

Chapter 6: Habitats

A Wildlife Species Endeavor

The purpose of Florida's State Wildlife Action Plan is to promote the conservation of fish and wildlife species that are imperiled or at risk of becoming imperiled in the future (Chapter 3: SGCN). In order to benefit the most species, the Action Plan has taken a habitat-based approach by addressing the needs of many species through the needs of their associated habitats. Although the Action Plan is organized around habitat categories and much effort has gone into identifying habitat-based conservation actions, it is intended to be a wildlife conservation endeavor. Accomplishment of habitat-based conservation actions is important and will help sustain wildlife populations. However, as Action Plan review and revision progresses, focus must continually be placed back upon the species for which all this work is being done. Conservation of habitat alone is not enough without the fish and wildlife that inhabit and define it.

Florida's State Wildlife Action Plan Habitats

There is no single accepted statewide comprehensive habitat classification system for Florida. As a result, the Action Plan uses a system modified to classify the breadth of Florida's habitats from several existing habitat classification systems and available Geographical Information Systems (GIS) landcover data. Forty-five habitat categories are described based on information from the Florida Fish and Wildlife Conservation Commission (FWC), Florida Natural Areas Inventory (FNAI), Water Management District GIS data, and expert opinions. The goal of using this system is to maximize the utility of the Action Plan, while at the same time addressing needs and concerns for habitats across the entire landscape of Florida – terrestrial, freshwater and marine. In this system, Florida's habitats are consolidated into 22 terrestrial ([Figure 6A](#)), 9 freshwater ([Figure 6B](#)) and 14 marine ([Figure 6C](#)) habitat categories. Two of the marine habitat categories (Beach/Surf Zone and Coastal Tidal River or Stream) also are identified in the terrestrial and freshwater habitat categories, respectively. They are listed in both systems because of their importance to each ecosystem. Refer to [FWC 2005](#) and Appendix E for more information regarding the formation and mapping of the habitat categories.

As with almost any habitat categorization, there are limitations associated with the classification system used for the Action Plan that should be considered in evaluating the following habitat chapters. These limitations include the following components:

- The natural environment of Florida is dynamic and complex, while the developed habitat categories are simplified and broad. Many exceptions to the category boundaries exist. For example, what is classified as a Spring upstream can be called a Calcareous Stream downstream and then a Softwater Stream farther downstream. Also, Sandhill can gradually grade into Mixed Hardwood-Pine Forest or Natural Pineland. The processes and functions of one habitat can feed another, such as

streams that feed into an estuary. Because the classification is divided at a broad, statewide level, these interconnecting aspects of ecology are sometimes obscured.

- The conservation needs of species associated with a particular habitat may not always be met by meeting the conservation needs of that habitat. Florida has chosen to take a habitat-based approach as the most efficient way to address the conservation needs of its large number of Species of Greatest Conservation Need (SGCN). However, while this approach will address many of the important issues facing Florida’s wildlife and maximize the benefit to the largest number of species, it should be recognized that some species will have specific conservation needs unrelated to habitat threats. In addition, the needs of some wide-ranging species will not be met entirely by actions in a single habitat.
- The maps used to represent habitat categories incorporate the most comprehensive GIS data available (FWC 2005). Despite this, the cover of many of the habitats does not accurately reflect their true spatial extent and/or configuration. The habitat maps are intended to be used as a general guide for the distribution of the habitat types in Florida.

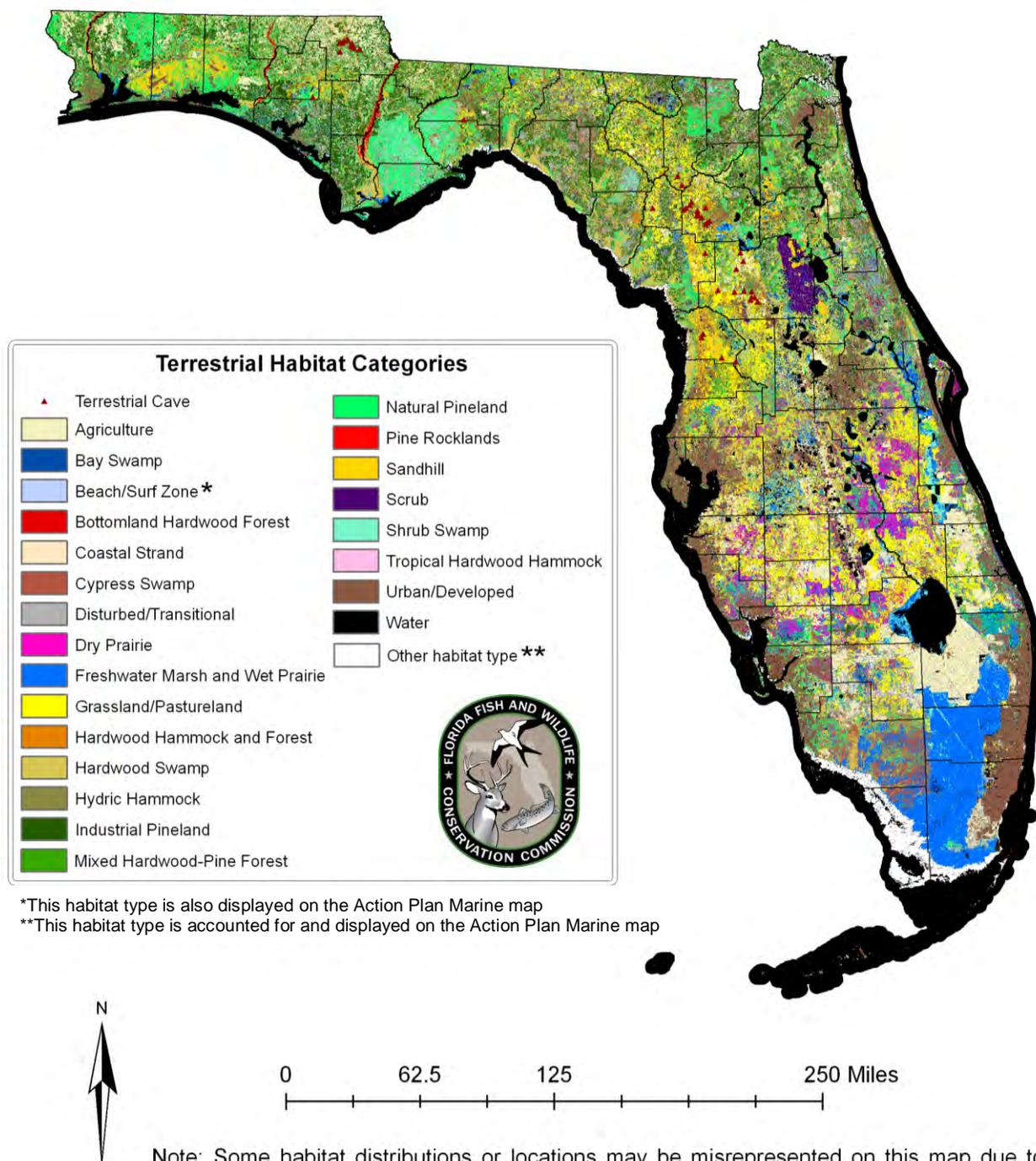
All 45 habitat categories identified in the Action Plan are ecologically important; however, 18 habitats have been identified as being under the greatest overall threat (Tables 6A, 6B, 6C). These habitats, listed in alphabetical order, are generally associated with coastal, wetland, upland pine, springs, reef and seagrass areas:

- | | |
|---|---|
| 1. Beach/Surf Zone | 10. Natural Pineland |
| 2. Bivalve Reef | 11. Pine Rockland |
| 3. Coastal Strand | 12. Salt Marsh |
| 4. Coastal Tidal River or Stream | 13. Sandhill |
| 5. Coral Reef | 14. Scrub |
| 6. Dry Prairie | 15. Seagrass |
| 7. Freshwater Marsh and Wet Prairie | 16. Softwater Stream |
| 8. Inlet | 17. Spring and Spring Run |
| 9. Mangrove Swamp | 18. Tidal Flat |

The relationships among habitat categories and associated threats may be visualized in tabular format. Three tables, one each for terrestrial ([Table 6A](#)), freshwater ([Table 6B](#)) and marine ([Table 6C](#)) habitat categories were created based on 12 Threat and Action Workshop sessions across Florida (FWC 2005). Ranking and evaluation of the habitat threat status is based on The Nature Conservancy’s (TNC) 5-S planning process (FWC 2005, Gordon et al. 2005). The overall threat rank was determined by a process that combined threat ranks across all habitat categories and was not simply a reflection of the highest threat rank within any habitat category (Low 2003). Therefore, several “low” scores could total to a “high” overall score, and different combinations of “low,” “medium,” “high” and “very high” scores could result in different overall threat ranks. Five habitat categories (Agriculture, Artificial Structure, Canal/Ditch, Disturbed/Transitional, Mixed Hardwood-Pine Forest and Urban/Developed) were not addressed through the Threat and Action Workshop process since they are not considered natural habitats.

Florida's State Wildlife Action Plan

Terrestrial Habitat Categories



Note: Some habitat distributions or locations may be misrepresented on this map due to size, resolution, map overlay difficulties, and insufficient data sources.

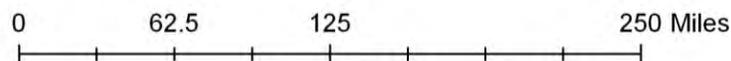
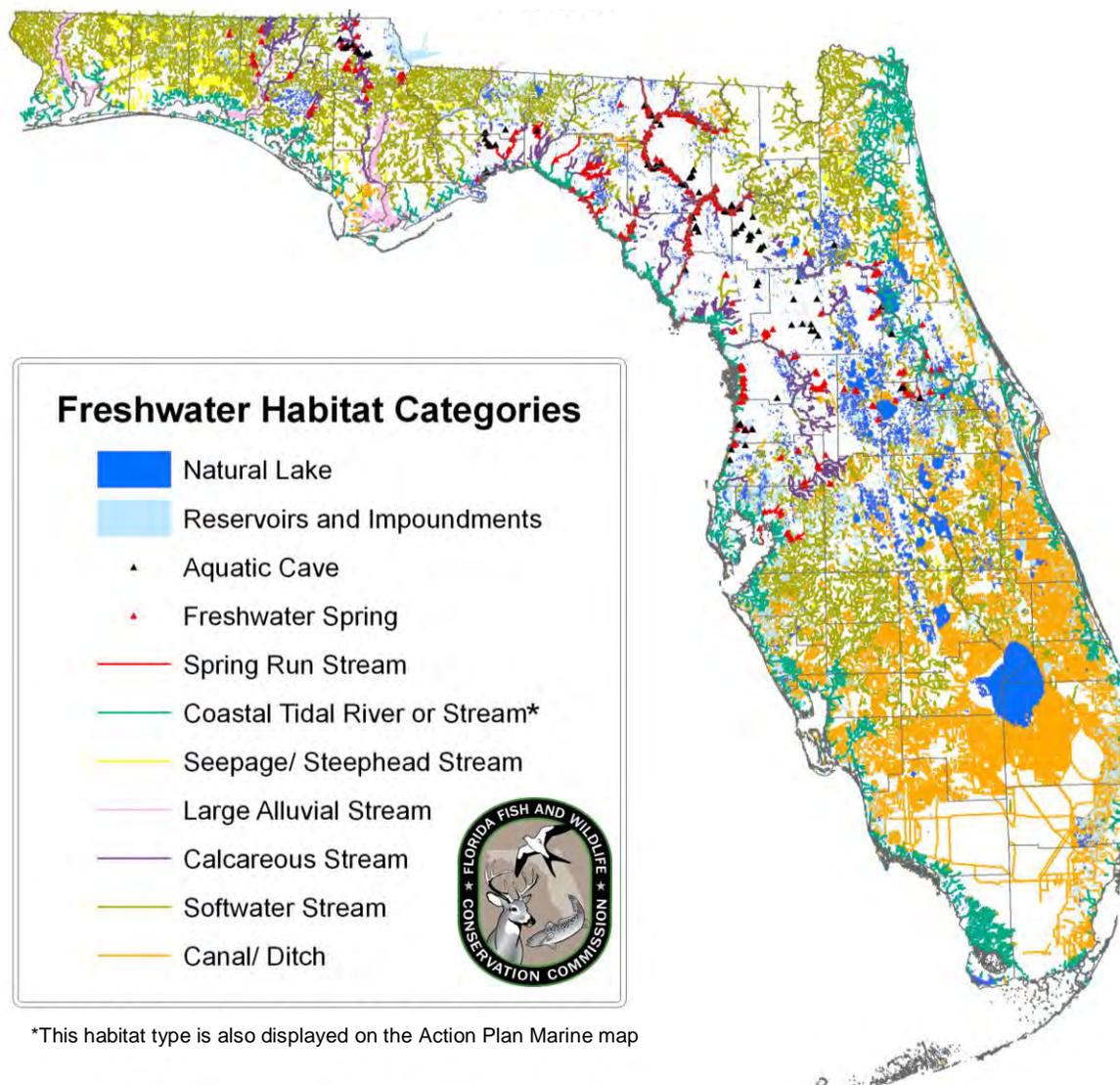
Figure 6A. Florida State Wildlife Action Plan Terrestrial Habitat Categories (FWC 2005 and Appendix C).

Table 6A. Overall threat rank across terrestrial habitat categories and collective threat status among terrestrial habitat categories.

Threat Category	Threat Rank By Habitat Category																		Overall Threat Rank	
	Bay Swamp	Beach/Surf Zone	Bottomland Hardwood Forest	Coastal Strand	Cypress Swamp	Dry Prairie	Freshwater Marsh and Wet Prairie	Grassland/Improved Pasture	Hardwood Hammock Forest	Hardwood Swamp/ Mixed Wetland Forest	Hydric Hammock	Industrial/ Commercial Pineland	Natural Pineland	Pine Rockland	Sandhill	Scrub	Terrestrial Cave	Tropical Hardwood Hammock		All Habitat Categories
1	Conversion to housing and urban development	High	-	-	Very High	High	Very High	Very High	High	High	Medium	-	High	Very High	Very High	Very High	Very High	-	Medium	Very High
2	Roads	-	-	Medium	High	Medium	Very High	High	High	High	Medium	-	Medium	Very High	Very High	Very High	Very High	-	Low	Very High
3	Conversion to commercial and industrial development	-	-	-	-	-	High	-	-	High	-	-	High	High	Very High	High	Very High	-	-	Very High
4	Incompatible fire	Low	-	-	Low	Low	Medium	High	-	Low	Medium	-	-	High	High	High	Very High	-	Medium	Very High
5	Incompatible recreational activities	-	Very High	-	High	-	-	Medium	-	-	Low	-	-	High	-	Very High	Medium	High	-	Very High
6	Surface water withdrawal	Medium	-	-	-	High	Medium	High	-	Medium	High	-	-	High	-	-	-	-	Medium	Very High
7	Invasive plants	High	-	Medium	Medium	High	Low	High	-	Medium	High	Medium	-	High	Medium	Medium	Medium	-	High	Very High
8	Incompatible forestry practices	-	-	-	-	High	Low	Low	-	-	High	-	High	High	-	-	Very High	-	-	Very High
9	Conversion to agriculture	High	-	-	-	Medium	Medium	Very High	Medium	Low	Medium	-	-	Low	-	Very High	-	-	-	Very High
10	Invasive animals	Low	High	Medium	Medium	Medium	-	Medium	-	Low	Medium	-	-	Low	Medium	Medium	Medium	-	High	Very High
11	Incompatible resource extraction: mining/drilling	-	-	-	-	Low	Low	High	-	Medium	-	-	-	Low	-	Medium	Very High	Medium	-	Very High
12	Shoreline hardening	-	High	-	Very High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Very High
13	Sea level rise	-	High	-	High	-	-	-	-	-	-	-	High	-	-	-	-	-	-	Very High
14	Conversion to recreation areas	-	-	-	High	-	-	-	Low	Low	-	-	-	Medium	-	Medium	Medium	-	-	Very High
15	Groundwater withdrawal	Medium	-	-	-	Medium	-	Medium	-	Low	Low	-	-	Medium	-	-	-	-	Medium	High
16	Light pollution	-	High	-	High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
17	Nutrient loads - agriculture	-	-	-	-	High	-	High	-	-	-	-	-	-	-	-	-	-	-	High
18	Utility corridors	-	-	-	-	-	-	-	-	-	-	-	Medium	-	High	-	-	-	-	High
19	Incompatible residential activities	-	-	-	High	-	-	-	-	Low	-	-	-	Low	-	-	-	-	Low	High
20	Climate variability	-	-	-	High	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
21	Management of nature - inlet relocation and dredging	-	High	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High
22	Military activities	-	-	-	Medium	-	Low	-	-	-	-	-	Low	-	-	Medium	Medium	-	-	High
23	Nuisance animals	-	Medium	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	Low	High
24	Channel modification/shipping lanes	-	Medium	-	Medium	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	High
25	Management of nature - stormwater facilities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High	-	-	-	High
26	Management of nature - dredge spoil deposition	-	-	-	-	-	-	-	-	-	-	-	-	-	-	High	High	-	-	High
27	Parasites/pathogens	-	-	-	-	-	-	-	-	-	-	-	-	-	High	-	-	-	-	High
28	Nutrient loads - urban	-	-	-	Low	Low	-	Medium	-	-	-	-	-	-	-	-	-	-	-	Medium
29	Management of nature - water control structures	-	-	-	-	Low	-	Medium	-	-	Low	-	-	-	-	-	-	-	-	Medium
30	Incompatible grazing and ranching	Low	-	-	-	Low	Low	Low	-	-	Low	-	-	Low	-	-	Low	-	-	Medium
31	New dams	-	-	-	-	-	-	-	-	-	Medium	-	-	-	-	-	-	-	-	Medium
32	Incompatible agricultural practices	-	-	-	-	Low	Low	-	-	Low	-	-	-	Low	-	Medium	-	-	Low	Medium
33	Incompatible vegetation harvest	-	-	-	-	Low	-	-	-	-	Low	-	-	-	-	-	-	-	Low	Medium
34	Chemicals and toxins	-	-	-	Low	-	-	-	-	-	-	-	-	Medium	-	-	-	-	Low	Medium
35	Solid waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Medium	-	-	Medium
36	Management of nature - beach raking	-	Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Medium
37	Incompatible wild animal harvest	-	-	-	-	-	-	-	-	-	Low	-	-	-	Low	-	-	-	Low	Low
38	Humidity and temperature changes	-	-	-	-	-	-	-	-	Low	-	-	-	-	-	-	-	-	-	Low
39	Dam operations	-	-	-	-	-	-	-	-	-	Low	-	-	-	-	-	-	-	-	Low
40	Degraded habitat	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
41	Altered wind due to buildings	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
42	Management of nature - renourishment	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
43	Management of nature - driving for maintenance	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
44	Key predator/herbivore/pollinator losses	-	-	-	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Low
Habitat Category Threat Status		High	Very High	Medium	Very High	High	Very High	Very High	High	High	High	Medium	High	Very High	Very High	Very High	Very High	Medium	High	Very High

Florida's State Wildlife Action Plan

Freshwater Habitat Categories



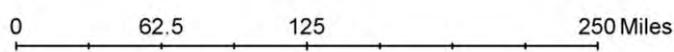
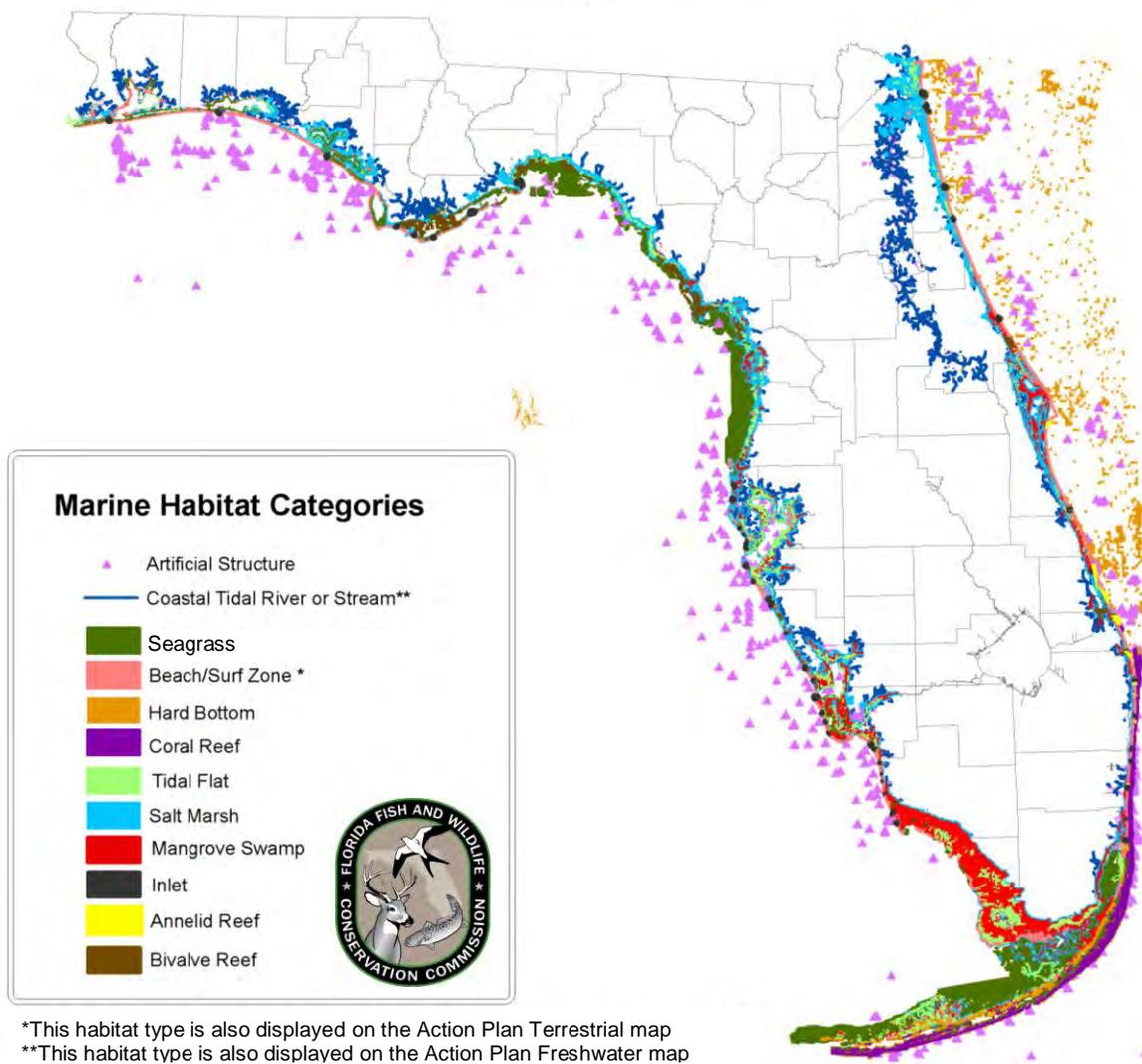
Note: Some habitat distributions or locations may be misrepresented on this map due to size, resolution, map overlay difficulties, and insufficient data sources.

Figure 6B. Florida State Wildlife Action Plan Freshwater Habitat Categories (FWC 2005 and Appendix C).

Table 6B. Overall threat rank across freshwater habitat categories and collective threat status among freshwater habitat categories.

Threat Category		Threat Rank By Habitat Category									Overall Threat Rank
		Aquatic Cave	Calcareous Stream	Coastal Tidal River or Stream	Large Alluvial Stream	Natural Lake	Reservoir/ Impoundment	Seepage/ Steephead Stream	Softwater Stream	Spring and Spring Run	
1	Invasive plants	-	High	Medium	-	High	High	-	Medium	Very High	Very High
2	Nutrient loads - urban	-	High	Medium	-	High	High	-	Medium	Very High	Very High
3	Surface water withdrawal	-	-	High	Medium	Medium	-	-	High	Medium	Very High
4	Invasive animals	-	Medium	Low	Medium	Medium	High	Medium	Medium	High	Very High
5	Nutrient loads - agriculture	-	High	Medium	-	Medium	Medium	-	High	High	Very High
6	Dam operations	-	-	High	High	High	-	-	Medium	-	Very High
7	Conversion to housing and urban development	-	Medium	High	-	High	-	Medium	High	-	Very High
8	Channel modification/shipping lanes	-	-	High	High	-	-	-	-	-	Very High
9	Roads	-	Medium	Medium	-	-	-	Medium	High	-	High
10	Chemicals and toxins	-	Medium	Medium	Low	Medium	Medium	-	Medium	-	High
11	Incompatible recreational activities	Medium	-	-	Low	Low	High	-	Low	Medium	High
12	Conversion to commercial and industrial development	-	-	Medium	-	Medium	-	Medium	Medium	Low	High
13	Management of nature - water control structures	-	-	-	High	-	-	Medium	-	-	High
14	Conversion to agriculture	-	-	-	-	Medium	-	-	High	-	High
15	Incompatible resource extraction: mining/drilling	Medium	Low	-	-	-	-	Medium	Medium	-	High
16	Shoreline hardening	-	-	High	-	-	-	-	-	-	High
17	Management of nature - veg clearing/snagging for water conveyance	-	-	Medium	-	-	-	-	-	-	Medium
18	Groundwater withdrawal	-	-	-	Low	Low	-	-	Low	Medium	Medium
19	Incompatible fire	-	-	-	-	-	-	Medium	-	-	Medium
20	Incompatible forestry practices	-	Low	-	Low	-	Low	Low	Low	Low	Medium
21	Incompatible agricultural practices	-	Low	-	-	Low	Medium	-	Low	-	Medium
22	Incompatible construction practices	-	-	-	-	-	Medium	-	-	-	Medium
23	Conversion to recreation areas	-	-	-	-	-	-	-	-	Low	Low
24	Management of nature - aquatic plant treatment	-	-	-	-	Low	-	-	-	-	Low
25	Sea level rise	-	-	Low	-	-	-	-	-	-	Low
26	Incompatible residential activities	-	-	-	-	Low	-	-	-	-	Low
27	Solid waste	Low	-	-	-	-	-	-	-	-	Low
Habitat Category Threat Status		Medium	High	Very High	High	High	High	Medium	Very High	Very High	Very High

Florida's State Wildlife Action Plan Marine Habitat Categories



Note: Some habitat distributions or locations may be misrepresented on this map due to size, resolution, map overlay difficulties, and insufficient data sources.

Figure 6C. Florida State Wildlife Action Plan Marine Habitat Categories (FWC 2005 and Appendix C).

Table 6C. Overall threat rank across marine habitat categories and collective threat status among marine habitat categories.

