplands to be preserved.
 3. The scarcity of the habitat provided by the proposed preservation area and the degree to which listed species use the area.
 4. The proximity of the area to be preserved to areas of national, state, or regional ecological significance, such as national or state parks, Outstanding Florida Waters, and other regionally significant ecological resources or habitats, such as lands acquired or to be acquired through governmental or non-profit land acquisition programs for environmental conservation, and whether the areas to be preserved include corridors between these habitats.
 5. The extent and likelihood of potential adverse impacts if the assessment area were not preserved.
- (b) The preservation adjustment factor is multiplied by the mitigation delta assigned to the preservation proposal to yield an adjusted mitigation delta for preservation.

Language from ...Chapter 62-345, FAC

Location and Landscape Support - 62-345.500(6)(a), FAC

(a) Location and landscape support – The value of functions provided by an assessment area to fish and wildlife are influenced by the landscape position of the assessment area and its relationship with surrounding areas. While the geographic location of the assessment area does not change, the ecological relationship between the assessment area and surrounding landscape may vary from the current condition to the “with impact” and “with mitigation” conditions. Many species that nest, feed or find cover in a specific habitat or habitat type are also dependent in varying degrees upon other habitats, including upland, wetland and other surface waters, that are present in the regional landscape. For example, many amphibian species require small isolated wetlands for breeding pools and for juvenile life stages, but may spend the remainder of their adult lives in uplands or other wetland habitats. If these habitats are unavailable or poorly connected in the landscape or are degraded, then the value of functions provided by the assessment area to the fish and wildlife identified in Part I is reduced. The location of the assessment area shall be considered to the extent that fish and wildlife utilizing the area have the opportunity to access other habitats necessary to fulfill their life history requirements. The availability, connectivity, and quality of offsite habitats, and offsite land uses which might adversely impact fish and wildlife utilizing these habitats, are factors to be considered in assessing the location of the assessment area. The location of the assessment area shall be considered relative to offsite and upstream hydrologic contributing areas and to downstream and other connected waters to the extent that the diversity and abundance of fish and wildlife and their habitats is affected in these areas. The opportunity for the assessment area to provide off site water quantity and quality benefits to fish and wildlife and their habitats downstream and in connected waters is assessed based on the degree of hydrologic connectivity between these habitats and the extent to which offsite habitats are affected by discharges from the assessment area. It is recognized that isolated wetlands lack surface water connections to downstream waters and as a result, do not perform certain functions (e.g., detrital transport) to benefit downstream fish and wildlife; for such wetlands, this consideration does not apply.

Language from ...Chapter 62-345, FAC

Water Environment - 62-345.500(6)(b), FAC

(b) Water Environment – The quantity of water in an assessment area, including the timing, frequency, depth and duration of inundation or saturation, flow characteristics, and the quality of that water, may facilitate or preclude its ability to perform certain functions and may benefit or adversely impact its capacity to support certain wildlife. Hydrologic requirements and tolerance to hydrologic alterations and water quality variations vary by ecosystem type and the wildlife utilizing the ecosystem. Hydrologic conditions within an assessment area, including water quantity and quality, must be evaluated to determine the effect of these conditions on the functions performed by area and the extent to which these conditions benefit or adversely affect wildlife. Water quality within wetlands and other surface waters is affected by inputs from surrounding and upstream areas and the ability of the wetland or surface water system to assimilate those inputs. Water quality within the assessment area can be directly observed or can be inferred based on available water quality data, on-site indicators, adjacent land uses and estimated pollutant removal efficiencies of contributing surface water management systems. Hydrologic conditions in the assessment area are a result of external hydrologic inputs and the water storage and discharge characteristics of the assessment area. Landscape features outside the assessment area, such as impervious surfaces, borrow pits, levees, berms, swales, ditches, canals, culverts, or control structures, may affect hydrologic conditions in the assessment area. Surrounding land uses may also affect hydrologic conditions in the assessment area if these land uses increase discharges to the assessment area, such as agricultural discharges of irrigation water, or decrease discharges, such as wellfields or mined areas.