	Threat Category	Threat Rank By Habitat Category													Overall Threat Rank
		Annelid Reef	Beach/ Surf Zone	Bivalve Reef	Coastal Tidal River or Stream	Coral Reef	Inlet	Mangrove Swamp	Hard Bottom	Pelagic	Salt Marsh	Seagrass	Subtidal Unconsolidated Marine/ Estuarine Sediment	Tidal Flat	
1	Coastal development	High	Very High	High	Very High	Very High	High	Very High	-	-	Very High	Very High	High	Very High	Very High
2	Inadequate stormwater management	Low	Medium	Very High	Very High	Very High	-	Medium	Medium	High	High	Very High	High	High	Very High
3	Dam operations/incompatible release of water (quality, quantity, timing)	Medium	Medium	High	Very High	High	High	High	Medium	-	High	High	High	High	Very High
4	Incompatible industrial operations	High	High	Low	High	Medium	Medium	High	Medium	Low	High	High	Medium	Very High	Very High
5	Channel modification/shipping lanes	High	High	Medium	Very High	High	High	High	High	Low	High	Very High	Medium	Medium	Very High
6	Climate variability	High	Very High	-	Medium	Very High	-	High	Medium	-	High	High	-	Medium	Very High
7	Roads, bridges & causeways	-	Very High	High	Medium	High	Medium	High	Low	-	High	High	Medium	High	Very High
8	Management of nature (beach nourishment, impoundments)	High	High	Medium	High	High	High	Medium	Medium	-	High	Medium	Low	High	Very High
9	Shoreline hardening	Low	High	-	Very High	Medium	High	High	Low	-	Medium	High	-	Medium	Very High
10	Harmful algal blooms	-	High	High	-	Medium	Medium	High	Medium	High	-	Very High	-	Low	Very High
11	Invasive plants	-	High	-	High	High	High	High	Medium	-	Medium	High	-	-	Very High
12	Nutrient loads (all sources)	-	Medium	Medium	Medium	Very High	-	Medium	-	Medium	-	High	Low	-	Very High
13	Disruption of longshore transport of sediments	Medium	High	-	-	Low	High	-	High	-	High	Medium	-	Medium	Very High
14	Invasive animals	-	Medium	Medium	High	-	Low	High	Low	Medium	-	Medium	Low	High	Very High
15	Surface water withdrawal	-	-	Medium	High	-	Low	Medium	-	-	High	High	Low	Low	Very High
16	Incompatible fishing pressure	-	Medium	Low	Medium	Very High	Medium	Medium	Medium	Medium	-	Medium	-	-	Very High
17	Incompatible recreational activities	Low	Medium	Low	Medium	Medium	High	Medium	-	-	-	Medium	Medium	High	Very High
18	Chemicals & toxins	-	Medium	-	High	Medium	-	Medium	Low	-	Medium	Medium	Low	High	Very High
19	Large industrial spills	-	Medium	-	High	Medium	Medium	Medium	-	-	Medium	Medium	-	High	Very High
20	Parasites/pathogens	-	-	-	-	Very High	-	High	High	-	-	Low	-	-	Very High
21	Boating impacts	Low	-	Low	Medium	High	High	Medium	Low	-	Low	Medium	Low	Medium	Very High
22	Key predator/herbivore losses	-	Medium	-	-	High	-	-	Medium	High	-	Medium	-	-	Very High
23	Fishing gear impacts	Low	Low	-	Low	High	Medium	Low	Low	-	-	Medium	Medium	Low	Very High
24	Groundwater withdrawal	-	-	-	High	-	-	Medium	-	-	-	High	-	Low	Very High
25	Wildlife & fisheries management	-	Low	Low	-	-	-	High	Low	Low	High	-	-	-	Very High
26	Utility corridors	Medium	Low	-	Medium	Medium	Low	Low	Low	-	Medium	Medium	-	-	High
27	Vessel impacts	-	Low	-	Medium	High	Medium	-	Low	-	Low	Low	-	Low	High
28	Solid waste	-	Medium	-	Medium	Low	-	Medium	Low	-	-	Medium	Low	Medium	High
29	Incompatible resource extraction: mining/drilling	-	Medium	-	Medium	Medium	-	-	-	-	-	-	-	-	High
30	Incompatible aquaculture operations	-	Medium	-	-	-	-	Medium	-	Low	-	Medium	-	-	High
31	Sonic pollution	-	Low	-	Low	-	Medium	Medium	-	-	-	-	-	-	High
32	Light pollution	-	Medium	-	-	-	Medium	-	-	-	-	-	-	-	High
33	Placement of artificial structures	Low	-	-	-	Medium	-	Low	Low	Low	Low	Medium	-	-	Medium
34	Incompatible aquarium trade	-	-	-	-	Medium	-	-	Low	-	-	Low	-	-	Medium
35	Inadequate stormwater management	-	-	-	-	-	Medium	-	-	-	-	-	-	-	Medium
36	Thermal pollution	-	-	-	Low	-	-	Low	-	-	-	Low	Low	-	Medium
37	Military activities	-	-	-	-	Low	Medium	-	-	-	Low	-	-	-	Medium
	Habitat Category Threat Status	High	Very High	Very High	Very High	Very High	Very High	Very High	High	High	Very High	Very High	High	Very High	Very High

How to Use the Habitat Categories

This section is meant to be a brief guide of how to navigate and utilize the information contained within each of Florida's 45 habitat categories, which are listed in alphabetical order as follows:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Agriculture 2. Annelid Reef 3. Aquatic Cave 4. Artificial Structure 5. Bay Swamp 6. Beach/Surf Zone 7. Bivalve Reef 8. Bottomland Hardwood Forest 9. Calcareous Stream 10. Canal/Ditch 11. Coastal Strand 12. Coastal Tidal River or Stream 13. Coral Reef 14. Cypress Swamp 15. Disturbed/Transitional 16. Dry Prairie 17. Freshwater Marsh and Wet Prairie 18. Grassland/Improved Pasture 19. Hard Bottom 20. Hardwood Hammock Forest 21. Hardwood Swamp/Mixed Wetland Forest 22. Hydric Hammock | <ol style="list-style-type: none"> 23. Industrial/Commercial Pineland 24. Inlet 25. Large Alluvial Stream 26. Mangrove Swamp 27. Mixed Hardwood-Pine Forest 28. Natural Lake 29. Natural Pineland 30. Pelagic 31. Pine Rockland 32. Reservoir/Managed Lake 33. Salt Marsh 34. Sandhill 35. Scrub 36. Seagrass 37. Seepage/Steephead Stream 38. Shrub Swamp 39. Softwater Stream 40. Spring and Spring Run 41. Subtidal Unconsolidated Marine/Estuarine Sediment 42. Terrestrial Cave 43. Tidal Flat 44. Tropical Hardwood Hammock 45. Urban/Developed |
|--|--|

Photos

The photos presented are a visual representation of the corresponding habitat category.

Distribution Map

The maps provided are the best available representation of where the habitat category generally occurs within Florida. These maps are a general visual representation and may not always be precisely accurate. In habitats where complete map data are not currently available, such as Hard Bottom and Pelagic, it is noted in the status section (see Status description below).

Status

The overall preliminary assessment of the condition and trend is summarized as a "status" for each habitat category. This rank represents an initial ecological assessment of a habitat from a statewide perspective. Total area, acres in conservation or private ownership, Florida Forever

projects, and ecological significance (area of Strategic Habitat Conservation Areas) that each comprises were derived principally from GIS data sources (Appendix C: GIS Data Tables). Florida Forever project acreages are those that are proposed conservation lands under the Florida Forever program. Strategic Habitat Conservation Areas (SHCA) are important uplands and wetlands that are currently not protected. Acreages of communities and disturbances are approximate, but provide a reasonable estimate.

Habitat Description

The description is intended to be a succinct yet comprehensive portrayal of the habitat type. Habitat categories are cross-walked with the widely known ecosystem classification scheme employed by FNAI as presented in the [*Guide to the Natural Communities of Florida*](#) (FNAI and Florida Department of Natural Resources 1990). The description and location of the community type presented for each habitat category was developed from a wide range of sources (see References/Literature Cited) and professional knowledge.

Associated Species

Within each habitat chapter, there is a list of SGCN associated with the corresponding habitat category. These associations were determined by the best available professional opinion. Species are in phylogenetic order and are separated by taxa group (mammals, birds, amphibians, reptiles, fish and invertebrates). Detailed information about the process of identifying the list of 1036 SGCN can be found in Chapter 3: SGCN.

Conservation Threats

For the purposes of the Action Plan, the term ‘source of stress’ is used synonymously with the term ‘threat’. The first set of threats listed for each habitat are statewide threats that are fully addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. Next, there is a short evaluation of the threats specific to the habitat. This discussion is based on the threats that are most important to that particular habitat and the species it contains. Accompanying each assessment are two tables illustrating the results of TNC’s threat analysis for the habitat. Threats were divided into two parts by TNC’s 5-S planning process (FWC 2005, Gorden et al. 2005, and Appendix E):

- Stress – the factors that destroy, degrade or impair habitats by impacting variables associated with habitat size, condition or configuration in the landscape
- Source of stress – the proximate cause of the stress.

Each stress is assigned a letter and a rank. Stresses are ranked in terms of the potential severity of damage to the habitat and the geographic scope of that damage. Only those stresses that had an overall rank of very high or high were further addressed in the source of stress analysis.

Each source is given a number, a rank, and a list of stresses it causes from the first table. Sources are ranked in terms of the degree to which they contribute to the stress, and the

irreversibility of the stress caused by the source. Overall stress and source of stress rankings are combined to derive a statewide threat rank of the habitat.

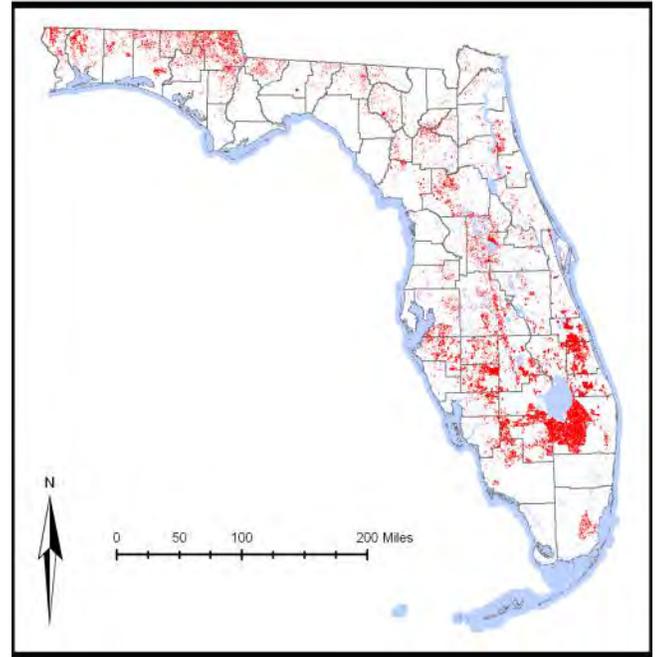
Understanding the sources that contribute the greatest proportion of the particular stress will help focus and prioritize action that should be undertaken to abate the threat. Multiple sources generally contribute to a particular stress, and a single source may contribute to several stresses. Therefore, examination and ranking of sources aids in further focusing attention on the most critical conservation actions.

Conservation Actions

The conservation actions that were common to the current and multiple other habitats are found in Chapter 7: Multiple Habitat Threats and Conservation Actions. This section includes tables for each threat that is specific to the current habitat. Based on TNC's 5-S planning process (FWC 2005, Gordon et al. 2005, and Appendix E), the conservation actions for these specific threats are displayed as tables with the rankings of very high (VH), high (H), medium (M), or low (L) for the following categories:

- Feasibility – the ease of implementation
- Benefit – the degree to which the proposed action, if successfully implemented, is likely to achieve the desired outcome(s)
- Cost – total cost of implementing the action based on the time required for the action, but no longer than 10 years
- Overall rank – the average weighted rank combining feasibility and benefits

Agriculture



Status

Current condition: Fair and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 3,101,742 acres (1,255,230 ha) of Agriculture habitat exist. An unknown amount of this habitat is protected in reserves and easements. The majority is other private lands.

Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

This category includes lands which are planted to sugar cane, citrus groves, row crops (e.g., corn, tomatoes, potatoes, cotton, beans), field crops (e.g., hay and grasses), and other agricultural uses (e.g., orchards, nurseries, vineyards, horse and dairy farms, and fallow cropland). In most agricultural areas both the natural substrates and native plant communities have been greatly disturbed as a result of human activities. At the margins of Agriculture habitat, some patches of native vegetation may remain, but those areas often have been invaded to some degree by weedy or exotic species. Pastures and hayfields may provide secondary habitat for some wildlife species adapted to similar natural ecosystems. When managed appropriately, Agriculture habitat can provide food resources for migratory birds and other wildlife. Wildlife movements benefit from row crops and groves that can contribute to a network of continuous habitat.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Geomys pinetis pinetis</i> | Southeastern Pocket Gopher |
| • <i>Neofiber alleni ssp.</i> | Round-tailed Muskrat |
| • <i>Sciurus niger niger</i> | Southeastern Fox Squirrel |
| • <i>Sciurus niger shermani</i> | Sherman's Fox Squirrel |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulae</i> | Florida Long-tailed Weasel |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius ssp.</i> | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|--------------------------------------|-------------------------------|
| • <i>Anas rubripes</i> | American Black Duck |
| • <i>Anas fulvigula</i> | Mottled Duck |
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Egretta tricolor</i> | Tricolored Heron |
| • <i>Egretta rufescens</i> | Reddish Egret |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Eudocimus albus</i> | White Ibis |
| • <i>Plegadis falcinellus</i> | Glossy Ibis |
| • <i>Platalea ajaja</i> | Roseate Spoonbill |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Elanus leucurus</i> | White-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Caracara cheriway audubonii</i> | Audubon's Crested Caracara |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Grus canadensis tabida</i> | Sandhill Crane (Greater) |
| • <i>Grus canadensis pratensis</i> | Florida Sandhill Crane |
| • <i>Grus americana</i> | Whooping Crane |
| • <i>Pluvialis squatarola</i> | Black-bellied Plover |
| • <i>Pluvialis dominica</i> | American Golden-Plover |
| • <i>Recurvirostra americana</i> | American Avocet |
| • <i>Tringa solitaria</i> | Solitary Sandpiper |
| • <i>Tringa flavipes</i> | Lesser Yellowlegs |
| • <i>Bartramia longicauda</i> | Upland Sandpiper |
| • <i>Numenius americanus</i> | Long-billed Curlew |
| • <i>Calidris mauri</i> | Western Sandpiper |
| • <i>Calidris melanotos</i> | Pectoral Sandpiper |
| • <i>Calidris alpina</i> | Dunlin |
| • <i>Tryngites subruficollis</i> | Buff-breasted Sandpiper |

- *Limnodromus scolopaceus* Long-billed Dowitcher
- *Scolopax minor* American Woodcock
- *Phalaropus tricolor* Wilson's Phalarope
- *Chlidonias niger* Black Tern
- *Columbina passerina* Common Ground-Dove
- *Crotophaga ani* Smooth-billed Ani
- *Athene cunicularia* Burrowing Owl
- *Asio flammeus* Short-eared Owl
- *Chordeiles minor* Common Nighthawk
- *Chordeiles gundlachi* Antillean Nighthawk
- *Caprimulgus carolinensis* Chuck-will's-widow
- *Lanius ludovicianus* Loggerhead Shrike
- *Aphelocoma coerulescens* Florida Scrub-Jay
- *Riparia riparia* Bank Swallow
- *Setophaga discolor discolor* Prairie Warbler
- *Passerina ciris* Painted Bunting
- *Dolichonyx oryzivorus* Bobolink
- *Euphagus carolinus* Rusty Blackbird
- *Euphagus cyanocephalus* Brewer's Blackbird

Amphibians

- *Ambystoma tigrinum* Eastern Tiger Salamander

Reptiles

- *Rhineura floridana* Florida Wormlizard
- *Sphaerodactylus notatus notatus* Florida Reef Gecko
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis calligaster* Yellow-bellied Kingsnake
- *Lampropeltis getula* Eastern Kingsnake
- *Pantherophis guttatus* Red Cornsake (Lower Keys population)
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Gopherus polyphemus* Gopher Tortoise
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Siproeta stelenes* Malachite

Conservation Threats

While threats to its conservation as well as remedial actions were identified during earlier workshops, the Agriculture habitat category was not addressed in the TNC workshops that generated tables of ranked threats and actions, as seen in most other habitat categories. The decision to not rank threats and actions for this habitat was made (1) to maximize discussion time for higher-priority habitats and (2) because of some disagreement over recognition of this habitat type as important to wildlife conservation. Therefore, threats and actions are presented as simple bulleted lists, arranged in alphabetical order, with no prioritization.

The following stresses threaten this habitat:

- Altered community structure
- Altered fire regime—timing, frequency, intensity, extent
- Altered hydrologic regime—timing, duration, frequency, extent
- Altered landscape pattern or mosaic
- Altered soil structure & chemistry
- Altered species composition/dominance
- Altered successional dynamics
- Altered water and/or soil temperature
- Altered water quality of surface water or aquifer: contaminants
- Altered water quality of surface water or aquifer: nutrients
- Erosion/sedimentation
- Excessive depredation and/or parasitism
- Fragmentation of habitats, communities, ecosystems
- Habitat degradation/disturbance

The sources of stress, or threats, were used to generate conservation actions:

- Chemicals and toxins
- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Incompatible fire
- Incompatible recreational activities
- Invasive animals
- Invasive plants
- Management of nature impoundments
- Nuisance animals
- Nutrient loads
- Parasites/pathogens
- Solid waste

Conservation Actions

Actions to abate threats to Agriculture were designed to reduce the impacts of agricultural activities and increase the habitat's suitability to wildlife. many threats were statewide (chemicals and toxins, conversion to commercial and industrial development, conversion to housing and urban development, incompatible fire, incompatible recreational activities, invasive animals, invasive plants, and nutrient loads).

The actions to abate threats that were identified for Agriculture are below, though none were prioritized for implementation.

Land/Water Protection

- Acquire open space with an emphasis on greenways and network of contiguous habitats
- Conserve wildlife-suitable agricultural lands through conservation easements

Land/Water/Species Management

- Restore hydrology by removing ditches, levees, and dams
- Better fire management of rangelands
- Control exotic plants and animals
- Develop and follow Best Management Practices (BMPs)
- Enroll lands in landowner incentive programs

- Reduce amount of pesticide and fertilizer use

Research, Education and Awareness

- Increase public/private training and awareness about value of these lands
- Continue to educate landowners about the proper use of BMPs
- Research plans for restoration of this habitat and its hydrology
- Research and educate landowners about management practices for controlling invasive species

Economic and Other Incentives

- Provide landowner incentive (public and private) for protection and restoration of habitat

Capacity Building

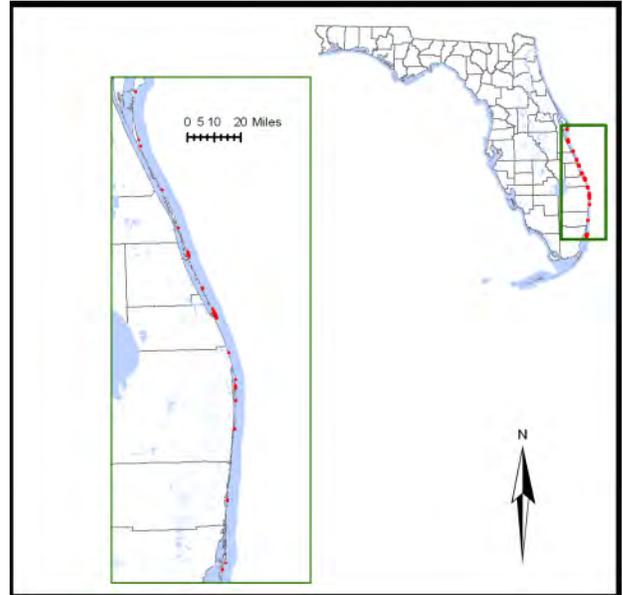
- Form and facilitate partnerships, alliances and networks of organizations willing to research, conserve, and manage this habitat

Annelid Reef



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), approximately 426 acres (172 ha) of Annelid Reefs are present in Florida.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Worm Reef

Annelid Reefs are formed by aggregations of *Phragmatopoma lapidosa* (also known as *P. caudata* and *P. lapidosa lapidosa*), a tropical marine worm, that create low reefs of sand tubes. These tubes consist of sand grains which are cemented together by protein produced by the worms. *Phragmatopoma* reproduce by releasing gametes into the water column. The free-floating larval stage can last from two to 20 weeks before they settle on or near existing Annelid Reefs that may result in habitat expansion. Waves and currents are important in transporting planktonic food and sand to the worms, thus influencing the health and growth of the reef. These reefs harbor a diverse community of live-bottom flora and fauna. Annelid Reefs provide a nursery for a variety of coastal fish and invertebrate species.

Annelid Reefs extend from Cape Canaveral to Key Biscayne in Florida but extend southward to near Santa Catarina, Brazil. In Florida, they occur in the highest abundances off St. Lucie and Martin counties. They are commonly found in the intertidal and shallow subtidal zone to about 10 m (33 ft) deep.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee

Reptiles

- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle

Fish

- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus perezi* Reef Shark
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Galeocerdo cuvier* Tiger Shark
- *Negaprion brevirostris* Lemon Shark
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Bairdiella sanctaeluciae* Striped Croaker
- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper
- *Epinephelus nigritus* Warsaw Grouper
- *Epinephelus striatus* Nassau Grouper

Invertebrates

- *Diadema antillarum* Long-spined Urchin

Conservation Threats

Threats to the Annelid Reef habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Incompatible industrial operations
- Incompatible recreational activities

- Management of nature (beach nourishment and impoundments)
- Shoreline hardening

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered structure	Very High
B	Altered weather regime/sea level rise	High
C	Habitat destruction	High
D	Habitat disturbance	High
E	Sedimentation	High

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Climate variability	High	A, B
2	Coastal development	High	A, C
3	Management of nature (beach nourishment, impoundments)	High	A, C, D, E
4	Channel modification/shipping lanes	High	A, C, D
5	Incompatible industrial operations	High	A, D
6	Utility corridors	Medium	A, C
7	Disruption of longshore transport of sediments	Medium	E
8	Dam operations/incompatible release of water: (quality, quantity, timing)	Medium	D
9	Placement of artificial structures	Low	A, C
10	Fishing gear impacts	Low	C, D
11	Incompatible recreational activities	Low	D
12	Shoreline hardening	Low	C
13	Inadequate stormwater management	Low	D
14	Boating impacts	Low	C
Statewide Threat Rank of Habitat		High	

Conservation Actions

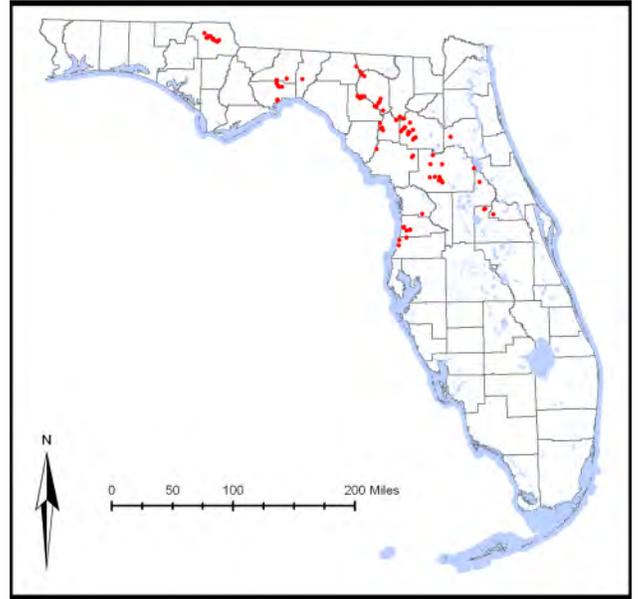
Actions to abate the threats to Annelid Reef habitats that were also identified as statewide threats (see list above), are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Many of the threats to Annelid Reefs are the same as for several other marine and estuarine habitats. Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Seagrass](#), [Mangrove Swamp](#), [Coral Reef](#), and [Beach/Surf Zone](#)).

Aquatic Cave



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 84 Aquatic Caves are included here. This represents only a fraction of all caves that have been identified. Of the mapped aquatic caves, 29% (24) are in existing conservation or managed areas, 5% (4) are within lands covered by Florida Forever projects, 1% (1) are in SHCA-identified lands, and the remaining 65% (55) of Aquatic Caves are within other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Aquatic Cave

Aquatic Caves are cavities below the surface of the ground that contain permanent standing water and range from shallow pools to completely inundated caverns. Caves develop in areas of karst topography, as water moves through underlying limestone, dissolving it and creating fissures and caverns. Due to the rise and fall of water levels, many Aquatic Caves have alternately been terrestrial caves. Some Aquatic Caves occur in conjunction with springs. Caves have stable internal environments with temperature, humidity, and water conditions remaining fairly constant. Cave waters are usually clear, and deep water often appears blue. The water may take on a brown stain if decaying plant matter is carried in with rainwater; in some areas the water may have a milky appearance because fine limestone silt is present. The chemical makeup of the water in caves is dependent on the source; most waters in aquatic caves have a high mineral content. Many Aquatic

Cave systems have species that are specifically adapted to and endemic in that system, and are therefore at greater risk from even minute changes in the habitat.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--------------------------------|---------------------|
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |

Amphibians

- | | |
|---------------------------|--------------------------|
| • <i>Eurycea wallacei</i> | Georgia Blind Salamander |
|---------------------------|--------------------------|

Fish

- | | |
|----------------------------|--------------|
| • <i>Anguilla rostrata</i> | American Eel |
|----------------------------|--------------|

Invertebrates

- | | |
|----------------------------------|-------------------------------------|
| • <i>Villosa amygdala</i> | Florida Rainbow |
| • <i>Dasyscias franzi</i> | Shaggy Ghostsnail |
| • <i>Crangonyx grandimanus</i> | Florida Cave Amphipod |
| • <i>Crangonyx hobbsi</i> | Hobbs' Cave Amphipod |
| • <i>Stygobromus</i> sp. 25 | An Aquatic Cave Amphipod |
| • <i>Caecidotea hobbsi</i> | Florida Cave Isopod |
| • <i>Caecidotea</i> sp. 7 | Rock Springs Cave Isopod |
| • <i>Caecidotea</i> sp. 8 | Econfina Springs Cave Isopod |
| • <i>Remasellus parvus</i> | Swimming Little Florida Cave Isopod |
| • <i>Cambarus cryptodytes</i> | Dougherty Plain Cave Crayfish |
| • <i>Procambarus acherontis</i> | Orlando Cave Crayfish |
| • <i>Procambarus attiguus</i> | Silver Glen Springs Cave Crayfish |
| • <i>Procambarus delicatus</i> | Big-cheeked Cave Crayfish |
| • <i>Procambarus erythropus</i> | Santa Fe Cave Crayfish |
| • <i>Procambarus franzi</i> | Orange Lake Cave Crayfish |
| • <i>Procambarus horsti</i> | Big Blue Spring Cave Crayfish |
| • <i>Procambarus leitheuseri</i> | Coastal Lowland Cave Crayfish |
| • <i>Procambarus lucifugus</i> | Light-fleeing Cave Crayfish |
| • <i>Procambarus milleri</i> | Miami Cave Crayfish |
| • <i>Procambarus morrisoni</i> | Putnam County Cave Crayfish |
| • <i>Procambarus orcinus</i> | Woodville Karst Cave Crayfish |
| • <i>Procambarus pallidus</i> | Pallid Cave Crayfish |
| • <i>Troglocambarus maclanei</i> | North Florida Spider Cave Crayfish |
| • <i>Troglocambarus</i> sp. 1 | Orlando Spider Cave Crayfish |
| • <i>Palaemonetes cummingsi</i> | Squirrel Chimney Cave Shrimp |

Conservation Threats

Threats to the Aquatic Cave habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Incompatible recreational activities
- Incompatible resource extraction: mining/drilling

Threats specific to Aquatic Caves also included mining activities causing destruction of critical, irreplaceable habitat. Habitat-specific incompatible recreation includes gating cave entrances and filling in cave openings to prevent trespass from unauthorized recreation. Caves support unique/irreplaceable species and those with very unique adaptations that may be sensitive to small increases in levels of contaminants, shifts in dissolved oxygen, temperature, or food webs.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat destruction or conversion	Medium
B	Habitat degradation/disturbance	Medium
C	Altered species composition/dominance	Medium
D	Altered hydrologic regime	Medium
E	Keystone species missing or lacking in abundance	Medium
F	Erosion/sedimentation	Low
G	Altered water quality or surface water or aquifer: contaminants	Low
H	Altered community structure	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible recreational activities	Medium	A
2	Incompatible resource extraction: mining/drilling	Medium	A
3	Solid waste	Low	A
Statewide Threat Rank of Habitat		Medium	

Conservation Actions

Actions to abate the threats to Aquatic Caves that were also identified as statewide threats (incompatible recreational activities, incompatible resource extraction: mining/drilling) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for statewide threats were only applicable to Aquatic Cave and a few other habitats (i.e., [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#),

[Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. These actions are intended to prevent harm to cave and other ecosystems influenced by groundwater by developing numeric nutrient criteria specific to cave systems and to prevent physical destruction or degradation of cave habitat from recreational activities (e.g., diving) and facilitate movement of bats and other species through upgrading or retrofitting cave entrances and infrastructure for access.

Incompatible Recreational Activities

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Discourage hard-gating or filling of cave or sink entrances and provide incentives (e.g., liability limitations where appropriate management procedures have been taken), cost-sharing, or design advice to secure cave entrances with bat-friendly gates.	H	M	M
M	Upgrade access infrastructure (e.g., boardwalks, planking) to aquatic caves to eliminate sediment disturbance by divers and spelunkers.	H	M	M

Incompatible Resource Extraction: Mining/Drilling

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create incentives to avoid loss of, and impacts to, SHCAs and sensitive habitats from mining, particularly wet and dry prairie, scrub, and bat caves.	H	M	H

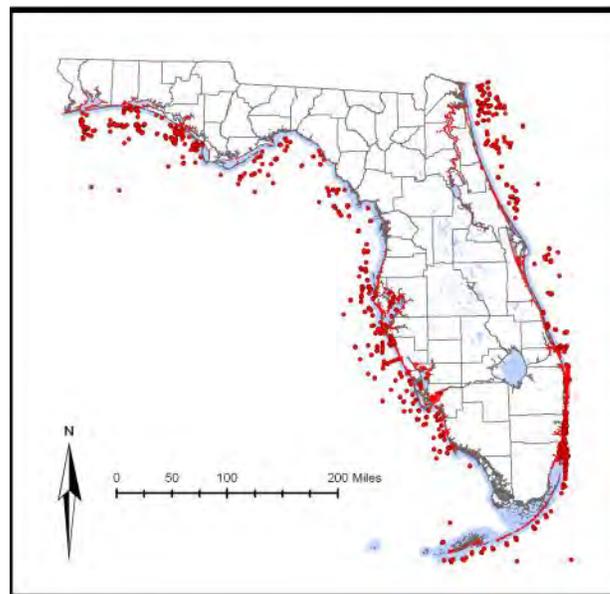
Artificial Structure



Status

Current condition: Unknown.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), over 2,000 artificial reefs and 4,368 miles (7,030 km) of hardened shoreline are known to exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources

Habitat Description

FNAI type: None

This artificial habitat is comprised of two major types of man-made structures in marine and estuarine waters—artificial reefs and hardened shorelines. Both of these structures create “Hard Bottom” habitat but after the initial deployment they typically are not actively managed as a habitat. There are multiple research and monitoring programs focusing on the impacts and benefits of these artificial habitats.

Artificial reefs are created to increase reef fish habitat, enhance recreational fishing and diving opportunities, provide socio-economic benefits to local coastal communities, and facilitate reef fish related research. Florida has one of the most active artificial reef programs among the 14 Gulf and Atlantic states involved in this activity. Thirty-four of 35 Florida coastal counties are or have been involved in artificial reef development, most of which has occurred in the last 20 years. Approximately 30 to 50 artificial reefs are constructed annually off Florida using a combination of federal, state, local, and private funds.