Language from ...Chapter 62-345, FAC

Community Structure - 62-345.500(6)(c), FAC

(c) Community Structure – Each impact and mitigation assessment area is evaluated with regard to its characteristic community structure. In general, a wetland or other surface water is characterized either by plant cover or by open water with a submerged benthic community. Wetlands and surface waters characterized by plant cover will be scored according to subparagraph 62-345.500(6)(c)1., F.A.C., while benthic communities will be assessed in accordance with subparagraph 62-345.500(6)(c)2., F.A.C. If the assessment area is a mosaic of relatively equal parts of submerged plant cover and a submerged benthic community, then both of these indicators will be scored and those scores averaged to obtain a single community structure score.

Language from ...Chapter 62-345, FAC

Community Structure - 62-345.500(6)(c), FAC

1. Vegetation and structural habitat – The presence, abundance, health, condition, appropriateness, and distribution of plant communities in surface waters, wetlands, and uplands can be used as indicators to determine the degree to which the functions of the community type identified are provided. Vegetation is the base of the food web in any community and provides many additional structural habitat benefits to fish and wildlife. In forested systems, for example, the vertical structure of trees, tree cavities, standing dead snag, and fallen logs provide forage, nesting, and cover habitat for wildlife. Topographic features, such as flats, deeper depressions, hummocks, or tidal creeks also provide important structure for fish and wildlife habitat. Overall condition of a plant community can often be evaluated by observing indicators such as dead or dying vegetation, regeneration and recruitment, size and age distribution of trees and shrubs, fruit production, chlorotic or spindly plant growth, structure of the vegetation strata, and the presence, coverage and distribution of inappropriate plant species. Human activities such as mowing, grazing, off-road vehicle activity, boat traffic, and fire suppression constitute more direct and easily observable impacts affecting the condition of plant communities. Although short-term environmental factors such as excessive rainfall, drought, and fire can have temporary impacts, human activities such as flooding, drainage via groundwater withdrawal and conveyance canals, or construction of permanent structures such as seawalls in an aquatic system can permanently damage these systems. The plant community should be evaluated to consider whether natural successional patterns for the community type are permanently altered. Inappropriate plants, including invasive exotic species, other invasive species, or other species atypical of the community type being evaluated, do not support the functions attributable to that community type and can out-compete and replace native species. Native upland and wetland vegetation, such as wax myrtle, pines and willow, which are not typically considered as invasive, can occur in numbers and coverage not appropriate for the community type and can serve as indicators of disturbance. The relative degree of coverage by inappropriate species, inappropriate vegetation strata, condition of vegetation, and both biotic and abiotic structure all provide an indication of the degree to which the functions anticipated for the community type identified are being provided.

Language from ...Chapter 62-345, FAC

Community Structure - 62-345.500(6)(c), FAC

2. Benthic Communities – This indicator is intended to be used in marine or freshwater aquatic systems that are not characterized by a plant community, and is not intended to be used in wetlands that are characterized by a plant community. The benthic communities within nearshore, inshore, marine and freshwater aquatic systems are analogous to the vascular plant communities of terrestrial wetland systems in that they provide food and habitat for other biotic components of the system and function in the maintenance of water quality. For example, oyster bars and beds in nearshore habitats and estuaries filter large amounts of particulate matter and provide food and habitat for a variety of species, such as boring sponges, mollusks, and polychaete worms. Live hardbottom community composition varies with water depths and substratum, but this community type contributes to the food web, as well as providing three-dimensional structure through the action of reef-building organisms and rock-boring organisms and water quality benefits from filter-feeding organisms. The distribution and quality of coral reefs reflect a balance of water temperature, salinity, nutrients, water quality, and presence of nearby productive mangrove and seagrass communities. Coral reefs contribute to primary productivity of the marine environment as well as creating structure and habitat for a large number of organisms. Even benthic infauna of soft-bottom systems stabilize the substrate, provide a food source, and serve as useful indicators of water quality. All of these communities are susceptible to human disturbance through direct physical damage, such as dredging, filling, or boating impacts, and indirect damage through changes in water quality, currents, and sedimentation.