Hardened shorelines differ from artificial reefs in that they are a result of coastal development. Hardened shorelines include rip-rap and other types of coastal armoring as well as breakwaters, piers, and docks. These structures may also provide habitat for some sessile bivalves,

crustaceans, and limited fish communities. In many cases they can negatively impact wildlife such as nesting sea turtles and shore birds, alter natural marine and estuarine shoreline processes, and alter or replace naturally-occurring coastal habitats such as marsh, beach, and dune.

Herein the term “Artificial Structure” includes structures (artificial reefs) specifically designed and placed to enhance natural populations of species associated with hard bottom and/or reef substrates as well as structures (breakwaters, seawalls) designed to moderate or eliminate natural coastal processes such as erosion. As artificial reefs are considered a tool for management (restoration or enhancement) of species associated with hard bottom or reef habitats, future versions of the Action Plan should evaluate the management implications of artificial structures.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Pelecanus occidentalis* Brown Pelican
- *Pandion haliaetus* Osprey
- *Haematopus palliatus* American Oystercatcher
- *Chaetura pelagica* Chimney Swift
- *Progne subis* Purple Martin
- *Hirundo rustica* Barn Swallow

Reptiles

- *Caretta caretta* Loggerhead Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle

Fish

- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus perezii* Reef Shark
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Galeocerdo cuvier* Tiger Shark
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Bairdiella sanctaeluciae* Striped Croaker
- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper

- *Epinephelus nigritus* Warsaw Grouper
- *Epinephelus striatus* Nassau Grouper

Invertebrates

- *Crassostrea virginica* Eastern Oyster

Conservation Threats

While threats to its conservation as well as remedial actions were identified during Action Plan Science Workshops I and II, the Artificial Structure habitat category was not addressed in TNC workshops that generated tables of ranked threats and actions, as seen in most other habitat categories. The decision to not rank threats and actions for this habitat was made to maximize discussion time for higher-priority habitats and because of some disagreement over recognition of this habitat type as important to wildlife conservation. Therefore, threats and actions are presented as bulleted lists with no prioritization.

The following stresses threaten this habitat:

- Absent to insufficient biological legacies
- Altered community structure
- Altered hydrologic regime—timing, duration, frequency, extent
- Altered species composition/dominance
- Altered successional dynamics
- Altered water and/or soil temperature
- Altered water quality of surface water or aquifer: contaminants
- Altered water quality of surface water or aquifer: nutrients
- Erosion/sedimentation
- Excessive depredation and/or parasitism
- Fragmentation of habitats, communities, ecosystems
- Habitat degradation/disturbance
- Keystone species missing or lacking in abundance
- Missing key communities, functional guilds, or seral stages

The following sources of stress, or threats, were used to generate conservation actions:

- Acoustic pollution
- Chemicals and toxins
- Coastal development
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Inadequate stormwater management
- Incompatible fishing pressure
- Incompatible recreational activities
- Incompatible wildlife and fisheries management strategies
- Invasive animals
- Invasive plants
- Management of nature—beach nourishment and impoundments
- Nuisance animals
- Nutrient loads—urban
- Parasites/pathogens
- Roads, bridges, and causeways
- Shoreline hardening
- Solid waste

Conservation Actions

Actions to abate threats to Artificial Structure were largely designed to reduce the impacts of urban activities, and to increase the habitat's suitability to wildlife. Most of the threats to this habitat (see list above) were also identified for multiple other habitats, and are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. Exceptions are acoustic pollution, nuisance animals, and solid waste.

The actions to abate threats that were identified for Artificial Structure habitat are below, though none were prioritized for implementation.

Law and Policy

- Encourage coastal development planning that minimizes the demand for shoreline hardening
- Institute seafloor management planning for wildlife habitat retention
- Support policies that reduce waste and increase ease of recycling (e.g., monofilament collection and recycling, municipal composting, water reuse, and curbside recycling)

Research, Education and Awareness

- Continue to investigate effects of artificial reefs on fish population dynamics
- Develop effective erosion control structures that minimize impacts to marine environment
- Target education for homeowners, developers, construction contractors, and policy makers to benefit wildlife in their day-to-day activities
- Involve community volunteers in wildlife conservation efforts and increase their opportunities for involvement
- Educate homeowners about proper pesticide and fertilizer use and disposal

Economic and Other Incentives

- Provide awards to municipalities, organizations, and individuals that implement wildlife-friendly design and management practices
- Provide funds and materials for landowners to remove invasive exotics (e.g., commensal rats, Brazilian pepper, etc)
- Support spay or neuter programs for cats and dogs and reduce number of free-ranging pets

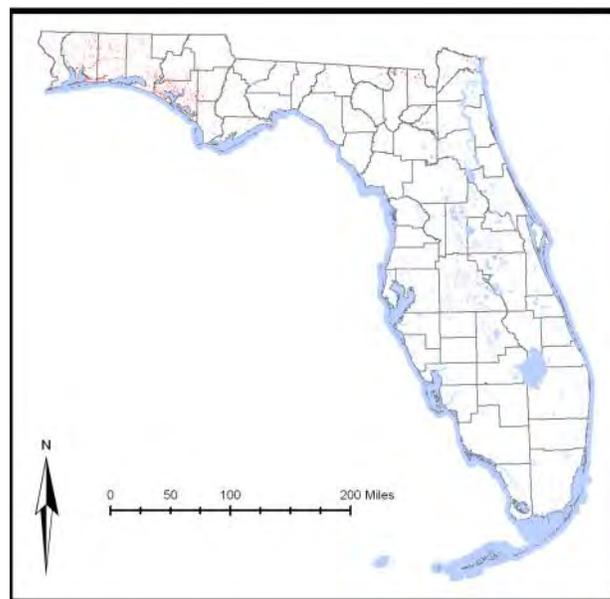
Bay Swamp



Status

Current condition: Unknown.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 201,765 acres (81,651 ha) of Bay Swamp habitat exist, of which 32% (65,570 ac; 26,535 ha) are in existing conservation or managed areas. Another 14% (27,471 ac; 11,117 ha) are Florida Forever projects and 7% (13,486 ac; 5,458 ha) are SHCA-identified lands. The remaining 47% (95,238 ac; 38,541 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Baygall, Bog

These hardwood swamps contain broadleaf evergreen trees that occur in shallow, stagnant drainages or depressions often found within pine flatwoods, or at the base of sandy ridges where seepage maintains constantly wet soils. Where Bay Swamp occurs in seepage areas it is often associated with or grades into Seepage/Steephead Stream habitat. The soils, which are usually covered by an abundant layer of leaf litter, are mostly acidic peat or muck that remains saturated for long periods but over which little water level fluctuation occurs.

The overstory within bayheads primarily is composed of evergreen hardwood trees, but bay trees, especially sweetbay, red bay, and loblolly bay, dominate the canopy and characterize the community. Depending on the location within the state, other species including pond pine, slash pine, blackgum, cypress, and Atlantic white cedar can occur as scattered individuals. Understory

and ground cover species may include dahoon holly, wax myrtle, fetterbush, greenbriar, royal fern, cinnamon fern, and sphagnum moss.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|---------------------------------------|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Neovison vison</i> ssp. | Mink |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|---------------------------------------|------------------------------------|
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Buteo brachyurus</i> | Short-tailed Hawk |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga dominica stoddardi</i> | Stoddard's Yellow-throated Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Euphagus carolinus</i> | Rusty Blackbird |

Amphibians

- | | |
|------------------------------------|--------------------------------|
| • <i>Hyla andersonii</i> | Pine Barrens Treefrog |
| • <i>Lithobates virgatipes</i> | Carpenter Frog |
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |
| • <i>Eurycea chamberlaini</i> | Chamberlain's Dwarf Salamander |
| • <i>Hemidactylum scutatum</i> | Four-toed Salamander |
| • <i>Notophthalmus perstriatus</i> | Striped Newt |
| • <i>Stereochilus marginatus</i> | Many-lined Salamander |

Reptiles

- | | |
|---|----------------------|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Plestiodon anthracinus pluvialis</i> | Southern Coal Skink |
| • <i>Crotalus horridus</i> | Timber Rattlesnake |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Farancia erytrogramma</i> | Rainbow Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Clemmys guttata</i> | Spotted Turtle |
| • <i>Deirochelys reticularia</i> | Chicken Turtle |
| • <i>Terrapene carolina</i> | Eastern Box Turtle |

Invertebrates

- | | |
|-----------------------------------|------------------------------|
| • <i>Amblyscirtes aesculapius</i> | Lace-winged Roadside Skipper |
|-----------------------------------|------------------------------|

- | | |
|--|--------------------------|
| • <i>Euphyes berryi</i> | Berry's Skipper |
| • <i>Euphyes dion</i> | Dion Skipper |
| • <i>Staphylus hayhurstii</i> | Scalloped Sooty Wing |
| • <i>Callophrys gryneus</i> | Olive Hairstreak |
| • <i>Callophrys gryneus sweadneri</i> | Florida Olive Hairstreak |
| • <i>Satyrium kingi</i> | King's Hairstreak |
| • <i>Satyrium liparops floridensis</i> | Sparkleberry Hairstreak |
| • <i>Zale perculata</i> | Okefenokee Zale Moth |
| • <i>Anthanassa texana seminole</i> | Seminole Crescent |
| • <i>Enodia portlandia floralae</i> | Florida Pearly Eye |
| • <i>Satyrodes appalachia</i> | Appalachian Brown |

Conservation Threats

Threats to Bay Swamp habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|---|--|
| • Conversion to agriculture | • Invasive animals |
| • Conversion to housing and urban development | • Invasive plants |
| • Groundwater withdrawal | • Surface water withdrawal and diversion |
| • Incompatible fire | • Roads |

Threats specific to Bay Swamp included loss and degradation that occurs when this habitat is surrounded by development, eutrophication impacts when water from agricultural or developed landscapes is drained into these swamps, and insufficient fire. These impacts have allowed Bay Swamp to expand into areas that were once herbaceous seepage communities, replacing herbaceous wetlands with closed-canopy forested wetlands.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered landscape mosaic or context	High
B	Altered species composition/dominance	High
C	Fragmentation of habitats, communities, ecosystems	High
D	Altered hydrologic regime	Medium
E	Altered soil structure and chemistry	Medium
F	Altered fire regime	Medium
G	Altered community structure	Medium
H	Altered water quality of surface water or aquifer: nutrients	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Invasive plants	High	B

2	Conversion to agriculture	High	A, C
3	Conversion to housing and urban development	High	A, C
4	Groundwater withdrawal	Medium	D
5	Surface water withdrawal	Medium	B, C, D
6	Incompatible grazing and ranching	Low	B, E
7	Invasive animals	Low	E
8	Incompatible fire	Low	A, F, G
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Bay Swamp habitat that were also identified as statewide threats are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Bay Swamp and other freshwater habitats are below, though none were ranked of high priority for implementation. These actions were designed to reduce the degrading impacts of agriculture and development, and increase fire management of this habitat.

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create voluntary incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.	M	M	H

Conversion to Housing and Urban Development

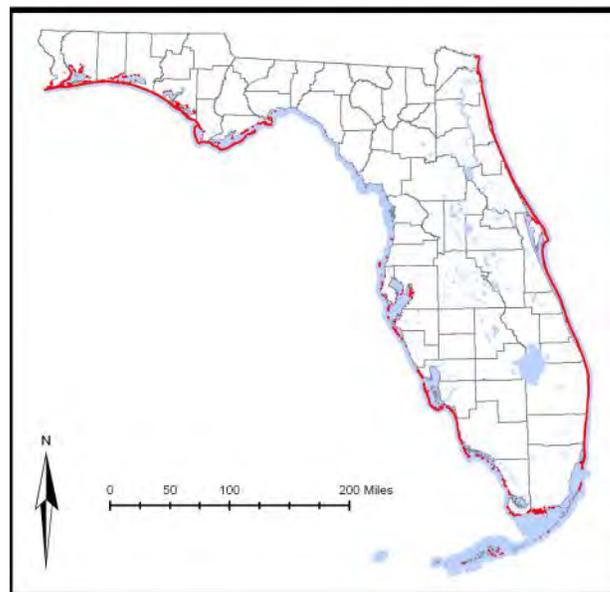
Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Provide voluntary tax or other incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers, and floodplains that would commit river frontage and riparian habitats to permanent conservation zones.	M	L	VH

Beach/Surf Zone



Status

Current condition: Good and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 32,295 acres (13,069 ha) of Beach/Surf Zone habitat exist, of which 46% (14,858 ac; 6,013 ha) are in existing conservation or managed areas. Another 1% (312 ac; 126 ha) are Florida Forever projects and 5% (1,473 ac; 596 ha) are SHCA-identified lands. The remaining 48% (15,652 ac; 6,334 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Beach Dune

The Beach/Surf Zone is the long, often narrow strip of sand and shells between the tides. Daily flooding by salt water and moderate- to high-energy waves prohibit plant growth except for some inconspicuous algae. Low-energy beaches provide important spawning habitat for horseshoe crabs and feeding habitat for multiple species of shorebirds. Beach dunes are mounds of wind-blown sand that are periodically inundated by seawater during extreme high tides and storms. Vegetation on beach dunes varies regionally in Florida but is restricted to a few highly specialized terrestrial plants.

Florida beaches are important nesting sites for several species of shorebirds and wintering grounds for others. Beaches are also vital nesting sites for many sea turtles and support numerous other mammals and invertebrates. The surf zone is an important nursery and feeding habitat for many species of fish including permit and Florida pompano.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|------------------------------|
| • <i>Peromyscus polionotus allophrys</i> | Choctawhatchee Beach Mouse |
| • <i>Peromyscus polionotus leucocephalus</i> | Santa Rosa Beach Mouse |
| • <i>Peromyscus polionotus niveiventris</i> | Southeastern Beach Mouse |
| • <i>Peromyscus polionotus peninsularis</i> | St. Andrew Beach Mouse |
| • <i>Peromyscus polionotus phasma</i> | Anastasia Island Beach Mouse |
| • <i>Peromyscus polionotus trissyllepsis</i> | Perdido Key Beach Mouse |
| • <i>Procyon lotor auspicatus</i> | Key Vaca Raccoon |
| • <i>Procyon lotor incautus</i> | Key West Raccoon |
| • <i>Procyon lotor inesperatus</i> | Matecumbe Key Raccoon |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |
| • <i>Eubalaena glacialis</i> (incl. <i>australis</i>) | North Atlantic Right Whale |

Birds

- | | |
|---|--------------------------|
| • <i>Sula dactylatra</i> | Masked Booby |
| • <i>Pelecanus occidentalis</i> | Brown Pelican |
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta rufescens</i> | Reddish Egret |
| • <i>Pandion haliaetus</i> | Osprey |
| • <i>Falco columbarius</i> | Merlin |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Pluvialis squatarola</i> | Black-bellied Plover |
| • <i>Pluvialis dominica</i> | American Golden-Plover |
| • <i>Charadrius nivosus</i> | Snowy Plover |
| • <i>Charadrius wilsonia</i> | Wilson's Plover |
| • <i>Charadrius melodus</i> | Piping Plover |
| • <i>Haematopus palliatus</i> | American Oystercatcher |
| • <i>Tringa semipalmata semipalmata</i> | Eastern Willet |
| • <i>Tringa semipalmata inornata</i> | Western Willet |
| • <i>Tringa flavipes</i> | Lesser Yellowlegs |
| • <i>Numenius phaeopus</i> | Whimbrel |
| • <i>Numenius americanus</i> | Long-billed Curlew |
| • <i>Limosa fedoa</i> | Marbled Godwit |
| • <i>Arenaria interpres</i> | Ruddy Turnstone |
| • <i>Calidris canutus</i> | Red Knot |
| • <i>Calidris canutus rufa</i> | Red Knot (<i>rufa</i>) |
| • <i>Calidris alba</i> | Sanderling |
| • <i>Calidris pusilla</i> | Semipalmated Sandpiper |
| • <i>Calidris mauri</i> | Western Sandpiper |
| • <i>Calidris alpina</i> | Dunlin |
| • <i>Calidris himantopus</i> | Stilt Sandpiper |
| • <i>Limnodromus griseus</i> | Short-billed Dowitcher |
| • <i>Anous stolidus</i> | Brown Noddy |
| • <i>Onychoprion fuscatus</i> | Sooty Tern |
| • <i>Onychoprion anaethetus</i> | Bridled Tern |
| • <i>Sternula antillarum</i> | Least Tern |
| • <i>Gelochelidon nilotica</i> | Gull-billed Tern |
| • <i>Hydroprogne caspia</i> | Caspian Tern |
| • <i>Sterna dougallii</i> | Roseate Tern |

- *Thalasseus maximus* Royal Tern
- *Thalasseus sandvicensis* Sandwich Tern
- *Rynchops niger* Black Skimmer

Reptiles

- *Crocodylus acutus* American Crocodile
- *Plestiodon egregius egregius* Florida Keys Mole Skink
- *Plestiodon egregius insularis* Cedar Key Mole Skink
- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Dermochelys coriacea* Leatherback Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead

Invertebrates

- *Uca minax* Red-jointed Fiddler, Brackish Water Fiddler
- *Uca pugilator* Sand Fiddler
- *Uca pugnax* Mud Fiddler
- *Cicindela hirticollis* Hairy-necked Tiger Beetle
- *Cicindela olivacea* Olive Tiger Beetle
- *Branchus floridanus* South Florida Beach Darkling Beetle
- *Neothyonidium parvum* A Sea Cucumber

Conservation Threats

Threats to the Beach/Surf Zone habitat that were also identified for multiple other terrestrial habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Climate variability
- Incompatible recreational activities
- Invasive animals
- Shoreline hardening

Threats to Beach/Surf Zone habitat that were also identified for multiple other marine and estuarine habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Coastal development

- Dam operations
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Incompatible wildlife and fisheries management strategies
- Industrial spills
- Invasive animals
- Invasive plants
- Key predator/herbivore losses
- Management of nature–beach nourishment
- Nutrient loads
- Roads, bridges and causeways
- Shoreline hardening
- Vessel impact

Beach/Surf Zone-specific land-based threats are similar to those for the Coastal Strand habitat. Because of the importance of these habitats for coastal SGCN, such as sea turtles, shorebirds, and beach mice, threats such as light pollution that can inhibit turtle nesting and increase predation for these and other species were highlighted. Dredging of new inlets and deposition of dredged materials for beach nourishment, dune restoration, and other purposes degrade these habitats and can directly impact these species, as can disturbance and predation by nuisance animals. While beach nourishment was primarily viewed as a threat, experts understood the related benefits of habitat restoration, particularly for sea turtles. Activities of residents and their pets living adjacent to Beach/Surf Zone and using the habitat can cause degradation. Military base closure threatens potential conservation protection for Beach/Surf Zone. This habitat also faces numerous water-based threats, such as those caused by changes in natural sediment movement, contamination from industrial spills or urban runoff, and incompatible boating and fishing recreational activities.

The following stresses (and sources of stress below) threaten this habitat in terrestrial habitats:

Stresses		Habitat Stress Rank
A	Habitat degradation/disturbance	Very High
B	Erosion/sedimentation	High
C	Excessive depredation and/or parasitism	High
D	Altered soil structure and chemistry	High
E	Insufficient size/extent of characteristic communities or ecosystems	Medium

The sources of stress, or threats, were used to generate conservation actions. The following sources of stress are threats identified for terrestrial habitats.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible recreational activities	Very High	A, C, D
2	Sea level rise	High	B, E
3	Shoreline hardening	High	A, B, D, E
4	Management of nature–nourishment	High	A, B, D, E

5	Light pollution	High	A, C
6	Invasive animals	High	C
7	Management of nature—inlet relocation and dredging	High	B, D
8	Nuisance animals	Medium	A, C
9	Channel modification/shipping lanes	Medium	A, B, E
10	Management of nature—beach raking	Medium	A, B
11	Management of nature—driving for maintenance	Low	A, C
Statewide Threat Rank of Habitat		Very High	

The following stresses (and sources of stress below) threaten this habitat in marine and estuarine habitats:

Stresses		Habitat Stress Rank
F	Erosion	Very High
G	Habitat destruction	Very High
H	Altered weather regime/sea level rise	High
I	Habitat disturbance	High
J	Altered structure	Medium
K	Habitat fragmentation	Medium

The following sources of stress are threats identified for marine and estuarine habitats:

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Climate variability	Very High	F, G, H, K
2	Coastal development	Very High	F, G, I, J, K
3	Roads, bridges and causeways	Very High	F, G, I, J, K
4	Shoreline hardening	High	F, G, I, J, K
5	Disruption of longshore transport of sediments	High	F, G, I, J, K
6	Management of nature (beach nourishment, impoundments)	High	I, J, K
7	Harmful algal blooms	High	I
8	Incompatible industrial operations	High	F, G, H, I, J, K
9	Invasive plants	High	I, J, K
10	Channel modification/shipping lanes	High	F, G, I, J
11	Nutrient loads (all sources)	High	I
12	Key predator/herbivore losses	High	I
13	Dam operations/incompatible release of water	High	F, I
14	Industrial spills	Medium	I

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
15	Invasive animals	Medium	I
16	Light pollution	Medium	I
17	Chemicals and toxins	Medium	I
18	Incompatible resource extraction: mining/drilling	Medium	F, G, I, J
19	Incompatible fishing pressure	Medium	I
20	Incompatible recreational activities	Medium	I
21	Inadequate stormwater management	Medium	F, I
22	Utility corridors	Medium	F, G
23	Sonic pollution	Medium	I
24	Fishing gear impacts	Medium	I
25	Vessel impacts	Medium	I
26	Solid waste	Medium	I, J, K
27	Incompatible wildlife and fisheries management strategies	Medium	I
28	Incompatible aquaculture operations	Low	I
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to the Beach/Surf Zone habitat that were also identified as statewide threats (see lists above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

The actions below address specific threats identified with the Beach/Surf Zone habitat (sometimes in conjunction with a few additional habitats). Actions specific to this habitat were identified in both the terrestrial and marine workshops. These voluntary and incentive-based actions were designed to reduce the need for beach nourishment through reduction of activities that cause sediment movement and protection of shorelines from development and other voluntary and incentive-based actions that might require nourishment. Other actions are identified improvements needed to prevent chemical spills, and changes to and education about fishing and boating activities that will reduce threats to coastal SGCN.

TERRESTRIAL-BASED ACTIONS

Light Pollution

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Ensure through state and local cooperation that coastal lighting ordinances are updated as technology and information improves.	VH	M	L

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Support cooperative education programs developed and/or implemented by utility companies and local governments for coastal property owners to ensure that light ordinances protecting coastal wildlife are supported (e.g., availability of automatic light shut-off features for beach lights).	VH	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Support and expand the coastal light replacement efforts of the U.S. Fish and Wildlife Service to be implemented statewide where sea turtle nesting and beach mouse habitat exists.	H	M	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Support sea turtle and beach mouse-friendly lighting in coastal habitats. Fund incentives for retrofitting existing light features.	VH	M	H
M	Support installation of appropriate light technology for conservation of sea turtles and other coastal species on military lands, Kennedy Space Center, and ports (domestic security facilities).	M	M	H

Nuisance Animals

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Increase funding to implement existing sea turtle management practices and ordinances regarding prevention of egg and hatchling predation. Promote the use of volunteer groups in association with the FWC to provide more capacity for implementation.	VH	L	M
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Identify important habitat areas for nesting shorebirds (of Greatest Conservation Need), and reduce impacts from people and pets (as appropriate) from these areas through targeted education and signage.	VH	L	M
L	Educate public landowners with responsibilities for coastal zone wildlife conservation about USDA protocols for raccoon management.	H	L	L
L	Develop public education tools on and encourage removal of unconsumed pet foods from outdoor containers.	L	M	M
L	Educate home and business owners on the use of wildlife-proof garbage containers.	H	L	H
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Encourage understanding of existing pet restraint rules.	M	L	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Future public lands management plans for coastal managed areas should consider inclusion of control plans for feral animals.	H	M	M
L	Develop techniques for waste management in areas where SGCN or habitats are subject to high depredation or disturbance rates by exotic and nuisance animals with populations elevated by access to garbage (providing a supplemental food source).	M	L	L
Overall Rank	Policy	Feasibility	Benefits	Cost
M	Assist counties, municipalities, and homeowner associations to develop and implement curbside pick-up of yard and household waste.	H	M	M

TERRESTRIAL-AND-MARINE-BASED ACTIONS**Management of Nature – Dredging**

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Assist in the development of statewide, system-specific dredge material disposal plans that identify long-term disposal sites, specify dredge deposition practices, and minimize or offset impacts to all fish and wildlife resources. Encourage linking the statewide dredge material management plan to port expansion management plans.	M	M	M
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Assist in the development of educational programs on natural coastal processes and the ecological benefits and impacts, and economic costs of beach nourishment efforts.	H	L	L
L	Provide technical expertise on impacts of beach dredging/nourishment projects.	L	M	M
L	Assist in the development of criteria for long-term monitoring of dredging and nourishment projects.	M	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Discourage dredging of natural inlets and passes not designated for navigation.	L	M	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop one or several coalitions of local groups statewide to identify local restoration projects where dredge material can be used.	M	L	L
Overall Rank	Research	Feasibility	Benefits	Cost
L	Compare the cost of conducting dredge/nourishment projects in perpetuity to spending equal state/federal dollars on acquiring lands subject to erosion (barrier islands) and putting those lands into uses that are not dependent upon dredging.	H	L	L
L	Fund research on the impacts of beach nourishment on fish and wildlife resources.	H	L	L

MARINE-BASED ACTIONS**Disruption of Longshore Transport of Sediments**

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Provide outreach to the public and to land-use, planning, and regulation agencies so they have a better understanding of barrier island dynamics and natural sediment movement (FEMA-like map). Include cost-benefit information on environmental communities affected.	M	L	L
L	Assist in the development of educational tools about the ephemeral characteristics of natural inlets and provide technical expertise on the fish and wildlife resources associated with this habitat.	L	M	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Encourage restoration of natural sediment transport processes as an alternative to beach nourishment where possible.	L	H	M
L	Improve implementation of sediment management practices.	L	M	L

Overall Rank	Policy	Feasibility	Benefits	Cost
M	Assist in the revision of national flood insurance programs and provide technical expertise on fish and wildlife resources for areas of high sediment transport and unstable shorelines.	M	M	L
Overall Rank	Research	Feasibility	Benefits	Cost
H	Conduct an economic analysis of maintaining structures such as inlets and hardened shorelines that includes benefits and impacts to fish and wildlife resources.	M	H	M
M	Conduct regional studies on sediment transport budget and natural sediment processes (not site by site). Collect and map historic information on barrier islands and estuarine sand bars.	M	M	M

Management of Nature–Beach Nourishment

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Establish a statewide data clearinghouse or public-private partnership to house all beach nourishment project monitoring results to facilitate the evaluation of cumulative project effects and future project design (i.e., lessons learned). Review the economics of projects including natural resource values pre- and post-project construction. Synthesize the data collected from all projects.	M	M	M
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
H	Assist in the development of educational materials about the impacts of coastal development; provide technical expertise on impacts to coastal fish and wildlife resources.	VH	M	M
M	Encourage beach resorts to protect turtle nests through awareness and education programs and by providing support for beach assessment teams (room and board). Provide funding for organizations that provide awareness support.	H	M	L
Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
VH	Acquire coastal lands for habitat protection and management to reduce the need for beach nourishment.	VH	VH	VH
H	Acquire more land where sea turtles are nesting and are known to nest. Support Florida Forever funding to accommodate a specific coastal zone acquisition component similar to the " Blue Acres " coastal protection program in New Jersey.	H	H	VH
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Investigate and develop, as necessary, sand management technologies to avoid using beach nourishment. Develop statewide BMPs for sand management.	M	M	M
L	Identify and prioritize beach dune restoration projects where possible and warranted. Be proactive as a means of avoiding the need for beach nourishment where possible. (Potential partner is the USACE.)	M	M	M
L	Establish a statewide beach dune restoration protocol for nourishment projects. (Determine if there are existing similar programs. If so, document their requirements and protocols.)	M	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Review state database to avoid known potential impacts and work with affected parties to develop avoidance, minimization, and mitigation strategies for future nourishment actions.	H	M	M

Industrial Spills

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Assist in the revision of emergency response plans in cooperation with the county EOCs, FDEP, DCA, and USCG for coastal waters where water-borne transport of oil and chemicals occur. Encourage bi-annual updates.	H	M	M
M	Assist in the revision of emergency response plans in cooperation with the county EOCs, FDEP, DCA, USCG and EPA for coastal waters that may be subject to land-based spills of oil and chemicals. Encourage bi-annual updates.	H	M	M

Incompatible Fishing Pressure

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Support an independent peer review of current fishery stock assessments of near-shore marine species.	H	M	H
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Develop and implement an outreach strategy for subsistence fishers to better understand their impacts on nearshore fish populations.	VH	L	M
Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
M	Review effectiveness of current no-take areas.	L	H	H

Incompatible Recreational Activities

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Educate boaters, especially new boat operators, about sensitive areas and proper boating techniques, including anchoring, through an outreach program (kiosks, pamphlets, and signage). Develop Boater Guides for areas where they are currently unavailable and distribute at the time of boater registration and at boat rental offices.	M	M	H
L	Conduct an outreach program to educate beachgoers and other recreational users about the impact of collecting live shells.	H	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Encourage the use of buffers to sensitive wildlife and habitat areas. Develop multi-use plans that include use of sensitive areas and areas for human use.	H	M	H
L	Initiate a statewide underwater coastal cleanup.	M	L	M
Overall Rank	Research	Feasibility	Benefits	Cost
M	Where information is lacking, conduct study(ies) to assess cumulative impacts of human use of beach habitats. Consider already shifted baselines.	M	M	H

- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Haematopus palliatus* American Oystercatcher
- *Tringa semipalmata semipalmata* Eastern Willet
- *Tringa semipalmata inornata* Western Willet
- *Numenius phaeopus* Whimbrel
- *Limosa fedoa* Marbled Godwit
- *Arenaria interpres* Ruddy Turnstone
- *Calidris canutus* Red Knot
- *Calidris canutus rufa* Red Knot (rufa)
- *Calidris mauri* Western Sandpiper
- *Calidris alpina* Dunlin
- *Limnodromus griseus* Short-billed Dowitcher
- *Limnodromus scolopaceus* Long-billed Dowitcher

Reptiles

- *Caretta caretta* Loggerhead Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Macrochelys temminckii* Alligator Snapping Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Acipenser brevirostrum* Shortnose Sturgeon
- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Carcharhinus plumbeus* Sandbar Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Atractosteus spatula* Alligator Gar
- *Epinephelus itajara* Goliath Grouper

Invertebrates

- *Crassostrea virginica* Eastern Oyster
- *Fasciolaria liliium* Banded Tulip
- *Lysmata wurdemanni* Peppermint Shrimp

Conservation Threats

Threats to the Bivalve Reef habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Incompatible wildlife and fisheries management strategies
- Invasive animals

- Management of nature (beach nourishment and impoundments)
- Nutrient loads–urban
- Roads, bridges and causeways
- Surface water and groundwater withdrawal

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered hydrologic regime	Very High
B	Altered structure	High
C	Altered water quality–physical, chemical	High
D	Habitat disturbance	High
E	Altered species composition	Medium
F	Altered water quality–nutrients	Medium
G	Altered water quality–contaminants	Medium
H	Erosion	Medium
I	Excessive depredation	Medium
J	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Inadequate stormwater management	Very High	A, B, C, D, F, G
2	Roads, bridges and causeways	High	A
3	Coastal development	High	A, J
4	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, B, C, F, G
5	Harmful algal blooms	High	D, E, F
6	Surface water withdrawal	High	A, C
7	Channel modification/shipping lanes	High	A, J
8	Invasive animals	High	B, E, I
9	Nutrient loads (all sources)	High	F
10	Management of nature (beach nourishment, impoundments)	High	A, B, C
11	Incompatible recreational activities	Low	D
12	Incompatible industrial operations	Low	G
13	Incompatible wildlife and fisheries management strategies	Low	B, E
14	Incompatible fishing pressure	Low	E
15	Boating impacts	Low	B, D, H
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

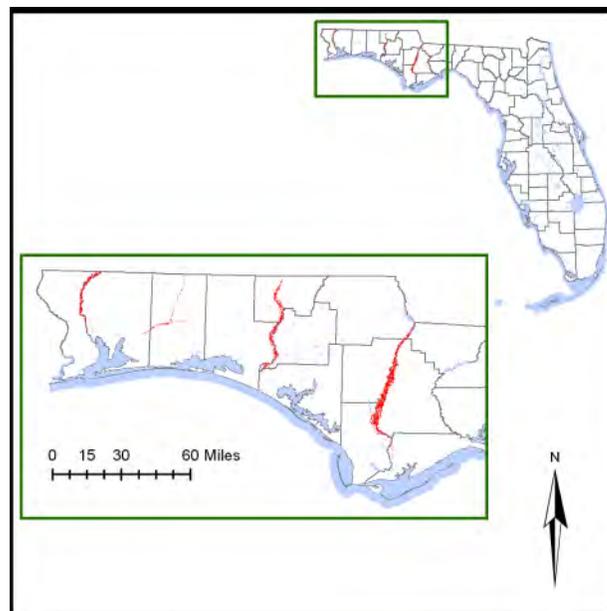
Nearly all threats to Bivalve Reefs were also identified as statewide threats (see list above). Actions for abatement are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. The sole habitat-specific threat to Bivalve Reefs is boating impacts, which also affects several other marine and estuarine habitats. Consequently, actions to abate this threat will be the same or similar to the actions recommended for the other affected marine and estuarine habitats (e.g., [Coastal Tidal River or Stream](#), [Seagrass](#), [Subtidal Unconsolidated Marine/Estuary Sediment](#), [Tidal Flat](#)) and are not repeated here.

Bottomland Hardwood Forest



Status

Current condition: Good and unknown trend. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 84,141 acres (34,051 ha) of Bottomland Hardwood Forest habitat exist, of which 58% (48,778 ac; 19,740 ha) are in conservation or managed areas. Another 5% (4,721 ac; 1,911 ha) are in Florida Forever projects and 25% (20,647 ac; 8,356 ha) are in SHCA-designated lands. The remaining 12% (9,995 ac; 4,045 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Floodplain Forest, Floodplain Swamp, Freshwater Tidal Swamp

These seasonally flooded wetland forests are composed of a diverse assortment of hydric hardwoods which occur on the rich alluvial soils of silt and clay deposited along the floodplain of several Panhandle rivers including the Apalachicola, Choctawhatchee, and Escambia. These communities are characterized by an overstory that includes water hickory, overcup oak, swamp chestnut oak, river birch, American sycamore, red maple, Florida elm, bald cypress, blue beech, and swamp ash. The understory can range from open and park-like to dense and nearly impenetrable. Understory plants can include bluestem palmetto, hackberry, swamp azalea, pink azalea lanceleaf greenbrier, poison ivy, peppervine, rattanvine, indigo bush, white grass, plume grass, redtop panicum, caric sedges, silverbells, crossvine, American wisteria, and wood grass. In Bottomland Hardwood Forests, soils and hydroperiods primarily determine the diverse temporary and permanent species composition along with community structure. Additionally, the rich organic material that accumulates on the forest floor is carried off by flooding waters during the wet season,

and therefore provides an essential source of minerals and nutrients for downstream ecosystems such as estuarine systems.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--------------------------------------|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Neovison vison</i> ssp. | Mink |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|---------------------------------------|------------------------------------|
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Buteo platypterus</i> | Broad-winged Hawk |
| • <i>Scolopax minor</i> | American Woodcock |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Campephilus principalis</i> | Ivory-billed Woodpecker |
| • <i>Progne subis</i> | Purple Martin |
| • <i>Hylocichla mustelina</i> | Wood Thrush |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Geothlypis formosa</i> | Kentucky Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga dominica stoddardi</i> | Stoddard's Yellow-throated Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Cardellina canadensis</i> | Canada Warbler |
| • <i>Euphagus carolinus</i> | Rusty Blackbird |

Amphibians

- | | |
|-----------------------------------|---------------------------|
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |
| • <i>Hemidactylium scutatum</i> | Four-toed Salamander |

Reptiles

- | | |
|--|-------------------------|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Plestiodon anthracinus pluvialis</i> | Southern Coal Skink |
| • <i>Agkistrodon contortrix contortrix</i> | Southern Copperhead |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Farancia erytrogramma</i> | Rainbow Snake |
| • <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |

- *Nerodia cyclopion* Mississippi Green Watersnake
- *Deirochelys reticularia* Chicken Turtle
- *Graptemys barbouri* Barbour's Map Turtle
- *Graptemys ernsti* Escambia Map Turtle
- *Macrochelys temminckii* Alligator Snapping Turtle
- *Pseudemys nelsoni* Florida Red-bellied Cooter (Panhandle Population)
- *Pseudemys suwanniensis* Suwannee Cooter
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Amblyscirtes aesculapius* Lace-winged Roadside Skipper
- *Amblyscirtes hegon* Pepper and Salt Skipper
- *Amblyscirtes vialis* Common Roadside-skipper
- *Megathymus cofaqui* Cofaqui Skipper
- *Megathymus yuccae* Yucca Skipper
- *Poanes yehl* Yehl Skipper
- *Callophrys augustinus* Brown Elfin
- *Callophrys henrici* Henry's Elfin
- *Feniseca tarquinius* Harvester
- *Satyrium kingi* King's Hairstreak
- *Satyrium liparops floridensis* Sparkleberry Hairstreak
- *Pyreferra ceromatica* Ceromatic Noctuid Moth
- *Anthanassa texana seminole* Seminole Crescent
- *Chlosyne nycteis* Silvery Checkerspot
- *Enodia portlandia floralae* Florida Pearly Eye

Conservation Threats

Threats to Bottomland Hardwood Forest habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Invasive animals
- Invasive plants
- Roads

No habitat-specific threats to Bottomland Hardwood Forest were identified.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	High
B	Altered community structure	Medium
C	Missing key communities, functional guilds, or seral stages	Medium
D	Altered hydrologic regime	Medium
E	Fragmentation of habitats, communities, ecosystems	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Roads	Medium	A
2	Invasive plants	Medium	A
3	Invasive animals	Medium	A
Statewide Threat Rank of Habitat		Medium	

Conservation Actions

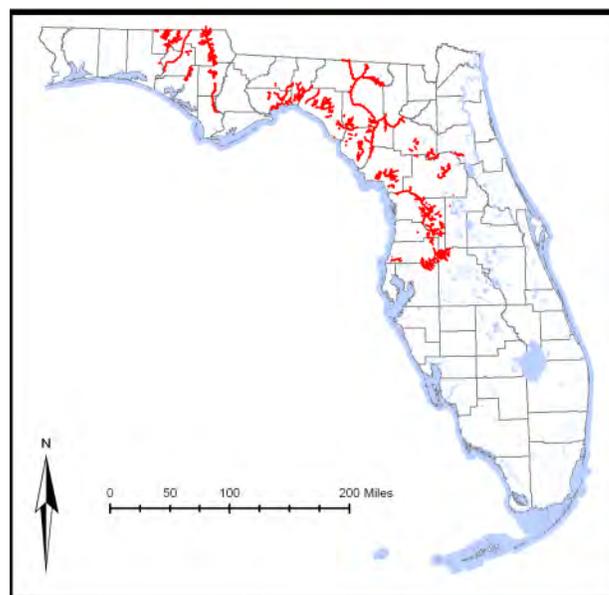
Actions to abate the threats to Bottomland Hardwood Forest that were also identified as statewide threats (invasive animals, invasive plants, roads) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Because the experts did not identify any Bottomland Hardwood Forest habitat-specific threats, no specific actions were identified.

Calcareous Stream



Status

Current condition: Good and declining. According to the best available GIS information at this time (Appendix C: GIS Data Tables), there are approximately 2,071 miles (3,332 km) of Calcareous Streams in Florida.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Spring-run Stream

The Calcareous Stream habitat occurs only in the north and central regions of the state and is comprised of 26 streams originating in or flowing through the Ocala Uplift region of north central Florida and the eastern panhandle, and the Dougherty Plain (Dougherty Karst) region in the central panhandle. Springs and spring runs form low-order tributaries to most of the Calcareous Streams. As a result, Calcareous Streams share many characteristics with the Spring and Spring Run habitat.

This habitat typically has a high pH, high carbonate level, and sand bottom with some limestone exposed. Most Calcareous Streams are clear and cool, although in areas where they flow through pinelands or scrub the streams will become stained by the tannins in the vegetation. Some Calcareous Streams are associated with sinks, where all or sections of the stream flow underground before resurfacing to flow overland. Surface and groundwater recharge is bidirectional; water in the river recharges the aquifer during flood conditions and the water in the aquifer recharges the river during drought conditions. Submerged plants are frequently dense, and can include tape grass, wild rice, and giant cutgrass. Calcareous Streams provide habitat to a variety of species including many snails, water snakes, and fish, and is critical to certain species of anadromous fish, such as Gulf Sturgeon. Examples of streams in this category include the Suwannee River (downstream of the Big Shoals), Santa Fe River (downstream of the Big Rise), Ichetucknee, lower Withlacoochee (north) and Alapaha Rivers, Chipola River, Econfina Creek, Ocklawaha River, Hillsborough River and the

lower, nontidal portions of most of the rivers draining into the Big Bend region on Florida's Gulf coast from the St. Marks River to the Waccasassa River.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |

Birds

- | | |
|-----------------------------------|-----------------------|
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Aramus guarauna</i> | Limpkin |
| • <i>Parkesia motacilla</i> | Louisiana Waterthrush |

Amphibians

- | | |
|-----------------------------------|---------------------------|
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |

Reptiles

- | | |
|-------------------------------------|---|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Farancia erytrogramma</i> | Rainbow Snake |
| • <i>Apalone spinifera aspera</i> | Gulf Coast Spiny Softshell |
| • <i>Clemmys guttata</i> | Spotted Turtle |
| • <i>Graptemys barbouri</i> | Barbour's Map Turtle |
| • <i>Macrochelys temminckii</i> | Alligator Snapping Turtle |
| • <i>Pseudemys nelsoni</i> | Florida Red-bellied Cooter (Panhandle Population) |
| • <i>Pseudemys suwanniensis</i> | Suwannee Cooter |

Fish

- | | |
|---|-------------------------|
| • <i>Acipenser brevirostrum</i> | Shortnose Sturgeon |
| • <i>Acipenser oxyrinchus desotoi</i> | Gulf of Mexico Sturgeon |
| • <i>Anguilla rostrata</i> | American Eel |
| • <i>Alosa aestivalis</i> | Blueback Herring |
| • <i>Alosa alabamae</i> | Alabama Shad |
| • <i>Moxostoma</i> n. sp. cf. <i>poecilurum</i> | Grayfin Redhorse |
| • <i>Pteronotropis welaka</i> | Bluenose Shiner |
| • <i>Fundulus blairae</i> | Lowland Topminnow |
| • <i>Atractosteus spatula</i> | Alligator Gar |
| • <i>Agonostomus monticola</i> | Mountain Mullet |
| • <i>Enneacanthus chaetodon</i> | Black Banded Sunfish |

- *Etheostoma olmstedi* Tessellated Darter
- *Etheostoma parvipinne* Goldstripe Darter
- *Micropterus notius* Suwannee Bass
- *Ameiurus brunneus* Snail Bullhead
- *Ameiurus serracanthus* Spotted Bullhead

Invertebrates

- *Alasmidonta triangulata* Southern Elktoe
- *Alasmidonta wrightiana* Ochlockonee Arcmussel
- *Amblema neislerii* Fat Three-ridge Mussel
- *Elliptio chipolaensis* Chipola Slabshell
- *Elliptio purpurella* Inflated Spike
- *Elliptoideus sloatianus* Purple Bankclimber
- *Fusconaia burkei* Tapered Pigtoe
- *Lampsilis floridensis* Yellow Sandshell
- *Medionidus acutissimus* Alabama Moccasinshell
- *Quadrula infucata* Sculptured Pigtoe
- *Quadrula kleiniana* Suwannee Pigtoe
- *Villosa villosa* Downy Rainbow
- *Elimia clenchi* Clench's Goniobasis
- *Elimia dickinsoni* Stately Elimia
- *Macrobrachium acanthurus* Cinnamon River Shrimp
- *Macrobrachium carcinus* Big Claw River Shrimp
- *Macrobrachium ohione* Ohio River Shrimp
- *Acentrella parvula* A Mayfly
- *Procloeon rubropictum* A Mayfly
- *Procloeon rufostrigatum* A Mayfly
- *Baetisca gibbera* A Mayfly
- *Baetisca obesa* A Mayfly
- *Allocapnia starki* Slender Winter Stonefly
- *Helopicus subvarians* A Stonefly
- *Isogenoides varians* Rock Island Springfly
- *Hydropsyche alabama* A Caddisfly
- *Hydroptila berneri* Berner's Microcaddisfly
- *Setodes chipolanus* Chipola River Caddisfly
- *Setodes guttatus* A Caddisfly

Conservation Threats

Threats to Calcareous Stream habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Conversion to housing and urban development
- Incompatible forestry practices
- Incompatible resource extraction: mining/drilling
- Invasive animals
- Invasive plants
- Nutrient loads–agriculture
- Nutrient loads–urban
- Road

The Calcareous Stream-specific threats identified focused on water quality issues caused primarily by nutrient inputs and on invasive plant species. Nutrients from stormwater runoff, agricultural fertilizers, and septic systems result in eutrophication of this habitat, potentially altering species composition and other important ecosystem functions and processes. Methods to control invasive aquatic plants are more successful in still water than in flowing water systems, also leading to changes in species composition and other stresses.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	High
B	Altered water quality of surface water or aquifer: nutrients	High
C	Erosion/sedimentation	High
D	Altered water quality of surface water or aquifer: contaminants	Medium
E	Altered landscape mosaic or context	Medium
F	Altered hydrologic regime	Medium
G	Fragmentation of habitats, communities, ecosystems	Low
H	Habitat destruction or conversion	Low
I	Altered water salinity, pH, conductivity, or other physical water quality characteristics of surface water or aquifer	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Nutrient loads–urban	High	A, B
2	Invasive plants	High	A
3	Nutrient loads–agriculture	High	A, B
4	Invasive animals	Medium	A, C
5	Conversion to housing and urban development	Medium	B, C, E
6	Chemicals and toxins	Medium	D
7	Roads	Medium	C
8	Incompatible forestry practices	Low	A, C
9	Incompatible agricultural practices	Low	B, C
10	Incompatible resource extraction: mining/drilling	Low	C
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Calcareous Stream that were also identified as statewide threats (nutrient loads–urban, invasive plants, nutrient loads–agriculture, invasive animals, conversion to housing and urban development, chemicals and toxins, roads, incompatible forestry

practices, incompatible resource extraction: mining/drilling) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to [Calcareous Stream](#) and a few other habitats (i.e., [Aquatic Cave](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. These actions were designed to prevent harm to stream ecosystems influenced by groundwater inflows by placing limits on the total permissible nutrient loads and to develop improved methods for applying herbicides in flowing water systems.

Nutrient Loads – Urban

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
H	Develop numeric nutrient criteria to monitor effects on groundwater ecosystems as well as biota where groundwater discharges to springs and other surface waters.	M	H	H

Invasive Plants

Overall Rank	Research	Feasibility	Benefits	Cost
M	Research methods for control of aquatic invasive species in flowing waters where current control methods for those species are only effective in non-flowing waters.	VH	L	M

Nutrient Loads – Agriculture

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
H	Develop numeric nutrient criteria to monitor effects on groundwater ecosystems as well as biota where groundwater discharges to springs and other surface waters.	M	H	H

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage tax or other incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers and floodplains.	M	L	VH
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Encourage development of and use of a buffer zone between new development and river or floodplain edges, of a minimum distance (e.g., the 550 ft zone specified for the Wekiva River, FWS recommendations).	M	L	M

Chemicals and Toxins

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	For situations where they do not yet exist, develop management techniques and standards for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M
Overall Rank	Research	Feasibility	Benefits	Cost
L	Conduct research defining appropriate sediment-quality standards for the various aquatic and marine systems for development and implementation of state sediment-quality standards. Fund research defining the cause-and-effect relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H
L	Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems for development and implementation of state water-quality standards. Fund research defining the cause-and-effect relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H

Roads

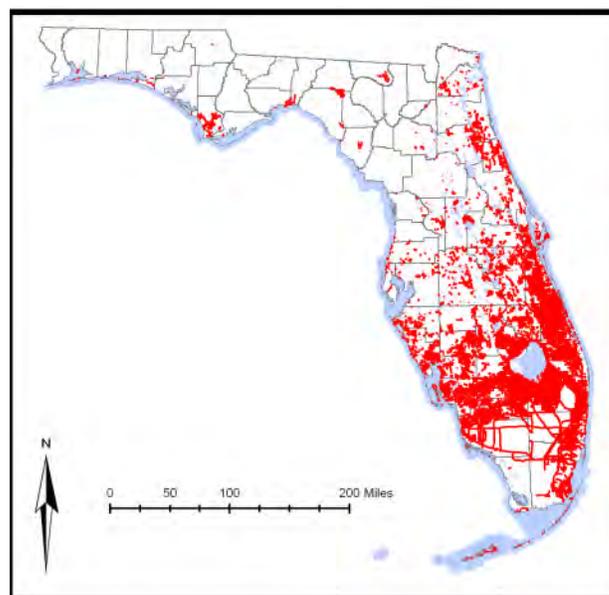
Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Work with the USFWS to improve coordination of the Technical Advisory Committee for the Stream Crossing Technical Center (SCTC).	VH	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Provide training to road maintenance personnel on methods for minimizing sediment movement to water bodies.	M	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Support operation of the SCTC to promote recovery and conservation of aquatic ecosystems from interactions between unpaved road-stream crossings that result in sediment movement into streams.	H	L	M
L	Based on a stream crossing inventory and prioritization, develop funding opportunities for road stabilization projects in Florida counties.	H	L	H

Canal/Ditch



Status

Current condition: Good and stable. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), approximately 27,594 miles (44,408 km) of Canal/Ditch are present in Florida.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

Canals are linear waterways, typically with steep sides, that frequently connect upstream wetlands or water sources with downstream habitats; they are typified by minimal or emergent vegetation. Ditches are shallow and roadside swales primarily serve as water catchments which support abundant wetland contiguous flora and fauna.

Canal/Ditch habitat in Florida serves many purposes including drainage, flood control, irrigation, navigation, and recreation. These waterways provide alternative habitat that would not otherwise be available. Species, such as the Panama City crayfish, have adapted to surviving in roadside ditches that may not always be recognized as a viable resource.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|-------------------------------------|------------------------------|
| • <i>Blarina shermani</i> | Sherman's Short-tailed Shrew |
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |

- *Lasiurus cinereus cinereus*
- *Lasiurus intermedius floridanus*
- *Lasiurus seminolus*
- *Myotis austroriparius*
- *Myotis grisescens*
- *Perimyotis subflavus*
- *Tadarida brasiliensis cynocephala*
- *Lontra canadensis lataxina*
- *Trichechus manatus latirostris*

- Hoary Bat
- Northern Yellow Bat
- Seminole Bat
- Southeastern Myotis
- Gray Bat
- Tricolored Bat
- Brazilian Free-tailed Bat
- River Otter
- West Indian Manatee

Birds

- *Anas fulvigula*
- *Mycteria americana*
- *Botaurus lentiginosus*
- *Ardea herodias*
- *Ardea herodias occidentalis*
- *Ardea alba*
- *Egretta thula*
- *Egretta caerulea*
- *Egretta tricolor*
- *Butorides virescens*
- *Nycticorax nycticorax*
- *Nyctanassa violacea*
- *Eudocimus albus*
- *Platalea ajaja*
- *Pandion haliaetus*
- *Rostrhamus sociabilis*
- *Haliaeetus leucocephalus*
- *Porphyrio martinica*
- *Aramus guarauna*
- *Tringa solitaria*
- *Tringa flavipes*
- *Numenius phaeopus*
- *Sternula antillarum*
- *Chlidonias niger*
- *Setophaga petechia gundlachi*
- *Euphagus cyanocephalus*

- Mottled Duck
- Wood Stork
- American Bittern
- Great Blue Heron
- Great White Heron
- Great Egret
- Snowy Egret
- Little Blue Heron
- Tricolored Heron
- Green Heron
- Black-crowned Night-Heron
- Yellow-crowned Night-Heron
- White Ibis
- Roseate Spoonbill
- Osprey
- Snail Kite
- Bald Eagle
- Purple Gallinule
- Limpkin
- Solitary Sandpiper
- Lesser Yellowlegs
- Whimbrel
- Least Tern
- Black Tern
- Cuban Yellow Warbler
- Brewer's Blackbird

Amphibians

- *Lithobates capito*
- *Pseudacris ornata*
- *Pseudobranchius striatus lustricolus*
- *Pseudobranchius striatus striatus*

- Gopher Frog
- Ornate Chorus Frog
- Gulf Hammock Dwarf Siren
- Broad-striped Dwarf Siren

Reptiles

- *Alligator mississippiensis*
- *Crocodylus acutus*
- *Plestiodon anthracinus pluvialis*
- *Lampropeltis getula*
- *Nerodia clarkii taeniata*
- *Nerodia cyclopion*
- *Seminatrix pygaea cyclas*

- American Alligator
- American Crocodile
- Southern Coal Skink
- Eastern Kingsnake
- Atlantic Saltmarsh Watersnake
- Mississippi Green Watersnake
- Southern Florida Swampsnake

- *Thamnophis sauritus sackenii* Peninsula Ribbonsnake (Lower Keys Population)
- *Clemmys guttata* Spotted Turtle
- *Deirochelys reticularia* Chicken Turtle
- *Kinosternon baurii* Striped Mud Turtle (Lower Keys Population)
- *Macrochelys temminckii* Alligator Snapping Turtle

Fish

- *Anguilla rostrata* American Eel
- *Pristis pectinata* Smalltooth Sawfish

Invertebrates

- *Villosa amygdala* Florida Rainbow
- *Procambarus apalachicola* A Crayfish
- *Procambarus capillatus* A Crayfish
- *Procambarus econfinae* Panama City Crayfish
- *Procambarus escambiensis* A Crayfish
- *Procambarus latipleurum* A Crayfish
- *Procambarus rathbunae* Combclaw Crayfish
- *Procambarus rogersi rogersi* A Crayfish
- *Macrobrachium acanthurus* Cinnamon River Shrimp
- *Macrobrachium carcinus* Big Claw River Shrimp
- *Macrobrachium ohione* Ohio River Shrimp
- *Isonychia bernerii* A Mayfly
- *Euphyes berryi* Berry's Skipper
- *Euphyes dion* Dion Skipper
- *Euphyes dukesi calhouni* Calhoun's Skipper
- *Nastra neamathla* Neamathla Skipper
- *Ministrymon azia* Gray Ministreak
- *Anthanassa frisia* Cuban Crescent
- *Junonia genoveva* Tropical Buckeye
- *Aphrissa statira* Statira

Conservation Threats

Canal/Ditch presently serves as surrogate habitat for a few aquatic SGCN in lieu of native historic habitat that has now largely been eliminated. Examples include the suite of “tropical peripheral” fishes (including opossum pipefish and several rare gobiid species) that now inhabit and spawn in coastal canals in the Indian River Lagoon and lower east coast of Florida in lieu of historical natural freshwater streams. Similarly, a number of marine species such as tarpon, ladyfish, and many others utilize canals in south and central Florida during some stages of their life cycles. In north Florida, the Panama City crayfish (a burrowing species once found in seasonally wet pine flatwoods in a small area of Bay County) now almost exclusively relies on shallow roadside swales and ditches because natural flatwoods in this area have been converted to developed land uses.

Although this situation clearly points to the need for conservation actions that involve restoring historic habitat for these species, in many cases where such habitat has been eliminated, this may not be feasible. Consequently, despite the fact that canals and ditches rank as a source of

stress for many habitats and species, maintaining existing sub-optimal habitat for these species in canals and ditches and taking action to reduce stress levels in these environments is critical.