Language from ...Chapter 62-345, FAC

62-345.500 - Assessment and Scoring - Part II

(7) The Part II score for an impact, wetland, or surface water mitigation assessment area shall be determined by summing the scores for each of the indicators and dividing that value by 30 to yield a number between 0 and 1. For upland mitigation assessment areas, the Part II score shall be determined by summing the scores for the location and community structure indicators and dividing that value by 20 to yield a number between 0 and 1.

Language from ...Chapter 62-345, FAC

62-345.300 - Assessment Method Overview and Guidance

(5) The degree of ecological change on a site must be determined for both the impact and mitigation assessment areas by the mathematical difference in the Part II scores established pursuant to section 62-345.500, FAC, between the current condition and with-impact condition assessment, and between the current condition or without preservation and the with mitigation condition assessments. This difference is termed the “delta.” This formula must be applied to all assessment areas within both proposed impact sites and mitigation sites (including mitigation banks and regional offsite mitigation areas when applicable).

Language from ...Chapter 62-345, FAC

62-345.600 *Time Lag*, Risk, and Mitigation Determination.

- (1) Time lag shall be incorporated into the gain in ecological value of the proposed mitigation as follows.
- (a) The time lag associated with mitigation means the period of time between when the functions are lost at an impact site and when those functions are replaced by the mitigation. In general, the time lag varies by the type and timing of mitigation in relation to the impacts. Wetland creation generally has a greater time lag to establish certain wetland functions than most enhancement activities. Forested systems typically require more time to establish characteristic structure and function than most herbaceous systems. Factors to consider when assigning time lag include biological, physical, and chemical processes associated with nutrient cycling, hydric soil development, and community development and succession. There is no time lag if the mitigation fully offsets the anticipated impacts prior to or at the time of impact.
 - (b) The time lag factor under this section shall be scored as 1 when evaluating mitigation for proposed phosphate and heavy mineral mining activities in accordance with this rule to determine compliance with section 373.414(6)(b), F.S.
 - (c) For the purposes of this rule, the time lag, in years, is related to a factor (T-factor) as established in Table 1 below, to reflect the additional mitigation needed to account for the deferred replacement of wetland or surface water functions.

Language from ...Chapter 62-345, FAC

62-345.600 - *Time Lag*, Risk, and Mitigation Determination. (continued)

(d) The “Year” column in Table 1 represents the number of years between the time the wetland impacts are anticipated to occur and the time when the mitigation is anticipated to fully offset the impacts, based on reasonable scientific judgment of the proposed mitigation activities and the site specific conditions.

TABLE 1.

Year	T-factor
< or = 1	1
2	1.03
3	1.07
4	1.10
5	1.14
6 – 10	1.25
11 – 15	1.46
16 – 20	1.68
21 – 25	1.92
26 – 30	2.18
31 – 35	2.45
36 – 40	2.73
41 – 45	3.03
46 – 50	3.34
51 – 55	3.65
>55	3.91

Language from ...Chapter 62-345, FAC

62-345.600 - Time Lag, *Risk*, and Mitigation Determination.