From the perspective of SGCN that utilize canals and ditches as a primary habitat or a critical habitat for certain life stages, the following stresses and sources of stress are most important to consider:

- Habitat destruction/conversion—Loss of existing ditch or swale habitat to curb and gutter or underground storm-sewer-type drainage systems associated with more intensive urban or suburban development (applies only in north region), or loss of “riparian” cover along canals/ditches as a result of canal maintenance practices (applies to central and south regions)

Sources: Conversion to housing and development (north region), intensification of surface water diversion/drainage associated with more intensive development (north region), incompatible canal maintenance practices (e.g., removing all canal bank vegetation through herbicide applications, etc.) (all regions)

- Altered landscape mosaic—Destruction or conversion of wet flatwoods adjacent to roadside ditches (north region)

Source: Conversion to housing and development (north region)

- Altered water quality—Nutrients

Sources: Nutrient loads—agriculture (all regions), nutrient loads—urban storm water (all regions)

- Altered water quality—Contaminants

Sources: Chemicals/toxins—oil/grease and heavy metals from roads (north region), incompatible agricultural practices—pesticides in runoff or drainage water (all regions), incompatible residential practices—pesticides in runoff (all regions), mosquito control (north region)

- Altered hydrologic regime—Large pulses of flood water or storm runoff that disrupts life cycle requirements or alters or removes physical habitat

Sources: Management of dams/control structures (central/south regions), incompatible agricultural practices—management of runoff (all regions), incompatible residential practices—management of runoff (all regions)

Conservation Actions

Actions to abate threats to Canal/Ditch habitat were not addressed directly in the actions workshops due to the experts’ impression that it is not a natural habitat and more often acts as a

threat to other habitats. However, one action was suggested in conjunction with the threat of invasive species that applies to this habitat. In addition, several desired outcomes were identified in the threat workshops that may guide actions developed to better manage this habitat for the needs of SGCN:

- Removal of or application of herbicide to native freshwater marsh vegetation should not be done in conjunction with canal maintenance in areas with known populations of SGCN
- Water releases should be managed to maintain adequate water velocities and dissolved oxygen needed to support fish and other aquatic life

Invasive Animals

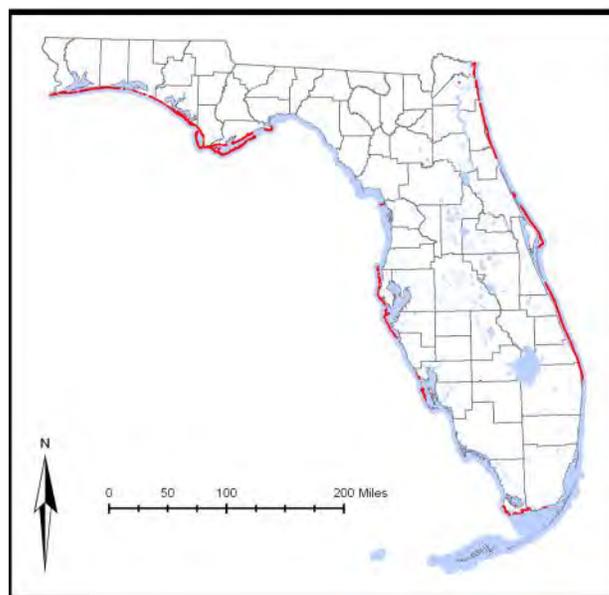
Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Promote canal designs that limit opportunities for movement and establishment of exotic aquatic species.	M	L	L

Coastal Strand



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 14,855 acres (6,012 ha) of Coastal Strand habitat exist, of which 76% (11,317 ac; 4,580 ha) are in conservation or managed areas. Another 1% (90 ac; 36 ha) are in Florida Forever projects and 3% (471 ac; 191 ha) are in SHCA-designated lands. The remaining 20% (2,977 ac; 1,205 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI types: Beach Dune, Coastal Berm, Coastal Grassland, Coastal Rock Barren, Coastal Strand

This habitat encompasses dunes and more landward areas typically described as coastal strand, as well as areas that may be described as upper beach and coastal rock formations. Coastal Strand is the vegetated zone that typically occurs between open beach and maritime hammock habitats. Coastal Strand occurs on deep, well-drained, sandy soils that are largely wind-deposited and washed or sorted by wave action to some extent. This habitat generally occurs in long, narrow bands along high-energy shorelines, parallel to the open waters of the Atlantic Ocean, Gulf of Mexico, and some coastal bays or sounds in both north and south Florida. Vegetation in this habitat is strongly affected by wind, wave action, and salt spray and consists of low-growing vines, grasses, and other herbaceous plants and salt-tolerant shrub species that, in some areas, may form dense thickets. Pioneer or early successional herbaceous vegetation characterizes foredune and upper beach areas with a gradual change to woody shrub species on the more protected and stabilized areas farther landward. Typical plant species of Coastal Strand include beach morning glory,

railroad vine, sea oats, saw palmetto, Spanish bayonet, yaupon holly, wax myrtle, and sea grape; in southern Florida, cocoplum, nickerbean, and other more tropical species are present.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|------------------------------|
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Peromyscus polionotus allophrys</i> | Choctawhatchee Beach Mouse |
| • <i>Peromyscus polionotus leucocephalus</i> | Santa Rosa Beach Mouse |
| • <i>Peromyscus polionotus niveiventris</i> | Southeastern Beach Mouse |
| • <i>Peromyscus polionotus peninsularis</i> | St. Andrew Beach Mouse |
| • <i>Peromyscus polionotus phasma</i> | Anastasia Island Beach Mouse |
| • <i>Peromyscus polionotus trissyllepsis</i> | Perdido Key Beach Mouse |
| • <i>Podomys floridanus</i> | Florida Mouse |
| • <i>Spilogale putorius</i> ssp. | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|---------------------------------------|------------------------------------|
| • <i>Falco columbarius</i> | Merlin |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Anous stolidus</i> | Brown Noddy |
| • <i>Onychoprion fuscatus</i> | Sooty Tern |
| • <i>Onychoprion anaethetus</i> | Bridled Tern |
| • <i>Columbina passerina</i> | Common Ground-Dove |
| • <i>Aphelocoma coerulescens</i> | Florida Scrub-Jay |
| • <i>Catharus bicknelli</i> | Bicknell's Thrush |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga kirtlandii</i> | Kirtland's Warbler |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga dominica stoddardi</i> | Stoddard's Yellow-throated Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Cardellina canadensis</i> | Canada Warbler |
| • <i>Passerina ciris</i> | Painted Bunting |

Reptiles

- | | |
|---|------------------------------------|
| • <i>Anolis carolinensis seminolus</i> | Southern Green Anole |
| • <i>Plestiodon egregius egregius</i> | Florida Keys Mole Skink |
| • <i>Sceloporus woodi</i> | Florida Scrub Lizard |
| • <i>Crotalus adamanteus</i> | Eastern Diamond-backed Rattlesnake |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake |
| • <i>Heterodon simus</i> | Southern Hog-nosed Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Pituophis melanoleucus mugitus</i> | Florida Pinesnake |
| • <i>Tantilla relicta</i> | Florida Crowned Snake |
| • <i>Caretta caretta</i> | Loggerhead Sea Turtle |
| • <i>Chelonia mydas</i> | Green Sea Turtle |
| • <i>Dermochelys coriacea</i> | Leatherback Sea Turtle |
| • <i>Eretmochelys imbricata</i> | Hawksbill Sea Turtle |

- *Gopherus polyphemus* Gopher Tortoise
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Arctosa sanctaerosae* Santa Rosa Wolf Spider
- *Coenobita clypeatus* Land Hermit Crab
- *Cardisoma guanhumi* Great Land Crab (Blue Land Crab)
- *Stizocera floridana* Florida Privet Long-horned Beetle
- *Anomala flavipennis okaloosensis* Panhandle Dune Anomala Scarab Beetle
- *Geopsammodius hydropicus* Atlantic Dune Tiny Sand-loving Scarab
- *Geopsammodius subpedalis* Underfoot Tiny Sand-loving Scarab
- *Gronocarus autumnalis* Lobed Spiny Burrowing Beetle
- *Gronocarus inornatus* Lobeless Spiny Burrowing Beetle
- *Polyphylla woodruffi* Woodruff's Polyphyllan Scarab Beetle
- *Hesperapis oraria* Barrier Island Hesperapis Bee
- *Megathymus cofaqui* Cofaqui Skipper
- *Megathymus yuccae* Yucca Skipper
- *Cyclargus thomasi bethunebakeri* Miami Blue
- *Strymon martialis* Martial Scrub-hairstreak
- *Anthanassa frisia* Cuban Crescent
- *Aphrissa statira* Statira

Conservation Threats

Threats to Coastal Strand habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Climate variability
- Conversion to housing and urban development
- Conversion to recreation areas
- Incompatible fire
- Incompatible recreational activities
- Invasive animals
- Invasive plants
- Roads
- Shoreline hardening

Threats specific to Coastal Strand are similar to those for the [Beach/Surf Zone](#) habitat. Because of the importance of these habitats for coastal SGCN, such as sea turtles, shorebirds, and beach mice, habitat-specific threats such as light pollution, that can inhibit turtle nesting and increase predation for these and other species, were highlighted. Deposition of dredged materials for beach nourishment, dune restoration, and other purposes degrade these habitats and can directly impact these species, as can disturbance and predation by nuisance animals. Activities of residents and their pets living adjacent to or utilizing Coastal Strand to access beach habitats can cause degradation. Military base closures threaten potential loss of protection of Coastal Strand. Unlike the adjacent seaward habitat, conversion of Coastal Strand to golf courses remains a significant source of habitat loss.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Erosion/sedimentation	Very High
B	Fragmentation of habitats, communities, ecosystems	High
C	Altered soil structure and chemistry	High
D	Habitat degradation/disturbance	High
E	Altered species composition/dominance	High
F	Excessive depredation and/or parasitism	Medium
G	Insufficient size/extent of characteristic communities or ecosystems	Medium
H	Habitat destruction or conversion	Medium
I	Altered fire regime	Low

The sources of the stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Shoreline hardening	Very High	A, B, C, G
2	Conversion to housing and urban development	Very High	A, B, C, G
3	Sea level rise	High	A, B, E
4	Conversion to recreation areas	High	A, B, C, G
5	Incompatible recreational activities	High	A, B, C, D
6	Roads	High	A, B, C, G
7	Light pollution	High	D, E, F
8	Climate variability	High	A, B, G
9	Incompatible residential activities	High	D, E
10	Invasive plants	Medium	A, D, E
11	Invasive animals	Medium	D, E
12	Nuisance animals	Medium	F
13	Management of nature–inlet relocation and dredging	Medium	A, B, C
14	Channel modification/shipping lanes	Medium	A, B
15	Military activities	Medium	A, B, G
16	Degraded habitat	Low	F
17	Management of nature–nourishment	Low	E
18	Key predator/herbivore/pollinator losses	Low	E
19	Chemicals and toxins	Low	E
20	Nutrient loads–urban	Low	E
21	Altered wind due to buildings	Low	E

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
22	Incompatible fire	Low	E
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Coastal Strand that were also identified as statewide threats (see list above in Conservation Threats section) may be found in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Coastal Strand are below. These actions were designed to reduce the impacts of light, dredged material, and humans and nuisance animals on coastal SGCN, reduce habitat loss to golf courses, and assure that the management and closure of military bases be implemented to retain critical habitat for Florida's SGCN.

Conversion to Recreation Areas

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Encourage incentives in county and regional planning for maintaining large tracts of native habitat in the development of recreational facilities.	M	M	H

Light Pollution

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Ensure through state and local cooperation that coastal lighting ordinances are updated as technology and information improves.	VH	M	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Support cooperative education programs developed and/or implemented by utility companies and local governments for coastal property owners to ensure that light ordinances protecting coastal wildlife are followed (e.g., availability of automatic light shut-off features for beach lights).	VH	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Support and expand the coastal light replacement efforts of the U.S. Fish and Wildlife Service to be implemented statewide where sea turtle nesting and beach mice habitat exists.	H	M	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Support incentives for retrofitting existing light features.	VH	M	H
M	Support installation of appropriate light technology for conservation of sea turtles and other coastal species on military lands, Kennedy Space Center, and ports (domestic security facilities) and continue application and enforcement on other public lands.	M	M	H

Incompatible Residential Activities

Overall Rank	Economic and Other Incentives	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Expand the scale of the Florida Yards and Neighborhoods program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.	M	M	L
L	Provide incentives (through local governments) for covenants, codes and restrictions in residential areas that address issues of pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and light-use in coastal areas.	M	L	L
L	Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.	M	L	L
L	Provide incentives (through local governments) (e.g., fast track, density breaks) for developers that produce on-site, site-specific educational materials and standards that are maintained by homeowner associations.	M	L	L
Overall Rank	Education and Awareness	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Develop and fund continuing education courses for the landscape maintenance industry that includes appropriate use of chemicals, irrigation, plants, and disposal of yard waste.	H	M	M
L	Provide information to homeowners about the nearest access points and areas for off-road vehicle use and the impacts of creating new access routes on coastal habitats.	M	L	L
Overall Rank	Policy	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Encourage understanding of and compliance with leash laws in coastal strand and beach zones through increased patrols and information dissemination during nesting season. Utilize volunteers and others to help.	M	L	L

Nuisance Animals

Overall Rank	Education and Awareness	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Identify important habitat areas for nesting and loafing shorebirds (of Greatest Conservation Need), and encourage people and their pets to avoid them (as appropriate) through targeted education, signage, and patrols.	VH	L	M
L	Educate public landowners with responsibilities for coastal zone wildlife conservation about USDA protocols for raccoon management.	H	L	L
Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Increase funding to implement existing sea turtle management practices regarding prevention of egg and hatchling predation. Promote the use of volunteer groups in association with the FWC to provide more capacity for implementation.	VH	L	M
Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Integrate feral animal management into public land management.	H	M	M
L	Develop and implement techniques for waste management in areas where SGCN or habitats are subject to high depredation or disturbance rates due to exotic or nuisance populations attracted or sustained by garbage.	M	L	L

Overall Rank	Policy	Feasibility	Benefits	Cost
M	Assist counties, municipalities, and homeowners associations to develop and implement curbside pick-up of yard and household waste.	H	M	M
L	Promote increased awareness and understanding of potential impacts of outdoor pet feeding on wildlife, and encourage homeowners to feed pets indoors.	L	M	M
L	Through cost-sharing and other incentive programs with local governments, ensure that home and business owners have wildlife-proof garbage containers.	H	L	H
L	Work with Homeowner Associations to amend their bylaws to address outdoor feeding of feral cats and raccoons.	M	L	L

Management of Nature–Dredging

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Develop statewide, system-specific dredge material disposal plans that identify long-term disposal sites, specify dredge deposition practices, and minimize or offset impacts to all coastal wildlife. Tie the overall statewide dredge material management plan to port expansion management plan (recommended in Incompatible Industrial Operations).	M	M	M
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Develop educational programs about the importance of natural coastal processes and the economic cost of continually battling the natural movement of sand—direct these programs toward both the public and their elected officials.	H	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop one or several coalitions of local groups statewide to identify local restoration projects where dredge material can be used.	M	L	L
Overall Rank	Policy	Feasibility	Benefits	Cost
L	Develop and promote incentive programs to encourage avoidance of areas where development is dependent upon beach dredging/nourishment.	L	M	M
L	Promote long-term monitoring of impacts for dredging and nourishment projects.	M	L	L
Overall Rank	Research	Feasibility	Benefits	Cost
L	Compare the cost of conducting dredge/nourishment projects in perpetuity to spending equal state/federal dollars on acquiring lands subject to erosion (barrier islands) and putting those lands into uses that are not dependent upon dredging.	H	L	L
L	Fund research on the impacts of beach nourishment on wildlife. For example, how invertebrate and benthic communities are impacted by nourishment projects and the cumulative impacts of repeated nourishment.	H	L	L
L	Establish a database of locations and timing of dredge/nourishment projects so that effects of repeated nourishment may be identified.	H	L	L

Military Activities

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Establish a permanent consultative group of multi-agency wildlife and habitat professionals that work with USDOD on development of any statewide plans for base expansion, increased usage, and growth or closure needs to enhance positive or minimize any negative impacts on wildlife and conservation lands.	M	H	M

Overall Rank	Land/Water Protection	<i>Feasibility</i>	<i>Benefits</i>	Cost
VH	Work to develop partnerships to encourage conservation of significant habitats on lands encompassed by federal/state base closures.	H	VH	VH
H	Work with the USDOD to develop management and mitigation alternatives for any loss or degradation of Coastal Strand habitat from military activities on barrier islands.	VH	M	VH
Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Create a cooperative program to ensure consistent implementation of management plans on federal lands with sufficient capacity for conservation management of wildlife and habitats on military lands in Florida (e.g., prescribed fire, invasive species control, monitoring). Agreements should include that USDOD provides sufficient access to critical habitats for management and monitoring purposes (e.g., identify a procedure for routine access to restricted areas for these purposes). (State agencies, NGO conservation organizations, and USDOD)	M	M	M
Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Work to develop partnerships to encourage implementation of comprehensive management and mitigation plans that protect high-quality habitats and natural resources.	H	M	M

Coastal Tidal River or Stream



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), the combined total length of all of Florida's Coastal Tidal River or Stream is approximately 6,088 miles (9,798 km).



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

Coastal Tidal River or Stream habitat includes the freshwater or brackish portions of a river or stream adjacent to an estuary or marine habitat in which the effects of tides cause the rise and fall of water levels. The effect of the tides at the upper limits of influence may lag several hours behind tides on the coast. The amount of water movement is controlled by the height of the tides, tidal range, downstream freshwater flow rates, rainfall, and wind. Saltwater wedges are formed in many of these systems, enabling numerous species a mechanism to move up or down river. Water flow is bidirectional in coastal tidal rivers and streams; as the tide rises, water flows toward the head of the river and, as the tide retreats, the water flows toward the coastal outlet. This habitat bridges the freshwater and marine realms, with aquatic communities ranging from tidal freshwater to tidal brackish; salinities can vary from freshwater to approximately that of seawater. This variation, along with temperature and water clarity, determines the flora and fauna of the Coastal Tidal River or Stream. Typical plants may include cord grass or submerged aquatic vegetation such as seagrasses and algae.

The Coastal Tidal River or Stream drains to the Gulf of Mexico or the Atlantic Ocean on Florida's entire coast and comprises the dominant stream habitat in the south Florida region. The longest or most extensive area of this habitat occurs in the lower St. Johns River. Other coastal bay systems such as Choctawhatchee Bay, Pensacola Bay, Tampa Bay, and Charlotte Harbor are also

included in this habitat. Numerous small tidal creeks and coastal rivers are also included, especially in the Big Bend region of Florida's Gulf coast along with the lower portions of other large rivers including the Suwannee and Escambia.

Associated Species of Greatest Conservation Need

Mammals

• <i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat
• <i>Eptesicus fuscus</i>	Big Brown Bat
• <i>Eumops floridanus</i>	Florida Bonneted Bat
• <i>Lasiurus borealis borealis</i>	Red Bat
• <i>Lasiurus seminolus</i>	Seminole Bat
• <i>Myotis austroriparius</i>	Southeastern Myotis
• <i>Perimyotis subflavus</i>	Tricolored Bat
• <i>Tadarida brasiliensis cynocephala</i>	Brazilian Free-tailed Bat
• <i>Lontra canadensis lataxina</i>	River Otter
• <i>Trichechus manatus latirostris</i>	West Indian Manatee
• <i>Eubalaena glacialis (incl. australis)</i>	North Atlantic Right Whale

Birds

• <i>Anas rubripes</i>	American Black Duck
• <i>Anas fulvigula</i>	Mottled Duck
• <i>Aythya marila</i>	Greater Scaup
• <i>Aythya affinis</i>	Lesser Scaup
• <i>Gavia immer</i>	Common Loon
• <i>Podiceps auritus</i>	Horned Grebe
• <i>Mycteria americana</i>	Wood Stork
• <i>Pelecanus occidentalis</i>	Brown Pelican
• <i>Ardea herodias</i>	Great Blue Heron
• <i>Ardea herodias occidentalis</i>	Great White Heron
• <i>Ardea alba</i>	Great Egret
• <i>Egretta thula</i>	Snowy Egret
• <i>Egretta caerulea</i>	Little Blue Heron
• <i>Egretta rufescens</i>	Reddish Egret
• <i>Butorides virescens</i>	Green Heron
• <i>Nycticorax nycticorax</i>	Black-crowned Night-Heron
• <i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron
• <i>Platalea ajaja</i>	Roseate Spoonbill
• <i>Pandion haliaetus</i>	Osprey
• <i>Haliaeetus leucocephalus</i>	Bald Eagle
• <i>Pluvialis squatarola</i>	Black-bellied Plover
• <i>Pluvialis dominica</i>	American Golden-Plover
• <i>Haematopus palliatus</i>	American Oystercatcher
• <i>Tringa semipalmata semipalmata</i>	Eastern Willet
• <i>Tringa semipalmata inornata</i>	Western Willet
• <i>Tringa flavipes</i>	Lesser Yellowlegs
• <i>Numenius americanus</i>	Long-billed Curlew
• <i>Limosa fedoa</i>	Marbled Godwit
• <i>Arenaria interpres</i>	Ruddy Turnstone
• <i>Calidris alpina</i>	Dunlin
• <i>Calidris himantopus</i>	Stilt Sandpiper

- *Limnodromus griseus* Short-billed Dowitcher
- *Limnodromus scolopaceus* Long-billed Dowitcher
- *Phalaropus tricolor* Wilson's Phalarope
- *Sternula antillarum* Least Tern
- *Gelochelidon nilotica* Gull-billed Tern
- *Hydroprogne caspia* Caspian Tern
- *Chlidonias niger* Black Tern
- *Thalasseus maximus* Royal Tern
- *Thalasseus sandvicensis* Sandwich Tern
- *Cistothorus platensis* Sedge Wren

Reptiles

- *Alligator mississippiensis* American Alligator
- *Crocodylus acutus* American Crocodile
- *Nerodia clarkii clarkii* Gulf Saltmarsh Watersnake
- *Nerodia clarkii compressicauda* Mangrove Saltmarsh Watersnake
- *Nerodia clarkii taeniata* Atlantic Saltmarsh Watersnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Caretta caretta* Loggerhead Sea Turtle
- *Clemmys guttata* Spotted Turtle
- *Macrochelys temminckii* Alligator Snapping Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin
- *Pseudemys nelsoni* Florida Red-bellied Cooter (Panhandle Population)
- *Pseudemys suwanniensis* Suwannee Cooter

Fish

- *Acipenser brevirostrum* Shortnose Sturgeon
- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Anguilla rostrata* American Eel
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Notropis harperi* Redeye Chub
- *Fundulus jenkinsi* Saltmarsh Topminnow
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharodon carcharias* White Shark
- *Galeocerdo cuvier* Tiger Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Awaous banana* River Goby
- *Ctenogobius pseudofasciatus* Slashcheek Goby
- *Epinephelus itajara* Goliath Grouper
- *Microphis brachyurus* Opossum Pipefish
- *Syngnathus fuscus* Northern Pipefish

Invertebrates

- | | |
|-----------------------------------|---|
| • <i>Crassostrea virginica</i> | Eastern Oyster |
| • <i>Uca minax</i> | Red-jointed Fiddler, Brackish Water Fiddler |
| • <i>Uca pugilator</i> | Sand Fiddler |
| • <i>Uca pugnax</i> | Mud Fiddler |
| • <i>Macrobrachium acanthurus</i> | Cinnamon River Shrimp |
| • <i>Macrobrachium carcinus</i> | Big Claw River Shrimp |
| • <i>Macrobrachium ohione</i> | Ohio River Shrimp |
| • <i>Cicindela hirticollis</i> | Hairy-necked Tiger Beetle |
| • <i>Cicindela waplery</i> | White-sand Tiger Beetle |
| • <i>Nectopsyche tavana</i> | Tavares White Miller Caddisfly |
| • <i>Oecetis porteri</i> | Porter's Long-horn Caddisfly |
| • <i>Triaenodes furcellus</i> | Little-fork Triaenode Caddisfly |
| • <i>Poanes viator zizaniae</i> | Broad-winged Skipper |

Conservation Threats

Threats to the Coastal Tidal River or Stream habitat that were also identified for multiple other freshwater and wetland habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|---|------------------------------|
| • Channel modification/shipping lanes | • Invasive animals |
| • Chemicals and toxins | • Invasive plants |
| • Climate variability | • Nutrient loads–agriculture |
| • Conversion to commercial/industrial development | • Nutrient loads–urban |
| • Conversion to housing and urban development | • Roads |

Threats to the Coastal Tidal River or Stream habitat that were also identified for multiple other marine and estuarine habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|--|---|
| • Channel modification/shipping lanes | • Industrial spills |
| • Chemicals and toxins | • Invasive animals |
| • Climate variability | • Invasive plants |
| • Coastal development | • Management of nature (beach nourishment and impoundments) |
| • Dam operations/incompatible release of water (quality, quantity, timing) | • Nutrient loads (urban) |
| • Fishing gear impacts | • Roads, bridges and causeways |
| • Incompatible fishing pressure | • Shoreline hardening |
| • Incompatible industrial operations | • Surface water and groundwater withdrawal |
| • Incompatible recreational activities | • Vessel impacts |
| • Incompatible resource extraction: mining/drilling | |

Additional threats specific to this habitat include the operation of dams or water control structures, especially in south and central Florida, dredging and channel modification, loss of

submarine springs, and shoreline hardening. The impacts of recreational activities from boating, especially impacts to manatees and seagrass communities in coastal rivers, and discarded fishing gear that threatens wildlife were specifically identified for this habitat.

The following stresses (and sources of stress below) threaten this habitat in freshwater habitats:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	High
B	Altered hydrologic regime	High
C	Altered landscape mosaic or context	High
D	Habitat destruction or conversion	Medium
E	Altered water quality of surface water or aquifer: nutrients	Medium
F	Altered water quality of surface water or aquifer: contaminants	Medium
G	Altered water salinity, pH, conductivity or other physical water quality characteristics of surface water of aquifer	Medium
H	Fragmentation of habitats, communities, ecosystems	Medium
I	Altered community structure	Medium
J	Erosion/sedimentation	Medium
K	Habitat degradation/disturbance	Low

The sources of stress, or threats, were used to generate conservation actions. The following sources of stress are threats identified for freshwater habitats:

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Surface water withdrawal	High	A, B, C, G, I
2	Channel modification/shipping lanes	High	A, B, D, G, I
3	Dam operations	High	A, B, G, H, I
4	Conversion to housing and urban development	High	B, C, D
5	Shoreline hardening	High	A, D, H, I
6	Management of nature-veg clearing/snagging for water conveyance	Medium	A, B, H, I
7	Roads	Medium	D
8	Chemicals and toxins	Medium	A, F
9	Conversion to commercial and industrial development	Medium	D
10	Nutrient loads-agriculture	Medium	A, E
11	Nutrient loads-urban	Medium	A, E
12	Invasive plants	Medium	A, I
13	Sea level rise	Low	B

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
14	Invasive animals	Low	A
Statewide Threat Rank of Habitat		Very High	

The following stresses (and sources of stress below) threaten this habitat in marine and estuarine habitats:

Stresses		Habitat Stress Rank
L	Altered hydrologic regime	Very High
M	Altered species composition	Very High
N	Altered water quality–contaminants	Very High
O	Altered water quality–physical, chemistry	Very High
P	Habitat destruction	Very High
Q	Habitat disturbance	Very High
R	Altered weather regime/sea level rise	High
S	Altered water quality–nutrients	High
T	Missing key communities or functional guilds/trophic shift	High
U	Sediment contamination	Medium
V	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions. The following sources of stress are threats identified for marine and estuarine habitats:

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Coastal development	Very High	L,M,P,T,U
2	Dam operations/incompatible release of water: (quality, quantity, timing)	Very High	L,M,N,O,Q,S,W
3	Channel modification/shipping lanes	Very High	L,O,P,Q,U,W
4	Inadequate stormwater management	Very High	L,M,N,O,Q,S,U
5	Shoreline hardening	Very High	L,P
6	Management of nature (beach nourishment, impoundments)	High	L,M,,O,Q,T
7	Chemicals and toxins	High	N,V
8	Industrial spills	High	N,Q,V
9	Incompatible industrial operations	High	L,M,N,T
10	Surface water withdrawal	High	L,M,O
11	Invasive animals	High	M,Q

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
12	Invasive plants	High	M,U
13	Incompatible resource extraction: mining/drilling	High	O
14	Climate variability	High	R
15	Nutrient loads (all sources)	High	S
16	Utility corridors	Medium	L,P
17	Vessel impacts	Medium	P,Q
18	Boating impacts	Medium	P,Q
19	Incompatible recreational activities	Medium	M,Q
20	Groundwater withdrawal	Medium	L,M,O
21	Incompatible fishing pressure	Medium	M,T
22	Solid waste	Medium	Q
23	Roads, bridges and causeways	Medium	L,P,U
24	Acoustic pollution	Medium	Q
25	Thermal pollution	Medium	O
26	Fishing gear impacts	Medium	Q
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Coastal Tidal River or Stream habitats that were also identified as statewide threats (see lists above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Actions for this habitat were developed in both the terrestrial/freshwater and marine workshops.

Several of the actions developed for a statewide threat were only applicable to [Coastal Tidal River or Stream](#) and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), and [Terrestrial Cave](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to prevent harm to aquatic ecosystems by managing the magnitude, duration, and frequency of fresh water inflows to coastal habitats and remediating the damage through targeted restoration projects, reducing sediment and nutrient loading through the development of advanced best management practices for urban activities, increasing the compatibility of urban development with conservation of coastal stream and associated riparian wetland and estuarine habitat, increasing scientific knowledge on the threats to submarine springs in coastal rivers, and improving enforcement for existing fishing and boating regulations.

TERRESTRIAL/FRESHWATER-BASED ACTIONS***Dam Operations***

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Encourage interstate coordination of Action Plan actions to ensure protection of all fish and wildlife resources when water management operations are altered.	M	H	L
L	Coordinate multi-agency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.	H	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Work cooperatively with other agencies to restore appropriate salinity regimes to coastal habitats	H	M	VH
Overall Rank	Research	Feasibility	Benefits	Cost
H	Determine the appropriate hydrological flows and levels for water reservations on the Apalachicola, Yellow, Ochlockonee and other interstate rivers using Ecologically Sustainable Water Management (ESWM) approach.	M	H	H
M	Evaluate cumulative impacts of small rural impoundments on fish and wildlife.	M	M	M
L	Evaluate feasibility of incentive programs to remove small rural impoundments.	H	L	L

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage tax or other incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers and floodplains.	M	L	VH
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Encourage establishment of and assist in development of criteria to create buffer zones between new development and river or floodplain edges.	M	L	M

Roads

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Encourage multi-agency participation in the Technical Advisory Committee for the Stream Crossing Technical Center (SCTC).	VH	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Provide training to road maintenance personnel on methods for minimizing sediment movement to water bodies.	M	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Support the implementation of the SCTC to promote recovery and conservation of aquatic ecosystems from impacts of unpaved road-stream crossings.	H	L	M
L	Based on a stream crossing inventory and prioritization, develop funding opportunities for road stabilization projects in Florida counties.	H	L	H

Chemicals and Toxins

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop management techniques and standards for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M
Overall Rank	Research	Feasibility	Benefits	Cost
L	Conduct research defining appropriate sediment quality standards for the various aquatic and marine systems for development and implementation of state sediment quality standards. Fund research defining the cause-and-effect relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H
L	Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems for development and implementation of state water quality standards. Fund research defining the cause-and-effect relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H

Invasive Plants

Overall Rank	Research	Feasibility	Benefits	Cost
M	Research methods for control of aquatic invasive species in flowing waters.	VH	L	M

MARINE-BASED ACTIONS***Industrial Spills***

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Assist in the revision of emergency response plans in cooperation with the county EOCs, FDEP, DCA, and USCG for coastal waters where water-borne transport of oil and chemicals occur. Encourage bi-annual updates.	H	M	M
M	Assist in the revision of emergency response plans in cooperation with the county EOCs, FDEP, DCA, USCG and EPA for coastal waters that may be subject to land-based spills of oil and chemicals. Encourage bi-annual updates.	H	M	M

Surface/Groundwater withdrawal

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Characterize and support restoration of appropriate flow regimes in estuarine systems and coastal tidal streams.	M	M	VH
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Explore options and alternative methods to protect submarine springs.	H	H	L

Incompatible Recreational Activities

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Improve understanding of and voluntary compliance with watercraft speed limits/zones, and work with all affected parties to explore options for reassessing speed zones.	H	M	M
L	Improve understanding of, signage for, and voluntary compliance with manatee protection zones.	H	L	M

Fishing Gear Impacts

Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Continue to support and expand coastal clean-up. Expand into underwater habitats and statewide (include lead sinkers).	VH	L	M

Coral Reef



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), approximately 1,400,000 acres (566,560 ha) of Coral Reef are present in Florida.

Habitat Description

FNAI type: Coral Reef

A Coral Reef is an epibenthic community; a concentrated topographic complex of massive corals and other sessile organisms (algae, bryozoans) that build calcium carbonate (limestone) skeletons. The structural complexity provides habitat for a highly diverse flora and fauna that live all or portions of their lives on Coral Reefs.

Two major Coral Reef types are recognized: patch reefs and offshore bank reefs. Bank Reefs are further defined by zones (e.g., reef flat, spur and groove). The types of Coral Reefs found off the coast of Florida include the shallow-wave resistant reefs in the region from Dry Tortugas to Martin County; deeper (30-130 ft; 10-40 m) reefs in the same region; the *Oculina* Banks seaward of Palm Beach to Vero Beach. Deep water (165-265 ft; 50-80 m) structures such as Pulley Ridge and the Florida Middle Grounds occur along the west Florida shelf break in federal waters.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Fregata magnificens* Magnificent Frigatebird
- *Onychoprion anaethetus* Bridled Tern
- *Sterna dougallii* Roseate Tern

Reptiles

- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle

Fish

- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus falciformis* Silky Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus perezii* Reef Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Cetorhinus maximus* Basking Shark
- *Manta birostris* Giant Manta Ray
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Bairdiella sanctaeluciae* Striped Croaker
- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper
- *Epinephelus striatus* Nassau Grouper
- *Lutjanus mahogoni* Mahogany Snapper
- *Starksia starcki* Key Blenny

Invertebrates

- *Gorgonia flabellum* Venus Sea Fan
- *Gorgonia ventalina* Purple Sea Fan
- *Bartholomea annulata* Ringed (Curlique Or Corkscrew) Anemone
- *Condylactis gigantea* Giant Caribbean Anemone
- *Epicystis crucifer* Beaded (Rock) Anemone
- *Stichodactyla helianthus* Sun (Carpet) Anemone
- *Acropora cervicornis* Staghorn Coral
- *Acropora palmata* Elkhorn Coral
- *Acropora prolifera* Fused Staghorn Coral
- *Agaricia agaricites* Lettuce Coral
- *Agaricia fragilis* Fragile Saucer Coral
- *Agaricia lamarcki* Lamarck's Sheet Coral
- *Agaricia tenuifolia* Thin Leaf Lettuce Coral
- *Leptoseria cucullata* Sunray Lettuce Coral
- *Eusmilia fastigiata* Flower Coral
- *Colpophyllia natans* Large Grooved Brain Coral
- *Diploria clivosa* Knobby Brain Coral
- *Diploria labyrinthiformis* Grooved Brain Coral

- *Diploria strigosa* Symmetrical Brain Coral
- *Manicina areolata* Rose Coral
- *Montastraea annularis* Boulder Star Coral
- *Montastraea cavernosa* Great Star Coral
- *Montastraea faveolata* Mountainous Star Coral
- *Montastraea franksi* Boulder Star Coral
- *Solenastrea bournoni* Smooth Star Coral
- *Solenastrea hyades* Knobby Star Coral
- *Dendrogyra cylindrus* Pillar Coral
- *Dichocoenia stokesii* Elliptical Star Coral, Pineapple Coral
- *Meandrina meandrites* Butterprint Brain Coral, Maze Coral
- *Isophyllastrea rigida* Rough Star Coral
- *Isophyllia sinuosa* Sinuous Cactus Coral
- *Mussa angulosa* Large Flower Coral
- *Mycetophyllia aliciae* Knobby Cactus Coral
- *Mycetophyllia danaana* Low-ridge Cactus Coral
- *Mycetophyllia ferox* Rough Cactus Coral
- *Mycetophyllia lamarckiana* Ridged Cactus Coral
- *Scolymia cubensis* Artichoke Coral
- *Scolymia lacera* Atlantic Mushroom Coral
- *Oculina robusta* Robust Ivory Tree Coral
- *Oculina varicosa* Large Ivory Coral
- *Madracis decactis* Ten-rayed Star Coral
- *Madracis formosa* Eight-rayed Star Coral
- *Madracis mirabilis* Yellow Pencil Coral
- *Madracis pharensis* Encrusting Star Coral
- *Porites branneri* Blue Crust Coral
- *Porites porites* Finger Coral
- *Phyllangia americana* Hidden Cup Coral
- *Siderastrea siderea* Massive Starlet Coral
- *Discosoma calgreni* Forked-tentacle Corallimorpharian
- *Discosoma neglecta* Umbrella Mushroom, Umbrella Corallimorph
- *Discosoma sanctithomae* Warty False Coral
- *Ricordea florida* Florida False Coral
- *Plumapathes pennacea* Feather Black Coral
- *Tanacetipathes barbadensis* Bottle Brush Black Coral
- *Tanacetipathes tanacetum* Bottle Brush Black Coral
- *Tanacetipathes thamnea* Black Coral
- *Distichopora violacea* Violet Lace Coral
- *Stylaster filigranus* Frilly Lace Coral
- *Millepora alcicornis* Encrusting Fire Coral
- *Millepora complanata* Bladed Fire Coral
- *Pseudobiceros splendidus* Red-rim Flatworm, Splendid Flatworm
- *Calliostoma javanicum* Chocolate-lined Topsnail
- *Lithopoma americanum* American Starsnail
- *Cassis flammea* Flame Helmet
- *Cassis madagascariensis* Emperor or Queen Helmet
- *Cassis tuberosa* King Helmet
- *Cypraea cervus* Atlantic Deer Cowrie
- *Cypraea zebra* Measled Cowrie
- *Cyphoma mcgintyi* Spotted Cyphoma
- *Chondropoma dentatum* Crenulate Horn
- *Charonia tritonis variegata* Atlantic Trumpet Triton

- *Cymatium femorale*
- *Strombus gallus*
- *Strombus gigas*
- *Fasciolaria liliium*
- *Chromodoris kempfi*
- *Glossodoris sedna*
- *Favorinus auritululus*
- *Cyerce cristallina*
- *Elysia clarki*
- *Elysia crispata*
- *Elysia picta*
- *Octopus burryi*
- *Octopus joubini*
- *Enoplometopus antillensis*
- *Lysmata wurdemanni*
- *Mithrax aculeatus (pilosus)*
- *Luidia senegalensis*
- *Poraniella echinulata*
- *Copidaster lymani*
- *Oreaster reticulatus*
- *Asterina folium*
- *Echinaster echinophorus*
- *Asteroporpa annulata*
- *Astropyga magnifica*
- *Diadema antillarum*
- *Lytechinus williamsi*
- *Clypeaster chesheri*
- *Clypeaster luetkeni*
- *Clypeaster rosaceus*
- *Clypeaster subdepressus*
- *Duasmodyctyla seguroensis*
- *Ocnus suspectus*
- *Havelockia inermis*
- *Neothyonidium parvum*
- *Euthyonidiella destichada*
- *Euthyonidiella trita*
- *Actinopyga agassizii*
- *Holothuria mexicana*
- *Holothuria occidentalis*
- *Holothuria parvula*
- *Holothuria rowei*
- Angular Triton
- Roostertail Conch
- Queen Conch
- Banded Tulip
- Purple-crowned Sea Goddess
- Red-tipped Sea Goddess
- Long-eared Nudibranch
- Harlequin Glass-slug
- Lettuce Sea Slug
- Lettuce Slug
- Painted Elysia
- Brownstripe Octopus
- Atlantic Pygmy Octopus
- Flaming Reef Lobster
- Peppermint Shrimp
- Hairy Clinging Crab
- Nine-armed Sea Star
- Red Miniature Sea Star
- Mottled Red Sea Star
- Cushion Star, Bahama Star
- Common Blunt Armed Sea Star
- Thorny Sea Star
- Basket Star
- Magnificent Urchin
- Long-spined Urchin
- Jewel Urchin
- A Sea Biscuit
- A Sea Biscuit
- West Indian Sea Biscuit
- Sea Biscuit
- A Sea Cucumber
- Five-toothed Sea Cucumber, West Indian Sea Cucumber
- Donkey Dung Sea Cucumber
- A Sea Cucumber
- A Sea Cucumber
- A Sea Cucumber

Conservation Threats

The threat to Coral Reef habitats caused by Key predator/herbivore loss reflects the loss of *Diadema antillarum* sea urchins that has resulted in an overabundance of algae and threatens the health of the entire community. Other threats include over-fishing of the snapper/grouper complex, and intensive fishing of the spiny lobster and stone crab. Nutrient loading impacts species composition and community structure, and potentially interacts with parasites and pathogens to degrade the community further. Damage from groundings of boats and ships, and anchors of all size vessels have direct and cumulative impact on Coral Reefs.

Threats to the Coral Reef habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Incompatible resource extraction: mining/drilling
- Industrial spills
- Invasive plants
- Key predator/herbivore loss
- Management of nature (beach nourishment and impoundments)
- Nutrient loads (urban)
- Roads, bridges and causeways
- Shoreline hardening
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered structure	Very High
B	Altered species composition	Very High
C	Missing key communities or functional guilds/trophic shift	Very High
D	Keystone species missing or lacking in abundance	Very High
E	Habitat destruction	Very High
F	Altered weather regime/sea level rise	High
G	Altered water quality, physical, chemistry	High
H	Altered primary productivity	High
I	Altered water quality–contaminants	Medium
J	Altered water quality–nutrients	Medium
K	Habitat disturbance	Medium
L	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Climate variability	Very High	A, B, C, D, E, F, G, H, I, J, K
2	Inadequate stormwater management	Very High	A, B, C, D, E, G, H, I, J, K
3	Coastal development	Very High	A, E, G
4	Nutrient loads (all sources)	Very High	A, B, C, D, G, H, J, K

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
5	Parasites/pathogens	Very High	A, B, C, D, E, H, K
6	Incompatible fishing pressure	Very High	A, B, C, D, E, H, K
7	Fishing gear impacts	High	A, B, C, D, E, K
8	Invasive plants	High	A, B, C, D, E, K
9	Key predator/herbivore losses	High	A, B, D, K
10	Dam operations/incompatible release of water (quality, quantity, timing)	High	B, E, G, H
11	Channel modification/shipping lanes	High	A, E, G
12	Roads, bridges and causeways	High	A, B, C, E, G, H, I, K
13	Vessel impacts	High	A, B, C, D, E, I, K
14	Boating impacts	High	A, B, C, D, E, G, I, K
15	Management of nature (beach nourishment, impoundments)	High	A, B, C, E, G, I, K
16	Incompatible aquarium trade	High	B, C, D, K
17	Chemicals and toxins	High	B, C, D, I, K
18	Incompatible resource extraction: mining/drilling	High	G
19	Shoreline hardening	High	E, G
30	Harmful algal blooms	High	G, H
21	Utility corridors	Medium	A, B, D, E, K
22	Incompatible recreational activities	Medium	A, B, E, I, K
23	Incompatible industrial operations	Medium	A, B, C, D, I, K
24	Disruption of longshore transport of sediments	Medium	G
25	Industrial spills	Medium	A, B, C, E, H, I, K
26	Placement of artificial structures	Medium	A, B, C, D, E, G, K
27	Military activities	Medium	E
28	Solid waste	Medium	A, E
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Coral Reef that were also identified as statewide threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Outcomes identified for this habitat address restoration of *Diadema* populations, reducing pollution inputs, and

ensuring that ship anchorages are not sited over sensitive areas, and reducing the probability that vessels run aground.

Highest ranked actions identified for abating this source of stress focused on:

- Expanding the recommendations made by the [Land Based Sources of Pollution Focus Team of the Southeast Florida Coral Reef Initiative](#) statewide to include all estuarine and nearshore areas of the State
- Funding research and communication on parasites, pathogens, and biotoxins
- Establishing a funding source for remediation of damages from vessel impacts
- Development of a vessel anchoring management plan and use of mooring buoys

Additional actions included:

- Improving management of water control structures to restore freshwater flows to nearshore systems
- Developing additional methods using new technologies to keep vessels away from sensitive areas
- Supporting restoration of damaged areas and replacement of species lost

Dam Operations

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Encourage improvement of management of water control structures to protect and enhance downstream environmental conditions.	M	M	M

Climate Variability

Overall Rank	Research	Feasibility	Benefits	Cost
L	Continue and support research to better understand how coral reefs and other marine/estuarine habitats react to climate variability issues.	H	L	M

Nutrient Loads

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Support Southeast Florida Coral Reef Initiative (SEFCRI).	VH	M	M

Parasites/Pathogens

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Develop regional biotoxin working groups, such as the one in the IRL, to address fish and wildlife disease events.	VH	M	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Improve capabilities/sophistication for inspection, recognition, and treatment of aquatic organism diseases and parasites.	VH	M	M

H	Continue and support response teams/hotlines associated with disease outbreaks, traumas, strandings, fish kills for marine and estuarine species.	VH	M	M
L	Expand the number and capabilities of rehabilitation facilities for diseased and injured wildlife.	H	L	VH
Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
H	Conduct additional research for aquatic wildlife parasites and diseases and the impacts of biotoxins on fish and wildlife resources.	VH	M	H
H	Synthesize and consolidate understanding, and identify gaps in understanding, of marine flora/fauna diseases, pathogens, and biotoxin impacts on fish and wildlife resources.	VH	M	L
M	Research and examine use of parasites as indicators of estuarine and marine health.	VH	L	M

Key Predator/Herbivore Loss

Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
L	Fund research on bacterial/viral signature of healthy versus diseased specimens of selected species (i.e., urchins and corals).	M	L	H

Vessel Impacts

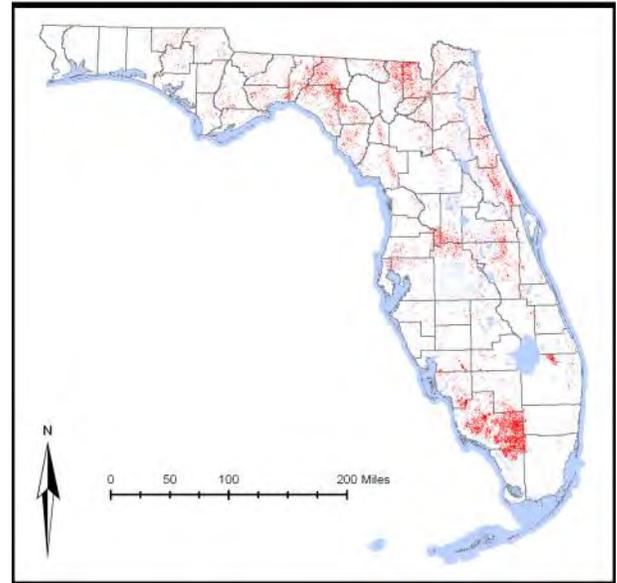
Overall Rank	Land/Water/Species Management:	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
VH	Support a marine/estuarine restoration trust fund.	M	VH	H
M	Develop a passive warning system for vessels to alert operators of sensitive or danger zones (shallows, reefs).	M	M	H
M	Encourage avoidance of anchorage and moorage in sensitive areas.	M	M	M
M	Identify appropriate areas for anchorage and moorings. Develop educational tools on low-impact mooring techniques.	M	M	M
L	Support a nursery(ies) for replacement stock of corals, seagrasses, etc.	M	L	H

Cypress Swamp



Status

Current Condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,586,941 acres (642,212 ha) of Cypress Swamp habitat exist, of which 44% (689,955 ac; 279,215 ha) are in existing conservation or managed areas. Another 11% (173,971 ac; 70,404 ha) are in Florida Forever projects and 10% (163,702 ac; 66,248 ha) are in SHCA-designated lands. The remaining 35% (559,313 ac; 226,346 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Strand Swamp, Dome Swamp

These regularly inundated wetlands form a forested border along large rivers, creeks, and lakes, or occur in depressions as circular domes or linear strands. These communities are strongly dominated by either bald cypress or pond cypress, with very low numbers of scattered black gum, red maple, and sweetbay. Understory and ground cover are usually sparse due to frequent flooding but sometimes include such species as buttonbush, lizard's-tail, and various ferns.

Associated Species of Greatest Conservation Need

Mammals

- *Corynorhinus rafinesquii* Rafinesque's Big-eared Bat
- *Eumops floridanus* Florida Bonneted Bat

- *Lasiurus borealis borealis*
 - *Lasiurus intermedius floridanus*
 - *Lasiurus seminolus*
 - *Myotis austroriparius*
 - *Perimyotis subflavus*
 - *Lontra canadensis lataxina*
 - *Neovison vison evergladensis*
 - *Neovison vison halilimnetes*
 - *Puma concolor coryi*
 - *Ursus americanus floridanus*
 - *Trichechus manatus latirostris*
- Red Bat
 - Northern Yellow Bat
 - Seminole Bat
 - Southeastern Myotis
 - Tricolored Bat
 - River Otter
 - Everglades Mink
 - Gulf Salt Marsh Mink
 - Florida Panther
 - Florida Black Bear
 - West Indian Manatee

Birds

- *Mycteria americana*
 - *Ardea herodias*
 - *Ardea alba*
 - *Egretta thula*
 - *Egretta caerulea*
 - *Butorides virescens*
 - *Nycticorax nycticorax*
 - *Nyctanassa violacea*
 - *Eudocimus albus*
 - *Plegadis falcinellus*
 - *Elanoides forficatus*
 - *Haliaeetus leucocephalus*
 - *Buteo brachyurus*
 - *Aramus guarauna*
 - *Campephilus principalis*
 - *Vermivora chrysoptera*
 - *Vermivora cyanoptera*
 - *Protonotaria citrea*
 - *Setophaga ruticilla*
 - *Setophaga dominica stoddardi*
 - *Setophaga discolor discolor*
 - *Cardellina canadensis*
 - *Euphagus carolinus*
- Wood Stork
 - Great Blue Heron
 - Great Egret
 - Snowy Egret
 - Little Blue Heron
 - Green Heron
 - Black-crowned Night-Heron
 - Yellow-crowned Night-Heron
 - White Ibis
 - Glossy Ibis
 - Swallow-tailed Kite
 - Bald Eagle
 - Short-tailed Hawk
 - Limpkin
 - Ivory-billed Woodpecker
 - Golden-winged Warbler
 - Blue-winged Warbler
 - Prothonotary Warbler
 - American Redstart
 - Stoddard's Yellow-throated Warbler
 - Prairie Warbler
 - Canada Warbler
 - Rusty Blackbird

Amphibians

- *Lithobates capito*
 - *Lithobates virgatipes*
 - *Pseudacris ornata*
 - *Ambystoma bishopi*
 - *Ambystoma cingulatum*
 - *Ambystoma tigrinum*
 - *Amphiuma pholeter*
 - *Desmognathus auriculatus*
 - *Eurycea chamberlaini*
 - *Hemidactylum scutatum*
 - *Notophthalmus perstriatus*
 - *Pseudobranchius striatus lustricolus*
 - *Pseudobranchius striatus striatus*
 - *Stereochilus marginatus*
- Gopher Frog
 - Carpenter Frog
 - Ornate Chorus Frog
 - Reticulated Flatwoods Salamander
 - Frosted Flatwoods Salamander
 - Eastern Tiger Salamander
 - One-toed Amphiuma
 - Southern Dusky Salamander
 - Chamberlain's Dwarf Salamander
 - Four-toed Salamander
 - Striped Newt
 - Gulf Hammock Dwarf Siren
 - Broad-striped Dwarf Siren
 - Many-lined Salamander

Reptiles

- | | |
|---|------------------------------|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Anolis carolinensis seminolus</i> | Southern Green Anole |
| • <i>Plestiodon anthracinus pluvialis</i> | Southern Coal Skink |
| • <i>Crotalus horridus</i> | Timber Rattlesnake |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Farancia erytrogramma</i> | Rainbow Snake |
| • <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Nerodia cyclopion</i> | Mississippi Green Watersnake |
| • <i>Seminatrix pygaea cyclas</i> | Southern Florida Swampsnake |
| • <i>Clemmys guttata</i> | Spotted Turtle |
| • <i>Deirochelys reticularia</i> | Chicken Turtle |
| • <i>Terrapene carolina</i> | Eastern Box Turtle |

Fish

- | | |
|---------------------------------|----------------------|
| • <i>Hybognathus hayi</i> | Cypress Minnow |
| • <i>Notropis melanostomus</i> | Blackmouth Shiner |
| • <i>Pteronotropis welaka</i> | Bluenose Shiner |
| • <i>Umbra pygmaea</i> | Eastern Mudminnow |
| • <i>Atractosteus spatula</i> | Alligator Gar |
| • <i>Acantharchus pomotis</i> | Mud Sunfish |
| • <i>Enneacanthus chaetodon</i> | Black Banded Sunfish |
| • <i>Etheostoma proeliare</i> | Cypress Darter |

Invertebrates

- | | |
|-------------------------------------|-------------------------|
| • <i>Cambarellus blacki</i> | Cypress Crayfish |
| • <i>Cambarellus schmitti</i> | A Crayfish |
| • <i>Procambarus apalachicola</i> | A Crayfish |
| • <i>Procambarus latipleurum</i> | A Crayfish |
| • <i>Chrysobasis lucifer</i> | Tail-light Damsel |
| • <i>Lestes tenuatus</i> | Blue-striped Spreadwing |
| • <i>Euphyes berryi</i> | Berry's Skipper |
| • <i>Euphyes dion</i> | Dion Skipper |
| • <i>Hesperia attalus slossonae</i> | Seminole Skipper |
| • <i>Callophrys henrici</i> | Henry's Elfin |
| • <i>Callophrys hesseli</i> | Hessel's Hairstreak |
| • <i>Zale perculata</i> | Okefenokee Zale Moth |
| • <i>Anthanassa texana seminole</i> | Seminole Crescent |
| • <i>Enodia portlandia floralae</i> | Florida Pearly Eye |

Conservation Threats

Threats to the Cypress Swamp habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|---|-----------------------------------|
| • Conversion to agriculture | • Groundwater withdrawal |
| • Conversion to housing and urban development | • Incompatible fire |
| | • Incompatible forestry practices |

- Incompatible resource extraction–mining/drilling
- Invasive animals
- Invasive plants
- Nutrient loads–agriculture
- Nutrient loads–urban
- Roads
- Surface water withdrawal and diversion

Widespread ditching and diking of this habitat and hydrologic fragmentation due to construction of roads through and adjacent to this habitat are large sources of altered hydrologic regime. Groundwater withdrawal for municipal and agricultural purposes has impacted cypress wetlands in localized areas throughout Florida, but this threat is most severe in portions of central Florida. Incompatible forestry practices threaten this habitat due to physical and hydrological disturbance and the slow regeneration time of cypress trees. Currently, most cypress harvest is of young, small-diameter trees for landscape mulch. Nearly all cypress wetlands in unprotected lands have suffered from altered landscape context as the surrounding uplands and wet prairies have been converted to other land uses, primarily agriculture and urban/suburban development. In many parts of Florida, cypress wetlands are particularly vulnerable to and have been seriously impacted by a variety of invasive plants. Many cypress wetlands in both agricultural and urban settings receive nutrient-laden discharges from stormwater management systems, often leading to drastic changes in understory plant community composition and associated faunal changes. Additional threats specific to this habitat include the numerous water control structures affecting Cypress Swamps, particularly smaller dome swamps, statewide.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered hydrologic regime	High
B	Altered landscape mosaic or context	High
C	Altered soil structure and chemistry	High
D	Altered community structure	High
E	Altered species composition/dominance	High
F	Habitat destruction or conversion	Medium
G	Altered water quality of surface water or aquifer: nutrients	Medium
H	Missing key communities, functional guilds, or seral stages	Medium
I	Altered fire regime	Medium
J	Fragmentation of habitats, communities, ecosystems	Medium
K	Altered water and/or soil temperature	Low
L	Habitat degradation/disturbance	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible forestry practices	High	A, B, C, D, E, F, H
2	Surface water withdrawal	High	A, B, C, D, E, F
3	Nutrient loads–agriculture	High	E, G
4	Invasive plants	High	D, E
5	Conversion to housing and urban development	High	A, B
6	Invasive animals	Medium	C, D, E
7	Groundwater withdrawal	Medium	A, C, E
8	Roads	Medium	A, B, E
9	Conversion to agriculture	Medium	A, B
10	Incompatible vegetation harvest	Low	E
11	Nutrient loads–urban	Low	E, G
12	Incompatible fire	Low	B, E
13	Incompatible resource extraction: mining/drilling	Low	A, F
14	Incompatible grazing and ranching	Low	D, E, G
15	Incompatible agricultural practices	Low	A
16	Management of nature–water control structures	Low	A, B
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Cypress Swamp that were also identified as statewide threats (incompatible forestry practices, surface water withdrawal and diversion, nutrient loads–agriculture, invasive plants, conversion to housing and urban development, invasive animals, groundwater withdrawal, roads, conversion to agriculture, nutrient loads–urban, incompatible fire, and incompatible resource extraction–mining/drilling) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat that were only applicable to Cypress Swamp and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to increase the spatial extent of Cypress Swamps in the landscape and improve the functionality of existing cypress wetlands through both regional and small-scale hydrologic restoration projects.

Incompatible Forestry Practices

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Encourage labeling on cypress mulch alternatives that promotes their ecological value to consumers.	M	L	L
L	Through garden clubs, landscapers, and other avenues, promote acceptable alternatives to cypress mulch and make them readily available.	M	L	M
Overall Rank	Research	Feasibility	Benefits	Cost
L	Investigate various sources of possible funding for cypress regeneration studies	M	L	L
L	Recognizing that species move between wetland and upland habitats, assess the effectiveness of current BMP's regarding bedding near isolated wetlands.	M	L	L

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage tax or other incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers and floodplains.	M	L	VH

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands, and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.	M	M	H

Management of Nature – Water Control Structures

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Review existing Farm Bill programs and explore options for enhancing economic benefits to landowners that improve or remove water control structures.	VH	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Develop an awareness program for Drainage Districts created by Chapter 298 of the Florida Administrative Code ("298 Districts") to educate them about opportunities to improve fish and wildlife habitat conditions through operational and/or structural changes in their drainage systems.	H	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Create a grant program (or utilize existing Farm Bill and other federal programs) to replace or retrofit existing stop log or manually controlled structures with V-notch weirs in agricultural drainage systems. Give priority to those control structures that are identified as acting as barriers to wildlife movement or sheet flow.	H	L	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Form an interagency task force to streamline the permitting process for wetland restoration projects that restore hydrology.	VH	M	M

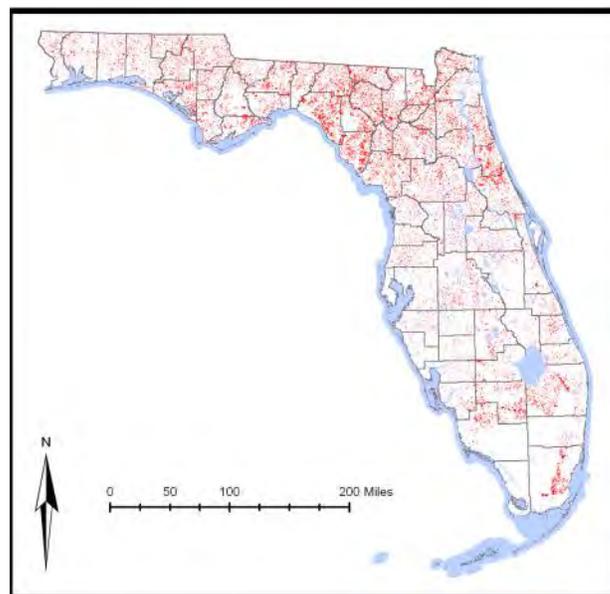
Disturbed/Transitional



Status

Current condition: Unknown.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), approximately 2,807,185 acres (1,136,027 ha) of Disturbed/Transitional habitat exist. However, this is a very dynamic cover class. Areas are rapidly added to and lost from this category, due to both natural processes (e.g., succession, wildfire) and human enterprise (e.g., agriculture).



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

This habitat category includes two principal types of Disturbed/Transitional habitat. The first type is comprised of a variety of situations where a natural upland community type has recently experienced an extensive disturbance resulting in the loss of nearly all of the vegetative cover (e.g., clear-cutting, land clearing, or severe fire) and is recovering through natural successional processes. This includes areas that range from bare soil to recently denuded areas where vegetative growth has resulted in a dense, mixed cover of herbaceous vegetation, shrubs, and vines. Species composition may approximate that of the pre-existing stand. These areas could be characterized as early-successional habitats.