- (2) Mitigation **risk** shall be evaluated to account for the degree of uncertainty that the proposed conditions will be achieved, resulting in a reduction in the ecological value of the mitigation assessment area. In general, mitigation projects which require longer periods of time to replace lost functions or to recover from potential perturbations will be considered to have higher risk than those which require shorter periods of time. The assessment area shall be scored on a scale from 1 (for no or *de minimus* risk) to 3 (high risk), on quarter-point (0.25) increments. A score of one would most often be applied to mitigation conducted in an ecologically viable landscape and deemed successful or clearly trending towards success prior to impacts, whereas a score of three would indicate an extremely low likelihood of success based on the ecological factors below. A single risk score shall be assigned, considering the applicability and relative significance of the factors below, based upon consideration of the likelihood and the potential severity of reduction in ecological value due to these factors.
- (a) The vulnerability of the mitigation to and the extent of the effect of different hydrologic conditions than those proposed, considering the degree of dependence on mechanical or artificial means to achieve proposed hydrologic conditions, such as pumps or adjustable weirs, effects of water withdrawals, diversion or drainage features, reliability of the hydrologic data, modeling, and design, unstable conditions due to waves, wind, or currents, and the hydrologic complexity of the proposed community. Systems with relatively simple and predictable hydrology, such as tidal wetlands, would entail less risk than complex hydrological systems such as seepage slopes or perched wetlands;

Language from ...Chapter 62-345, FAC

62-345.600 Time Lag, *Risk*, and Mitigation Determination.

- (b) The vulnerability of the mitigation to the establishment and long-term viability of plant communities other than that proposed, and the potential reduction in ecological value which might result, considering the compatibility of the site soils and hydrologic conditions with the proposed plant community, planting plans, and track record for community or plant establishment method;
- (c) The vulnerability of the mitigation to colonization by invasive exotic or other invasive species, considering the location of recruitment sources, the suitability of the site for establishment of these species, the degree to which the functions provided by plant community would be affected;
- (d) The vulnerability of the mitigation to degraded water quality, considering factors such as current and future adjacent land use, and construction, operation, and maintenance of surface water treatment systems, to the extent that ecological value is affected by these changes;
- (e) The vulnerability of the mitigation to secondary impacts due to its location, considering potential land use changes in surrounding area, existing protection provided to surrounding areas by easements, restrictive covenants, or federal, state, or local regulations, and the extent to which these factors influence the long term viability of functions provided by the mitigation site; and
- (f) The vulnerability of the mitigation to direct impacts, considering its location and existing and proposed protection provided to the mitigation site by easements, restrictive covenants, or federal, state, or local regulations, and the extent to which these measures influence the long term viability of the mitigation site.

Language from ...Chapter 62-345, FAC

62-345.600 Time Lag, Risk, and *Mitigation Determination*.

- (3) The relative gain of functions provided by a mitigation assessment area must be adjusted for time lag and risk using the following formula: $\text{Relative functional gain (RFG)} = \text{Mitigation Delta (or adjusted mitigation delta for preservation)} / (\text{risk} \times \text{t-factor})$. The loss of functions provided by impact assessment areas is determined using the following formula: $\text{Functional loss (FL)} = \text{Impact Delta} \times \text{Impact Acres}$.
- (a) To determine the number of potential mitigation bank credits a bank or regional offsite mitigation area can provide, multiply the relative functional gain (RFG) times the acres of the mitigation bank or regional offsite mitigation assessment area scored. The total amount of credits is the summation of the potential RFG for each assessment area.
 - (b) To determine the number of mitigation bank credits or amount of regional offsite mitigation needed to offset impacts, when the bank or regional offsite mitigation area is assessed in accordance with this rule, calculate the functional loss (FL) of each impact assessment area. The total number of credits required is the summation of the calculated functional loss for each impact assessment area. Neither time lag nor risk is applied to determining the number of mitigation bank credits or amount of mitigation necessary to offset impacts when the bank or regional offsite mitigation area has been assessed under this rule.
 - (c) To determine the acres of mitigation needed to offset impacts when not using a bank or a regional offsite mitigation area as mitigation, divide functional loss (FL) by relative functional gain (RFG). If there is more than one impact assessment area or more than one mitigation assessment area, the total functional loss and total relative functional gain is determined by summation of the functional loss and relative functional gain for each assessment area.

Section Divider