The second type of Disturbed/Transitional habitat is comprised of upland or wetland site dominated by non-native invasive plants, most commonly trees. These invasives may have been planted, or may have escaped cultivation and invaded native plant communities. These exotics include *Melaleuca*, Australian pine, Brazilian pepper, and *Eucalyptus*.

Associated Species of Greatest Conservation Need

Mammals

• <i>Blarina shermani</i>	Sherman's Short-tailed Shrew
• <i>Sorex longirostris eionis</i>	Homosassa Shrew
• <i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat
• <i>Eptesicus fuscus</i>	Big Brown Bat
• <i>Eumops floridanus</i>	Florida Bonneted Bat
• <i>Lasiurus borealis borealis</i>	Red Bat
• <i>Lasiurus cinereus cinereus</i>	Hoary Bat
• <i>Lasiurus intermedius floridanus</i>	Northern Yellow Bat
• <i>Lasiurus seminolus</i>	Seminole Bat
• <i>Myotis austroriparius</i>	Southeastern Myotis
• <i>Myotis grisescens</i>	Gray Bat
• <i>Perimyotis subflavus</i>	Tricolored Bat
• <i>Tadarida brasiliensis cynocephala</i>	Brazilian Free-tailed Bat
• <i>Sylvilagus palustris hefneri</i>	Lower Keys Marsh Rabbit
• <i>Geomys pinetis pinetis</i>	Southeastern Pocket Gopher
• <i>Neofiber alleni</i> ssp.	Round-tailed Muskrat
• <i>Neotoma floridana smalli</i>	Key Largo Woodrat
• <i>Oryzomys palustris natator</i>	Silver Rice Rat
• <i>Oryzomys palustris planirostris</i>	Pine Island Marsh Rice Rat
• <i>Oryzomys palustris sanibeli</i>	Sanibel Island Marsh Rice Rat
• <i>Peromyscus gossypinus allapaticola</i>	Key Largo Cotton Mouse
• <i>Peromyscus polionotus allophrys</i>	Choctawhatchee Beach Mouse
• <i>Peromyscus polionotus leucocephalus</i>	Santa Rosa Beach Mouse
• <i>Peromyscus polionotus niveiventris</i>	Southeastern Beach Mouse
• <i>Peromyscus polionotus peninsularis</i>	St. Andrew Beach Mouse
• <i>Peromyscus polionotus phasma</i>	Anastasia Island Beach Mouse
• <i>Peromyscus polionotus trissyllepsis</i>	Perdido Key Beach Mouse
• <i>Podomys floridanus</i>	Florida Mouse
• <i>Sciurus niger avicennia</i>	Big Cypress Fox Squirrel
• <i>Sciurus niger niger</i>	Southeastern Fox Squirrel
• <i>Sciurus niger shermani</i>	Sherman's Fox Squirrel
• <i>Sigmodon hispidus exsputus</i>	Lower Keys Cotton Rat
• <i>Sigmodon hispidus insulicola</i>	Insular Cotton Rat
• <i>Tamias striatus</i>	Eastern Chipmunk
• <i>Mustela frenata olivacea</i>	Southeastern Weasel
• <i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel
• <i>Procyon lotor auspicatus</i>	Key Vaca Raccoon
• <i>Procyon lotor incautus</i>	Key West Raccoon
• <i>Procyon lotor inesperatus</i>	Matecumbe Key Raccoon
• <i>Puma concolor coryi</i>	Florida Panther
• <i>Spilogale putorius</i> ssp.	Spotted Skunk
• <i>Ursus americanus floridanus</i>	Florida Black Bear
• <i>Odocoileus virginianus clavium</i>	Key Deer

Birds

• <i>Colinus virginianus</i>	Northern Bobwhite
• <i>Mycteria americana</i>	Wood Stork
• <i>Elanoides forficatus</i>	Swallow-tailed Kite
• <i>Elanus leucurus</i>	White-tailed Kite

• <i>Ictinia mississippiensis</i>	Mississippi Kite
• <i>Buteo platypterus</i>	Broad-winged Hawk
• <i>Buteo brachyurus</i>	Short-tailed Hawk
• <i>Caracara cheriway audubonii</i>	Audubon's Crested Caracara
• <i>Falco sparverius paulus</i>	Southeastern American Kestrel
• <i>Falco columbarius</i>	Merlin
• <i>Falco peregrinus</i>	Peregrine Falcon
• <i>Grus canadensis pratensis</i>	Florida Sandhill Crane
• <i>Grus americana</i>	Whooping Crane
• <i>Charadrius nivosus</i>	Snowy Plover
• <i>Charadrius wilsonia</i>	Wilson's Plover
• <i>Charadrius melodus</i>	Piping Plover
• <i>Tringa solitaria</i>	Solitary Sandpiper
• <i>Tryngites subruficollis</i>	Buff-breasted Sandpiper
• <i>Sternula antillarum</i>	Least Tern
• <i>Columbina passerina</i>	Common Ground-Dove
• <i>Crotophaga ani</i>	Smooth-billed Ani
• <i>Megascops asio</i>	Eastern Screech-Owl
• <i>Athene cunicularia</i>	Burrowing Owl
• <i>Chordeiles minor</i>	Common Nighthawk
• <i>Chordeiles gundlachi</i>	Antillean Nighthawk
• <i>Caprimulgus carolinensis</i>	Chuck-will's-widow
• <i>Caprimulgus vociferus</i>	Eastern Whip-poor-will
• <i>Tyrannus dominicensis</i>	Gray Kingbird
• <i>Lanius ludovicianus</i>	Loggerhead Shrike
• <i>Vireo altiloquus</i>	Black-whiskered Vireo
• <i>Aphelocoma coerulescens</i>	Florida Scrub-Jay
• <i>Catharus bicknelli</i>	Bicknell's Thrush
• <i>Helmitheros vermivorum</i>	Worm-eating Warbler
• <i>Parkesia motacilla</i>	Louisiana Waterthrush
• <i>Vermivora chrysoptera</i>	Golden-winged Warbler
• <i>Vermivora cyanoptera</i>	Blue-winged Warbler
• <i>Protonotaria citrea</i>	Prothonotary Warbler
• <i>Limnothlypis swainsonii</i>	Swainson's Warbler
• <i>Geothlypis formosa</i>	Kentucky Warbler
• <i>Setophaga ruticilla</i>	American Redstart
• <i>Setophaga kirtlandii</i>	Kirtland's Warbler
• <i>Setophaga cerulea</i>	Cerulean Warbler
• <i>Setophaga castanea</i>	Bay-breasted Warbler
• <i>Setophaga petechia gundlachi</i>	Cuban Yellow Warbler
• <i>Setophaga dominica stoddardi</i>	Stoddard's Yellow-throated Warbler
• <i>Setophaga discolor discolor</i>	Prairie Warbler
• <i>Setophaga discolor paludicola</i>	Florida Prairie Warbler
• <i>Cardellina canadensis</i>	Canada Warbler
• <i>Peucaea aestivalis</i>	Bachman's Sparrow
• <i>Ammodramus savannarum pratensis</i>	Grasshopper Sparrow
• <i>Ammodramus savannarum floridanus</i>	Florida Grasshopper Sparrow
• <i>Ammodramus henslowii</i>	Henslow's Sparrow
• <i>Ammodramus maritimus fisheri</i>	Louisiana Seaside Sparrow
• <i>Ammodramus maritimus macgillivraii</i>	Macgillivray's Seaside Sparrow
• <i>Ammodramus maritimus mirabilis</i>	Cape Sable Seaside Sparrow
• <i>Ammodramus maritimus peninsulae</i>	Scott's Seaside Sparrow
• <i>Ammodramus maritimus junicolus</i>	Wakulla Seaside Sparrow

- *Passerina ciris*
- *Euphagus cyanocephalus*

Painted Bunting
Brewer's Blackbird

Reptiles

- *Anolis carolinensis seminolus*
- *Plestiodon egregius egregius*
- *Plestiodon egregius insularis*
- *Plestiodon egregius lividus*
- *Plestiodon egregius onocrepis*
- *Plestiodon reynoldsi*
- *Rhineura floridana*
- *Sceloporus woodi*
- *Sphaerodactylus notatus notatus*
- *Agkistrodon contortrix contortrix*
- *Cemophora coccinea coccinea*
- *Crotalus adamanteus*
- *Crotalus horridus*
- *Diadophis punctatus acricus*
- *Drymarchon couperi*
- *Heterodon platirhinos*
- *Heterodon simus*
- *Lampropeltis calligaster*
- *Lampropeltis extenuata*
- *Lampropeltis getula*
- *Pantherophis guttatus*
- *Pituophis melanoleucus mugitus*
- *Storeria victa*
- *Tantilla oolitica*
- *Tantilla relicta*
- *Thamnophis sauritus sackenii*
- *Virginia valeriae valeriae*
- *Terrapene carolina*

Southern Green Anole
Florida Keys Mole Skink
Cedar Key Mole Skink
Blue-tailed Mole Skink
Peninsula Mole Skink
Florida Sand Skink
Florida Wormlizard
Florida Scrub Lizard
Florida Reef Gecko
Southern Copperhead
Florida Scarletsnake
Eastern Diamond-backed Rattlesnake
Timber Rattlesnake
Key Ring-necked Snake
Eastern Indigo Snake
Eastern Hog-nosed Snake
Southern Hog-nosed Snake
Yellow-bellied Kingsnake
Short-tailed Snake
Eastern Kingsnake
Red Cornsnake (Lower Keys population)
Florida Pinesnake
Florida Brownsnake (Keys Population)
Rim Rock Crowned Snake
Florida Crowned Snake
Peninsula Ribbonsnake (Lower Keys Population)
Eastern Smooth Earthsnake (Highlands Co.)
Eastern Box Turtle

Invertebrates

- *Amblyscirtes vialis*
- *Atrytonopsis loammi*
- *Ephyriades brunnea floridensis*
- *Hesperia attalus slossonae*
- *Megathymus cofaqui*
- *Megathymus yuccae*
- *Nastra neamathla*
- *Poanes yehl*
- *Polites baracoa*
- *Polites origenes*
- *Staphylus hayhurstii*
- *Callophrys irus*
- *Cupido comyntas*
- *Ministrymon azia*
- *Satyrium kingi*
- *Satyrium liparops floridensis*
- *Satyrium titus*
- *Anthanassa frisia*

Common Roadside-skipper
Loammi Skipper
Florida Duskywing
Seminole Skipper
Cofaqui Skipper
Yucca Skipper
Neamathla Skipper
Yehl Skipper
Baracoa Skipper
Crossline Skipper
Scalloped Sooty Wing
Frosted Elfin
Eastern Tailed Blue
Gray Ministreak
King's Hairstreak
Sparkleberry Hairstreak
Coral Hairstreak
Cuban Crescent

- | | |
|-----------------------------|---------------------|
| • <i>Chlosyne nycteis</i> | Silvery Checkerspot |
| • <i>Junonia genoveva</i> | Tropical Buckeye |
| • <i>Siproeta stelenes</i> | Malachite |
| • <i>Aphrissa statira</i> | Statira |
| • <i>Proserpinus gaurae</i> | Proud Sphinx |

Conservation Threats

While threats to its conservation as well as remedial actions were identified during Action Plan Science Workshops I and II, the Disturbed/Transitional habitat category was not addressed in TNC workshops that generated tables of ranked threats and actions, as seen in most other habitat categories. The decision to not rank threats and actions for this habitat was made (1) to maximize discussion time for higher-priority habitats and (2) because of some disagreement over recognition of this habitat type as important to wildlife conservation. Therefore, threats and actions are presented as simple bulleted lists, arranged in alphabetical order, with no prioritization.

The following stresses threaten this habitat:

- | | |
|---|--|
| • Absent or insufficient biological legacies | • Altered water quality of surface water or aquifer: nutrients |
| • Altered community structure | • Erosion/sedimentation |
| • Altered fire regime—timing, frequency, intensity, extent | • Excessive depredation and/or parasitism |
| • Altered hydrologic regime—timing, duration, frequency, extent | • Fragmentation of habitats, communities, ecosystems |
| • Altered landscape pattern or mosaic | • Habitat degradation/ disturbance |
| • Altered soil structure and chemistry | • Insufficient size/extent of characteristic communities/ ecosystems |
| • Altered species composition/dominance | • Keystone species missing or lacking in abundance |
| • Altered successional dynamics | • Missing key communities, functional guilds, or seral stages |
| • Altered water and/or soil temperature | |
| • Altered water quality of surface water or aquifer: contaminants | |

The following sources of stress, or threats, were used to generate conservation actions.

- | | |
|---|---|
| • Chemicals and toxins | • Incompatible forestry practices |
| • Conversion to agriculture | • Incompatible recreational activities |
| • Conversion to commercial and industrial development | • Incompatible resource extraction—mining |
| • Conversion to housing and urban development | • Incompatible wildlife and fisheries management strategies |
| • Conversion to recreation areas | • Invasive animals |
| • Incompatible fire | • Invasive plants |

- Lack of knowledge/ appreciation of early-successional habitat
- Nuisance animals
- Nutrient loads–agriculture
- Roads, bridges, and causeways

Conservation Actions

Actions to abate threats to Disturbed/Transitional were designed to reduce the impacts of on-site and adjacent management activities, and to increase the habitat’s suitability to wildlife. Most of the threats to this habitat (see list above) were also identified for multiple other habitats, and are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. Exceptions are Conversion to commercial and industrial development, lack of knowledge/appreciation of early-successional habitat, and nuisance animals.

The actions to abate threats that were identified for Disturbed/Transitional habitat are below, though none were prioritized for implementation.

Land/Water/Species Management

- Convert invasives-dominated sites into early-successional habitat, and maintain

Law and Policy

- Develop a plan to fund long-term post-reclamation management programs–include control of invasive flora and fauna
- Promote the use of mitigation banking

Research, Education and Awareness

- Increase development of biocontrol options for invasive plants to reduce need for herbicides
- Increase public and private training on the conservation value of these lands (e.g., via extension education)
- Target education for landowners and policy makers to benefit wildlife in their day-to-day activities
- Encourage wildlife-friendly land management (e.g., maintaining early-successional habitat, etc.)

Economic and Other Incentives

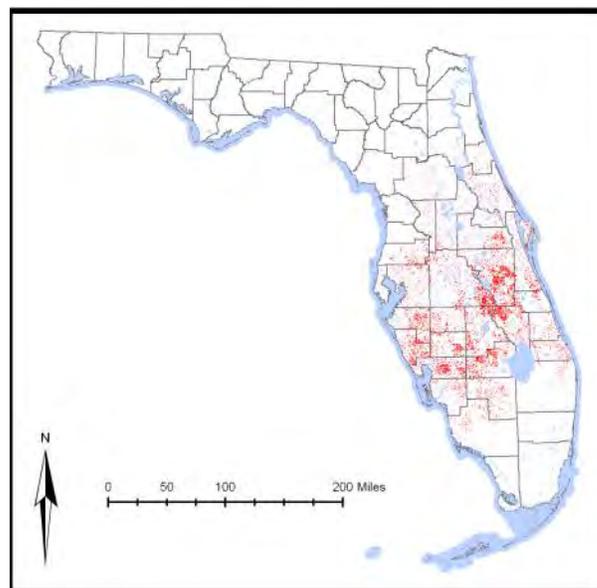
- Provide incentives to improve land for wildlife
- Provide economic incentives for “green” developments (e.g., give density breaks for developments that cluster housing)
- Provide awards to municipalities, organizations, and individuals that implement wildlife-friendly design and management practices
- Provide funds and materials for landowners to remove invasive exotics

Dry Prairie



Status

Current Condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,215,099 acres (491,733 ha) of Dry Prairie habitat exist, of which 29% (353,768 ac; 143,165 ha) are in existing conservation or managed areas. Another 13% (163,613 ac; 66,212 ha) are in Florida Forever projects and 11% (131,803 ac; 53,339 ha) are in SHCA-designated lands. The remaining 47% (565,915 ac; 229,018 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Dry Prairie

Dry Prairies are large native grass- and shrub-lands occurring on very flat terrain interspersed with scattered cypress domes and strands, bayheads, isolated freshwater marshes, and hardwood hammocks. This community is characterized by many species of grasses, sedges, herbs, and shrubs, including saw palmetto, fetterbush, staggerbush, tar flower, gallberry, blueberry, wiregrass, carpet grasses, and various bluestems. The largest areas of these treeless plains historically occurred just north of Lake Okeechobee. In central and south Florida, palmetto prairies, which consist of former pine flatwoods where the overstory trees have been thinned or removed, are also included in this category. These sites contain highly scattered pines that cover less than 10 to 15 % of an area.

Associated Species of Greatest Conservation Need

Mammals

- *Eumops floridanus* Florida Bonneted Bat
- *Tadarida brasiliensis cynocephala* Brazilian Free-tailed Bat
- *Puma concolor coryi* Florida Panther
- *Spilogale putorius* ssp. Spotted Skunk

Birds

- *Anas fulvigula* Mottled Duck
- *Colinus virginianus* Northern Bobwhite
- *Elanus leucurus* White-tailed Kite
- *Caracara cheriway audubonii* Audubon's Crested Caracara
- *Falco sparverius paulus* Southeastern American Kestrel
- *Grus canadensis tabida* Sandhill Crane (Greater)
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Grus americana* Whooping Crane
- *Pluvialis dominica* American Golden-Plover
- *Bartramia longicauda* Upland Sandpiper
- *Columbina passerina* Common Ground-Dove
- *Crotophaga ani* Smooth-billed Ani
- *Athene cunicularia* Burrowing Owl
- *Asio flammeus* Short-eared Owl
- *Chordeiles minor* Common Nighthawk
- *Caprimulgus carolinensis* Chuck-will's-widow
- *Riparia riparia* Bank Swallow
- *Setophaga discolor discolor* Prairie Warbler
- *Peucaea aestivalis* Bachman's Sparrow
- *Ammodramus savannarum pratensis* Grasshopper Sparrow
- *Ammodramus savannarum floridanus* Florida Grasshopper Sparrow
- *Ammodramus henslowii* Henslow's Sparrow
- *Ammodramus leconteii* Le Conte's Sparrow

Amphibians

- *Lithobates capito* Gopher Frog
- *Pseudacris ornata* Ornate Chorus Frog

Reptiles

- *Anolis carolinensis seminolus* Southern Green Anole
- *Cemophora coccinea coccinea* Florida Scarletsnake
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis calligaster* Yellow-bellied Kingsnake
- *Lampropeltis getula* Eastern Kingsnake
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Gopherus polyphemus* Gopher Tortoise
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- | | |
|---|------------------------------|
| • <i>Amblyscirtes alternata</i> | Dusky Roadside-skipper |
| • <i>Atrytone arogos arogos</i> | Arogos Skipper |
| • <i>Atrytonopsis loammi</i> | Loammi Skipper |
| • <i>Ephyriades brunnea floridensis</i> | Florida Duskywing |
| • <i>Euphyes berryi</i> | Berry's Skipper |
| • <i>Hesperia attalus slossonae</i> | Seminole Skipper |
| • <i>Hesperia meskei straton</i> | Eastern Meske's Skipper |
| • <i>Polites origenes</i> | Crossline Skipper |
| • <i>Idia gopheri</i> | Gopher Tortoise Noctuid Moth |

Conservation Threats

Threats to Dry Prairie habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|---|---|
| • Conversion to agriculture | • Incompatible forestry practices |
| • Conversion to commercial and industrial development | • Incompatible resource extraction: mining/drilling |
| • Conversion to housing and urban development | • Invasive plants |
| • Incompatible fire | • Roads |
| | • Surface water withdrawal |

Threats specific to Dry Prairie included incompatible forestry practices because this habitat supports grassland bird SGCN that are not tolerant of adjacent dense pine stands. Habitat-specific threats from mining include both habitat loss and inadequate mitigation for habitat alteration that results in small, fragmented areas rather than more contiguous areas of this habitat. Military base closure threatens potential conservation protection for Dry Prairie.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Fragmentation of habitats, communities, ecosystems	High
B	Habitat destruction or conversion	High
C	Altered hydrologic regime	High
D	Altered fire regime	High
E	Insufficient size/extent of characteristic communities or ecosystems	High
F	Altered landscape mosaic or context	High
G	Altered community structure	Medium
H	Altered species composition/dominance	Medium
I	Habitat degradation/disturbance	Low

The sources of the stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Roads	Very High	A, B, C, D, E, F
2	Conversion to housing and urban development	Very High	A, B, C, D, E, F
3	Conversion to commercial and industrial development	High	A, B, E
4	Conversion to agriculture	Medium	A, B, C, E, F
5	Surface water withdrawal	Medium	A, C, D, F
6	Incompatible fire	Medium	D, F
7	Incompatible grazing and ranching	Low	D, F
8	Military activities	Low	A, B, E
9	Invasive plants	Low	D, F
10	Incompatible agricultural practices	Low	A, B, F
11	Incompatible forestry practices	Low	A, E
12	Incompatible resource extraction: mining/drilling	Low	A, B, E
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Dry Prairie that were also identified as statewide threats (roads, conversion to housing and urban development, conversion to commercial and industrial development, conversion to agriculture, surface water withdrawal, incompatible fire, invasive plants, incompatible forestry practices (also see actions below), Incompatible resource extraction: mining/drilling (also see actions below) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Dry Prairie are listed below. These actions were designed to reduce the impacts of adjacent forest management, mining and mine mitigation, and potential management or loss on Avon Park Air Force Range.

Military Activities

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Establish a permanent consultative group of multi-agency environmental professionals that work with USDOD on development of any statewide plans for base expansion, increased usage, and growth or closure needs to enhance positive, or minimize any negative, impacts on wildlife and conservation lands.	M	H	M
Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
VH	Work to develop partnerships to encourage conservation of significant habitats on lands encompassed by federal/state base closures.	H	VH	VH

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Support a collaborative effort among the USFWS, Avon Park Air Force Range (APAFR), Archbold Biological Station, and the FWC to develop and implement a mitigation and management plan to accommodate military needs and maintain habitat and species viability at APAFR.	VH	M	VH
M	Create a cooperative program to ensure consistent implementation of management plans on federal lands with sufficient capacity for conservation management of wildlife and habitats on military lands in Florida (e.g., prescribed fire, invasive species control, monitoring). Agreement should include that USDOD provides sufficient access to critical habitats for management and monitoring purposes (e.g., identify a procedure for routine access to restricted areas for these purposes). (State agencies, NGO conservation organizations, and USDOD)	M	M	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Work to develop partnerships to encourage the implementation of comprehensive management, and mitigation plans that protect high quality habitats and natural resources.	H	M	M

Incompatible Forestry Practices

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Ensure that bird viability is the priority in management decisions on public lands where silvicultural management is in conflict with maintaining viable populations of imperiled grassland and scrub birds.	M	L	L

Incompatible Resource Extraction: Mining

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
H	Create incentives (e.g., mitigation credits, permit streamlining) to encourage preservation of large contiguous patches of Dry Prairie and other sensitive upland habitats.	H	H	H
M	Create incentives to avoid loss of, and impacts to, SHCAs and sensitive habitats from mining, particularly wet and dry prairie, scrub, and bat caves.	H	M	H

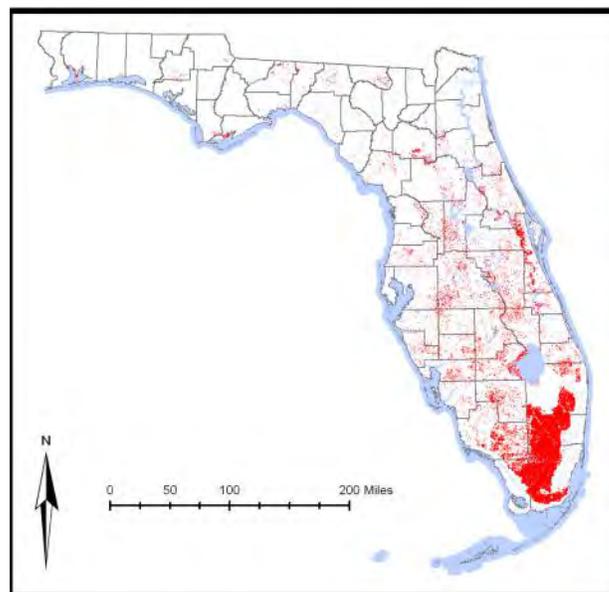
Freshwater Marsh and Wet Prairie



Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 2,941,170 acres (1,190,249 ha) of Freshwater Marsh and Wet Prairie habitat exist, of which 67% (1,959,950 ac; 793,164 ha) are in existing conservation or managed areas. Another 5% (145,462 ac; 58,866 ha) are in Florida Forever projects and 7% (200,677 ac; 81,211 ha) are in SHCA-designated lands. The remaining 21% (635,081 ac; 257,008 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Basin Marsh, Coastal Interdunal Swale, Depression Marsh, Marl Prairie, Wet Prairie, Floodplain Marsh, Sough, Swale

These wetland communities are dominated by a wide assortment of herbaceous plant species growing on sand, clay, marl, and organic soils in areas of variable water depths and inundation regimes. Generally, Freshwater Marsh habitat occurs in deeper, more strongly inundated situations and is characterized by tall emergents and floating-leaved species. Freshwater Marshes occur within flatwoods depressions, along broad, shallow lake and river shorelines, and scattered in open areas within hardwood, Dry Prairie, and Cypress Swamps. Portions of freshwater lakes, rivers, and canals that are dominated by floating-leaved plants such as lotus, spatterdock, duck weed, and water hyacinths are included in this category. Freshwater Marshes are common features of many river deltas, such as the Escambia, Apalachicola and Choctawhatchee, where these rivers discharge into estuaries. Wet Prairies commonly occur in shallow, periodically inundated areas and are usually

dominated by aquatic grasses, sedges, and their associates. Wet Prairies occur as scattered, shallow depressions within Dry Prairie and flatwoods habitat and on marl prairie areas in south Florida. Also included in this category are areas in southwest Florida with scattered dwarf cypress having less than 20 % canopy coverage, and a dense ground cover of freshwater marsh plants. Various combinations of pickerel weed, sawgrass, maidencane, arrowhead, fire flag, cattail, spike rush, bulrush, white water lily, water shield, and various sedges dominate Freshwater Marshes and Wet Prairies. Many subcategories of this habitat, such as sawgrass marsh or maidencane prairie, have been described and named based on their dominant plant species.

Associated Species of Greatest Conservation Need

Mammals

• <i>Eumops floridanus</i>	Florida Bonneted Bat
• <i>Lasiurus borealis borealis</i>	Red Bat
• <i>Lasiurus intermedius floridanus</i>	Northern Yellow Bat
• <i>Lasiurus seminolus</i>	Seminole Bat
• <i>Myotis austroriparius</i>	Southeastern Myotis
• <i>Tadarida brasiliensis cynocephala</i>	Brazilian Free-tailed Bat
• <i>Neofiber alleni</i> ssp.	Round-tailed Muskrat
• <i>Oryzomys palustris natator</i>	Silver Rice Rat
• <i>Oryzomys palustris planirostris</i>	Pine Island Marsh Rice Rat
• <i>Oryzomys palustris sanibeli</i>	Sanibel Island Marsh Rice Rat
• <i>Lontra canadensis lataxina</i>	River Otter
• <i>Neovison vison evergladensis</i>	Everglades Mink
• <i>Neovison vison halilimnetes</i>	Gulf Salt Marsh Mink
• <i>Neovison vison lutensis</i>	Atlantic Salt Marsh Mink
• <i>Neovison vison</i> ssp.	Mink
• <i>Puma concolor coryi</i>	Florida Panther
• <i>Ursus americanus floridanus</i>	Florida Black Bear
• <i>Trichechus manatus latirostris</i>	West Indian Manatee

Birds

• <i>Anas rubripes</i>	American Black Duck
• <i>Anas fulvigula</i>	Mottled Duck
• <i>Mycteria americana</i>	Wood Stork
• <i>Botaurus lentiginosus</i>	American Bittern
• <i>Ixobrychus exilis</i>	Least Bittern
• <i>Ardea herodias</i>	Great Blue Heron
• <i>Ardea herodias occidentalis</i>	Great White Heron
• <i>Ardea alba</i>	Great Egret
• <i>Egretta thula</i>	Snowy Egret
• <i>Egretta caerulea</i>	Little Blue Heron
• <i>Egretta tricolor</i>	Tricolored Heron
• <i>Egretta rufescens</i>	Reddish Egret
• <i>Butorides virescens</i>	Green Heron
• <i>Nycticorax nycticorax</i>	Black-crowned Night-Heron
• <i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron
• <i>Eudocimus albus</i>	White Ibis
• <i>Plegadis falcinellus</i>	Glossy Ibis
• <i>Platalea ajaja</i>	Roseate Spoonbill

- *Elanoides forficatus* Swallow-tailed Kite
- *Elanus leucurus* White-tailed Kite
- *Rostrhamus sociabilis* Snail Kite
- *Ictinia mississippiensis* Mississippi Kite
- *Haliaeetus leucocephalus* Bald Eagle
- *Caracara cheriway audubonii* Audubon's Crested Caracara
- *Coturnicops noveboracensis* Yellow Rail
- *Laterallus jamaicensis* Black Rail
- *Rallus elegans* King Rail
- *Porphyrio martinica* Purple Gallinule
- *Aramus guarauna* Limpkin
- *Grus canadensis tabida* Sandhill Crane (Greater)
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Grus americana* Whooping Crane
- *Recurvirostra americana* American Avocet
- *Tringa solitaria* Solitary Sandpiper
- *Tringa flavipes* Lesser Yellowlegs
- *Numenius americanus* Long-billed Curlew
- *Calidris fuscicollis* White-rumped Sandpiper
- *Calidris melanotos* Pectoral Sandpiper
- *Calidris alpina* Dunlin
- *Calidris himantopus* Stilt Sandpiper
- *Tryngites subruficollis* Buff-breasted Sandpiper
- *Limnodromus scolopaceus* Long-billed Dowitcher
- *Chlidonias niger* Black Tern
- *Crotophaga ani* Smooth-billed Ani
- *Asio flammeus* Short-eared Owl
- *Chordeiles minor* Common Nighthawk
- *Progne subis* Purple Martin
- *Riparia riparia* Bank Swallow
- *Cistothorus platensis* Sedge Wren
- *Setophaga discolor discolor* Prairie Warbler
- *Cardellina canadensis* Canada Warbler
- *Ammodramus leconteii* Le Conte's Sparrow
- *Ammodramus maritimus mirabilis* Cape Sable Seaside Sparrow
- *Euphagus carolinus* Rusty Blackbird
- *Euphagus cyanocephalus* Brewer's Blackbird

Amphibians

- *Lithobates capito* Gopher Frog
- *Lithobates virgatipes* Carpenter Frog
- *Pseudacris ornata* Ornate Chorus Frog
- *Ambystoma bishopi* Reticulated Flatwoods Salamander
- *Ambystoma cingulatum* Frosted Flatwoods Salamander
- *Ambystoma tigrinum* Eastern Tiger Salamander
- *Notophthalmus perstriatus* Striped Newt

Reptiles

- *Alligator mississippiensis* American Alligator
- *Anolis carolinensis seminolus* Southern Green Anole
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake

- *Lampropeltis getula* Eastern Kingsnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Storeria dekayi limnetes* Marsh Brownsnake
- *Storeria victa* Florida Brownsnake (Keys Population)
- *Thamnophis sauritus sackenii* Peninsula Ribbonsnake (Lower Keys Population)
- *Clemmys guttata* Spotted Turtle
- *Deirochelys reticularia* Chicken Turtle
- *Kinosternon baurii* Striped Mud Turtle (Lower Keys Population)
- *Pseudemys nelsoni* Florida Red-bellied Cooter (Panhandle Population)
- *Terrapene carolina* Eastern Box Turtle

Fish

- *Anguilla rostrata* American Eel
- *Pteronotropis welaka* Bluenose Shiner
- *Umbra pygmaea* Eastern Mudminnow
- *Enneacanthus chaetodon* Black Banded Sunfish
- *Etheostoma proeliare* Cypress Darter

Invertebrates

- *Procambarus econfinae* Panama City Crayfish
- *Gymnoscirtetes morsei* Morse's Wingless Grasshopper
- *Desmopachria cenchramis* Fig Seed Diving Beetle
- *Photuris brunnipennis floridana* Everglades Brownwing Firefly
- *Orthotrichia curta* Short Orthotrichian Microcaddisfly
- *Oecetis parva* Little Oecetis Longhorned Caddisfly
- *Triaenodes dendyi* A Caddisfly
- *Triaenodes florida* Floridian Triaenode Caddisfly
- *Cernotina truncona* Florida Cernotinan Caddisfly
- *Amblyscirtes reversa* Reversed Roadside-skipper
- *Atrytonopsis loammi* Loammi Skipper
- *Euphyes berryi* Berry's Skipper
- *Euphyes dion* Dion Skipper
- *Poanes viator zizaniae* Broad-winged Skipper
- *Polites origenes* Crossline Skipper
- *Staphylus hayhurstii* Scalloped Sooty Wing
- *Merycomyia brunnea* Brown Merycomyian Tabanid Fly

Conservation Threats

Threats to the Freshwater Marsh and Wet Prairie habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to agriculture
- Conversion to housing and urban development
- Groundwater withdrawal
- Incompatible fire
- Incompatible forestry practices
- Incompatible recreational activities
- Incompatible resource extraction—mining/drilling
- Invasive animals
- Invasive plants
- Nutrient loads—agriculture

- Nutrient loads–urban
- Roads
- Surface water withdrawal and diversion

As one of the most ubiquitous and widespread wetland types in Florida, the Freshwater Marsh and Wet Prairie habitat is subject to a wide array of threats, many of them highly ranked. Widespread ditching, diking, and hydrologic fragmentation caused by roads in or adjacent to this habitat are important sources of altered hydrologic regime. Groundwater withdrawal for municipal and agricultural purposes has impacted depressional marsh wetlands in localized areas throughout Florida, but this threat is most severe in portions of central Florida. Nearly all marsh and wet prairie systems in unprotected lands have suffered from direct habitat conversion and altered landscape context as the surrounding uplands and much of the wet prairie habitat have been converted to other land uses, primarily agriculture and urban/suburban development. Small wetlands are undervalued and frequently altered even though they are the only sites in which certain Florida species either live or reproduce. In south and central Florida, marsh and wet prairie wetlands are particularly vulnerable to and have been seriously impacted by a variety of invasive plants. Many marsh and wet prairie wetlands in both agricultural and urban settings receive nutrients from discharges from stormwater management systems which may lead to substantial changes in plant community composition and associated faunal changes. The experts noted that very little of the marsh and wet prairie habitat statewide is receiving adequate fire as a result of perceived difficulties in burning these habitats and lack of knowledge of the role of fire in herbaceous wetland ecosystems. Additional threats specific to this habitat include the numerous water control structures affecting marsh and wet prairie habitat, particularly in the Everglades region and in smaller isolated wetlands, statewide.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered hydrologic regime	High
B	Fragmentation of habitats, communities, ecosystems	High
C	Altered fire regime	High
D	Altered landscape mosaic or context	High
E	Altered water quality of surface water or aquifer: nutrients	High
F	Altered species composition/dominance	High
G	Habitat destruction or conversion	Medium
H	Altered community structure	Medium
I	Habitat degradation/disturbance	Medium
J	Keystone species missing or lacking in abundance	Medium
K	Insufficient size/extent of characteristic communities or ecosystems	Medium
L	Absent or insufficient biological legacies	Medium
M	Altered water salinity, pH, conductivity or other physical water quality characteristics of surface water or aquifer	Low
N	Altered water quality of surface water or aquifer: contaminants	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Conversion to agriculture	Very High	A, B, D, G, J, K
2	Conversion to housing and urban development	Very High	A, B, C, D, G, J, K
3	Surface water withdrawal	High	A, B, C, D, E, F, H, J, K, L
4	Incompatible fire	High	B, C, D, F, G, H, K, L
5	Nutrient loads–agriculture	High	E, F, H
6	Incompatible resource extraction: mining/drilling	High	A, B, D, E, G, K
7	Roads	High	A, B, C, D, F, G
8	Invasive plants	High	B, C, D, F, H, K
9	Incompatible recreational activities	Medium	C, H, I
10	Invasive animals	Medium	F, H
11	Management of nature–water control structures	Medium	A, B, C, D, F
12	Nutrient loads–urban	Medium	E, F, H
13	Groundwater withdrawal	Medium	A, D, F
14	Incompatible forestry practices	Low	A, B, G
15	Incompatible grazing and ranching	Low	C, E, F
16	Channel modification/shipping lanes	Low	G
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Freshwater Marsh and Wet Prairie that were also identified as statewide threats (see list above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Freshwater Marsh and Wet Prairie and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to support the ecological restoration efforts under way in the Everglades region, specifically, and more generally to increase the spatial extent of herbaceous wetlands in the landscape, improve the functionality of existing herbaceous wetlands through both regional and small-scale hydrologic restoration projects, raise awareness of the need for fire in herbaceous wetland systems, prevent harm to wetland ecosystems caused by discharge to and nutrient loading of marshes and wet prairies, and decrease the amount of wetland acreage converted to other land uses by making development more compatible with wetland habitat conservation.

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create voluntary incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands, and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.	M	M	H

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Provide tax reductions or other voluntary incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers and floodplains.	M	L	VH

Surface Water Withdrawal

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
VH	Continue funding projects that address ecological restoration, including Comprehensive Everglades Restoration Plan, Minimum Flows and Levels, water reservations, and other conservation programs	VH	VH	VH

Incompatible Fire

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Develop and disseminate a focused education program for ranchers and plantation owners on the value of growing season burns and burning in wetlands. Review and improve existing agency outreach materials to address these issues.	H	M	L

Incompatible Resource Extraction – Mining/Drilling

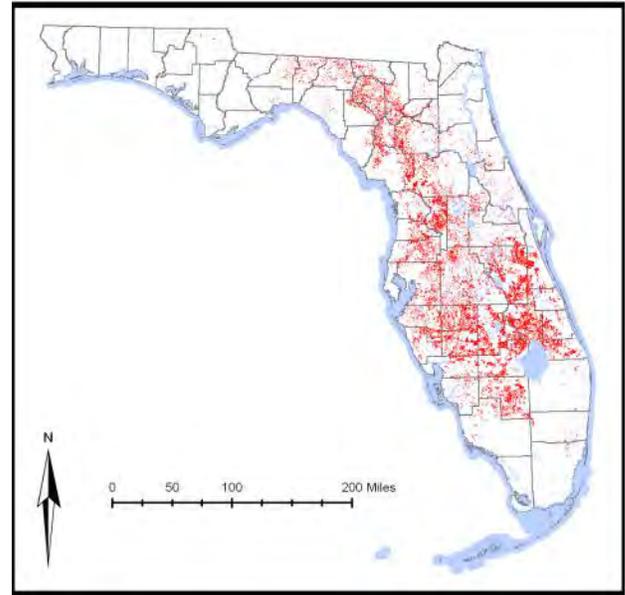
Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create incentives to avoid loss of, and impacts to, SHCAs and sensitive habitats from mining, particularly wet and dry prairie, scrub, and bat caves.	H	M	H

Management of Nature – Water Control Structures

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Review existing Farm Bill programs and explore options for enhancing economic benefits to landowners that improve or remove water control structures.	VH	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Develop an awareness program for Drainage Districts created by Chapter 298 of the Florida Administrative Code ("298 Districts") to educate them about opportunities to improve fish and wildlife habitat conditions through operational and/or structural changes in their drainage systems.	H	L	M

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Implement projects in the Comprehensive Everglades Restoration Plan .	H	H	VH
L	Create a grant program (or utilize existing Farm Bill and other federal programs) to replace or retrofit existing stop log or manually controlled structures with V-notch weirs in agricultural drainage systems. Give priority to those control structures identified as acting as barriers to wildlife movement or sheet flow.	H	L	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Form an interagency task force to streamline the permitting process for wetland restoration projects that restore hydrology.	VH	M	M
Overall Rank	Research	Feasibility	Benefits	Cost
M	Fund research to identify the habitat needs, movements, and impacts of wetland restoration on SGCN. Inventory water control structures, and identify the extent to which particular existing water control structures negatively affect species ecology.	VH	L	M
L	Recognizing that species move between wetland and upland habitats, assess the effectiveness of current BMP's regarding bedding near isolated wetlands.	H	L	L

Grassland/Improved Pasture



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Status

Current condition: Good and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 2,931,999 acres (1,186,538 ha) of Grassland/Improved Pasture habitat exist, of which 6% (186,662 ac; 75,539 ha) are in existing conservation or managed areas. Another 7% (193,063 ac; 78,130 ha) are in Florida Forever projects, and 9% (262,558 ac; 106,253 ha) are in SHCA-designated lands. The remaining 78% (2,289,716 ac; 926,615 ha) are other private lands.

Habitat Description

FNAI type: None

This is an upland community where the predominant vegetative cover is very low-growing grasses and forbs, most commonly in monocultures of non-invasive, non-native species. Improved Pastures have typically been cleared, tilled, reseeded with specific grass types, and periodically improved with brush control and fertilizer application.

Associated Species of Greatest Conservation Need

Mammals

- *Lasiurus borealis borealis* Red Bat
- *Lasiurus intermedius floridanus* Northern Yellow Bat
- *Lasiurus seminolus* Seminole Bat

- *Tadarida brasiliensis cynocephala* Brazilian Free-tailed Bat
- *Geomys pinetis pinetis* Southeastern Pocket Gopher
- *Sciurus niger avicennia* Big Cypress Fox Squirrel
- *Sciurus niger niger* Southeastern Fox Squirrel
- *Sciurus niger shermani* Sherman's Fox Squirrel
- *Puma concolor coryi* Florida Panther
- *Spilogale putorius ssp.* Spotted Skunk

Birds

- *Anas fulvigula* Mottled Duck
- *Colinus virginianus* Northern Bobwhite
- *Mycteria americana* Wood Stork
- *Plegadis falcinellus* Glossy Ibis
- *Elanoides forficatus* Swallow-tailed Kite
- *Elanus leucurus* White-tailed Kite
- *Ictinia mississippiensis* Mississippi Kite
- *Caracara cheriway audubonii* Audubon's Crested Caracara
- *Falco sparverius paulus* Southeastern American Kestrel
- *Falco columbarius* Merlin
- *Falco peregrinus* Peregrine Falcon
- *Grus canadensis tabida* Sandhill Crane (Greater)
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Grus americana* Whooping Crane
- *Calidris melanotos* Pectoral Sandpiper
- *Tryngites subruficollis* Buff-breasted Sandpiper
- *Scolopax minor* American Woodcock
- *Columbina passerina* Common Ground-Dove
- *Crotophaga ani* Smooth-billed Ani
- *Athene cunicularia* Burrowing Owl
- *Asio flammeus* Short-eared Owl
- *Chordeiles minor* Common Nighthawk
- *Caprimulgus carolinensis* Chuck-will's-widow
- *Lanius ludovicianus* Loggerhead Shrike
- *Aphelocoma coerulescens* Florida Scrub-Jay
- *Riparia riparia* Bank Swallow
- *Cistothorus platensis* Sedge Wren
- *Peucaea aestivalis* Bachman's Sparrow
- *Ammodramus savannarum pratensis* Grasshopper Sparrow
- *Ammodramus savannarum floridanus* Florida Grasshopper Sparrow
- *Ammodramus henslowii* Henslow's Sparrow
- *Ammodramus leconteii* Le Conte's Sparrow
- *Passerina ciris* Painted Bunting
- *Euphagus carolinus* Rusty Blackbird
- *Euphagus cyanocephalus* Brewer's Blackbird

Amphibians

- *Lithobates capito* Gopher Frog
- *Pseudacris ornata* Ornate Chorus Frog
- *Ambystoma tigrinum* Eastern Tiger Salamander

Reptiles

- *Cemophora coccinea coccinea* Florida Scarletsnake

- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis calligaster* Yellow-bellied Kingsnake
- *Lampropeltis getula* Eastern Kingsnake
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Tantilla oolitica* Rim Rock Crowned Snake
- *Tantilla relicta* Florida Crowned Snake
- *Gopherus polyphemus* Gopher Tortoise
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Procambarus rogersi rogersi* A Crayfish
- *Neamathla* Neamathla Skipper
- *Polites origenes* Crossline Skipper
- *Cupido comyntas* Eastern Tailed Blue
- *Idia gopheri* Gopher Tortoise Noctuid Moth
- *Junonia genoveva* Tropical Buckeye

Conservation Threats

Threats to Grassland/Improved Pasture habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to more intensive agriculture
- Conversion to housing and urban development
- Conversion to recreation areas
- Roads

No habitat-specific threats to Grassland/Improved Pasture were identified.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Fragmentation of habitats, communities, ecosystems	High
B	Habitat destruction or conversion	High
C	Altered species composition/dominance	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Roads	High	A, B
2	Conversion to housing and urban development	High	A, B
3	Conversion to agriculture	Medium	A, B
4	Conversion to recreation areas	Low	A, B
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Grassland/Improved Pasture that were also identified as statewide threats (conversion to agriculture, conversion to housing and urban development, conversion to recreation areas, and roads) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Because the experts did not identify any Grassland/Improved Pasture habitat-specific threats, no specific actions were identified. However, during the threats workshops, the participants identified several desired outcomes for this habitat that could form the basis for specific actions:

- While pasture is not a native landscape, pastures can provide significant wildlife habitat; therefore, conversion of pastures to more intense land uses should be discouraged, particularly in areas with karst geology. As much of this area is in private lands, incentives and/or cooperative agreements should be developed to identify and to retain or improve the functional values that these lands provide to wildlife.
- Conversion of natural and semi-natural habitats to improved pasture should be discouraged through incentive programs and easements.
- The value of this habitat could be enhanced for species that use pasture but are not doing well overall. For example, kestrel nest boxes could be placed on rights-of-way, and animal burrows could be located and avoided by heavy equipment operators.

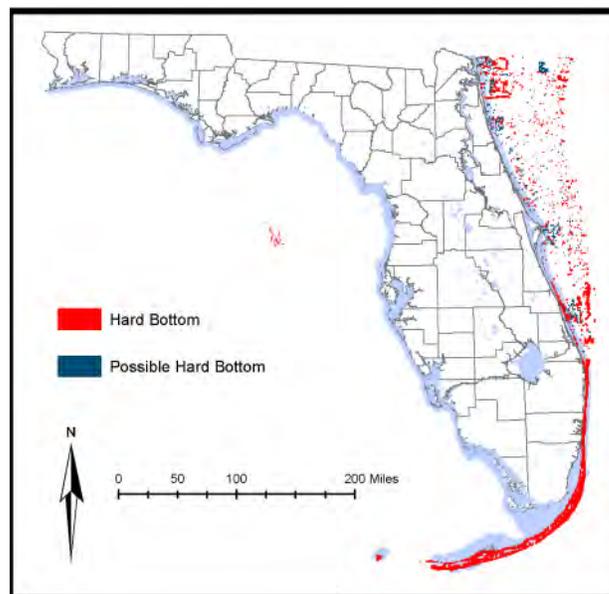
- More conservation land could be acquired (e.g., in Citrus County or adjacent to Withlacoochee State Forest) to protect habitat for burrowing owls, kestrels, and red-cockaded woodpecker.
- A network of contiguous habitats could be conserved, through voluntary restoration or preservation of patches of native vegetation at intervals across the range of this habitat.

Hard Bottom



Status

Current condition: Poor and declining.
Due to the lack of sufficient map data for this habitat category (see Appendix C: GIS Data Tables), no acreage estimates are currently available.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Consolidated Substrate, Octocoral Bed, Sponge Bed

Hard Bottom is characterized as mixed communities of algae, sponges, octocorals and stony corals. This habitat occurs in subtidal, intertidal, and supratidal zones throughout Florida's coastal waters. Hard Bottom is composed of attendant epibenthic biota on a rocky substrate composed of coquina, limestone, or relic coral, molluscan, and annelid reefs. Coquina is a limestone composed of broken shell debris. Limestone rock (many different strata) occurs as high- or low-relief outcrops of calcium carbonate. Relic reefs are the skeletal remains of once-living reefs such as the Vermetid Reef built by worm-like gastropod mollusks, *Petalocochus*. These reefs are only known to be found in shallow waters seaward of the outer islands in the Ten Thousand Islands area of southwest Florida.

Hard Bottom biological communities are structured by depth and latitude and inhabited by sessile, planktonic, epifaunal, and pelagic plants and animals; infaunal organisms are present in interstitial soft bottom substrate. In the region south of Stuart on the east coast and Bay Port on the west coast, subtidal hard bottom communities are characteristically inhabited by soft corals (octocorals) and sponges. Octocoral Beds have dense concentrations of sea fans, sea plumes, and sea feathers. Mobile species found in octocoral beds include flamingo tongue shell, purple shrimp, and basket starfish. Sponge beds include the branching, vase, tube, Florida loggerhead, and

sheepswool sponges. Other mobile fauna found in both the octocoral beds and the sponge beds include amphipods, isopods, burrowing shrimp, crabs, sand dollars, and many species of fish. Although the coral species found in Hard Bottom habitat are not reef-building, they do contribute to the three-dimensional nature of the areas by increasing the surface area for sessile organisms and by providing important refuges for a variety of fish and invertebrates.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee
- *Eubalaena glacialis* (incl. *australis*) North Atlantic Right Whale

Birds

- *Aythya affinis* Lesser Scaup
- *Gavia immer* Common Loon
- *Podiceps auritus* Horned Grebe

Reptiles

- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus falciformis* Silky Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus perezii* Reef Shark
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Cetorhinus maximus* Basking Shark
- *Manta birostris* Giant Manta Ray
- *Negaprion brevirostris* Lemon Shark
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Atractosteus spatula* Alligator Gar
- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper
- *Epinephelus nigritus* Warsaw Grouper
- *Epinephelus niveatus* Snowy Grouper
- *Epinephelus striatus* Nassau Grouper
- *Lutjanus mahogoni* Mahogany Snapper

Invertebrates

- *Gorgonia flabellum*
- *Gorgonia ventalina*
- *Bartholomea annulata*
- *Condylactis gigantea*
- *Epicystis crucifer*
- *Stichodactyla helianthus*
- *Acropora cervicornis*
- *Acropora palmata*
- *Acropora prolifera*
- *Agaricia agaricites*
- *Eusmilia fastigiata*
- *Diploria clivosa*
- *Diploria labyrinthiformis*
- *Diploria strigosa*
- *Manicina areolata*
- *Montastraea annularis*
- *Solenastrea hyades*
- *Dendrogyra cylindrus*
- *Dichocoenia stokesii*
- *Isophyllastrea rigida*
- *Isophyllia sinuosa*
- *Oculina robusta*
- *Oculina varicosa*
- *Porites porites*
- *Phyllangia americana*
- *Siderastrea siderea*
- *Discosoma calgreni*
- *Discosoma neglecta*
- *Discosoma sanctithomae*
- *Ricordea florida*
- *Plumapathes pennacea*
- *Tanacetipathes barbadensis*
- *Tanacetipathes tanacetum*
- *Tanacetipathes thamnea*
- *Millepora alcicornis*
- *Pseudobiceros splendidus*
- *Calliostoma javanicum*
- *Lithopoma americanum*
- *Cassis flammea*
- *Cassis madagascariensis*
- *Cassis tuberosa*
- *Cypraea cervus*
- *Cypraea zebra*
- *Cyphoma mcgintyi*
- *Strombus gallus*
- *Strombus gigas*
- *Dolabrifera dolabrifera*
- *Glossodoris sedna*
- *Elysia picta*
- *Octopus joubini*
- Venus Sea Fan
- Purple Sea Fan
- Ringed (Curlique Or Corkscrew) Anemone
- Giant Caribbean Anemone
- Beaded (Rock) Anemone
- Sun (Carpet) Anemone
- Staghorn Coral
- Elkhorn Coral
- Fused Staghorn Coral
- Lettuce Coral
- Flower Coral
- Knobby Brain Coral
- Grooved Brain Coral
- Symmetrical Brain Coral
- Rose Coral
- Boulder Star Coral
- Knobby Star Coral
- Pillar Coral
- Elliptical Star Coral, Pineapple Coral
- Rough Star Coral
- Sinuuous Cactus Coral
- Robust Ivory Tree Coral
- Large Ivory Coral
- Finger Coral
- Hidden Cup Coral
- Massive Starlet Coral
- Forked-tentacle Corallimorpharian
- Umbrella Mushroom, Umbrella Corallimorph
- Warty False Coral
- Florida False Coral
- Feather Black Coral
- Bottle Brush Black Coral
- Bottle Brush Black Coral
- Black Coral
- Encrusting Fire Coral
- Red-rim Flatworm, Splendid Flatworm
- Chocolate-lined Topsnail
- American Starsnail
- Flame Helmet
- Emperor or Queen Helmet
- King Helmet
- Atlantic Deer Cowrie
- Measled Cowrie
- Spotted Cyphoma
- Roostertail Conch
- Queen Conch
- Warty Seacat
- Red-tipped Sea Goddess
- Painted Elysia
- Atlantic Pygmy Octopus

- *Lysmata wurdemanni*
 - *Mithrax aculeatus (pilosus)*
 - *Luidia senegalensis*
 - *Poraniella echinulata*
 - *Copidaster lymani*
 - *Oreaster reticulatus*
 - *Asterina folium*
 - *Echinaster echinophorus*
 - *Asteroporpa annulata*
 - *Astropyga magnifica*
 - *Diadema antillarum*
 - *Lytechinus williamsi*
 - *Ocnus suspectus*
 - *Euthyonidiella destichada*
 - *Euthyonidiella trita*
 - *Actinopyga agassizii*
 - *Holothuria mexicana*
 - *Holothuria parvula*
- Peppermint Shrimp
 - Hairy Clinging Crab
 - Nine-armed Sea Star
 - Red Miniature Sea Star
 - Mottled Red Sea Star
 - Cushion Star, Bahama Star
 - Common Blunt Armed Sea Star
 - Thorny Sea Star
 - Basket Star
 - Magnificent Urchin
 - Long-spined Urchin
 - Jewel Urchin
 - A Sea Cucumber
 - A Sea Cucumber
 - A Sea Cucumber
 - Five-toothed Sea Cucumber, West Indian Sea Cucumber
 - Donkey Dung Sea Cucumber
 - A Sea Cucumber

Conservation Threats

Threats to Hard Bottom habitats are caused by changes in sediment accretion and removal from beach nourishment activities, damage from ship and boat groundings, cumulative impacts of anchors of all size vessels, and alteration of species composition and trophic interactions caused by parasites and pathogens.

Threats to Hard Bottom habitats that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible wildlife and fisheries management strategies
- Invasive animals
- Invasive plants
- Key predator/herbivore loss
- Management of nature (beach nourishment and impoundments)
- Roads, bridges and causeways
- Shoreline hardening
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition	High
B	Altered structure	High
C	Altered water quality—physical, chemistry	High
D	Altered weather regime/sea level rise	High

E	Habitat destruction	High
F	Habitat disturbance	High
G	Keystone species missing or lacking in abundance	High
H	Missing key communities or functional guilds/trophic shift	High
I	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Parasites/pathogens	High	A, B, E, G, H
2	Disruption of longshore transport of sediments	High	E, F, I
3	Channel modification/shipping lanes	High	E, F, I
4	Incompatible industrial operations	Medium	C, E
5	Incompatible fishing pressure	Medium	A, G
6	Dam operations/incompatible release of water: (quality, quantity, timing)	Medium	A, C, F
7	Climate variability	Medium	D
8	Inadequate stormwater management	Medium	A, C, G
9	Key predator/herbivore losses	Medium	A, F
10	Harmful algal blooms	Medium	A, F, G
11	Invasive plants	Medium	A, H
12	Management of nature (beach nourishment, impoundments)	Medium	A, C, E, F, I
13	Fishing gear impacts	Medium	B, E, F
14	Incompatible wildlife and fisheries management strategies	Medium	A, G
15	Placement of artificial structures	Medium	A, B, E, H
16	Shoreline hardening	Medium	E
17	Vessel impacts	Medium	E
18	Chemicals and toxins	Medium	F
19	Invasive animals	Medium	A
20	Solid waste	Medium	E, F
21	Utility corridors	Low	B, E
22	Roads, bridges and causeways	Low	E
23	Boating impacts	Low	E
24	Incompatible aquarium trade	Low	A
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Hard Bottom that were also identified as statewide threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Outcomes identified for this habitat address better understanding of the effects of beach nourishment and ensuring that ship anchorages are not sited over sensitive areas to reduce the probability that vessels run aground.

Highest ranked actions identified for abating this source of stress focus on:

- Establishing a funding source for remediation of damages from vessel impacts
- Development of a vessel anchoring management plan
- Improving the detection of pathogens, parasites, and biotoxins in marine organisms and the ability to rehabilitate impacted animals

Additional actions included:

- Evaluating whether parasites are indicators of estuarine and marine health
- Developing methods for keeping vessels away from sensitive areas
- Supporting restoration of damaged areas and replacement of species lost

The following actions, organized by action type, were identified to abate this threat:

Beach Nourishment/Impoundments

Overall Rank	Land/Water Species Management	Feasibility	Benefits	Cost
H	Review and revise criteria for statewide monitoring protocols to assess beach and offshore habitat impacts related to beach nourishment projects similar to BACI (Before-after-control-impacts: the analytical framework and adaptive management tool).	VH	M	L

Parasites/Pathogens

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Improve capabilities for/sophistication of inspection, recognition and treatment of aquatic organism diseases and parasites.	VH	M	M
H	Continue and support response teams/hotlines associated with disease outbreak, trauma, strandings, and mortality events for fish and wildlife species.	VH	M	M
L	Expand the number and capabilities of rehabilitation facilities for diseased and injured wildlife.	H	L	VH
Overall Rank	Research	Feasibility	Benefits	Cost
H	Conduct additional research on aquatic wildlife parasites and diseases, and the impacts of biotoxins on fish and wildlife resources.	VH	M	H
H	Synthesize and consolidate understanding, and identify gaps in understanding, of marine flora/fauna diseases, pathogens, and biotoxin impacts on fish and wildlife resources.	VH	M	L
M	Research and examine use of parasites as indicators of estuarine and marine health.	VH	L	M

Vessel Impacts

Overall Rank	Land/Water/Species Management:	<i>Feasibility</i>	<i>Benefits</i>	Cost
VH	Explore establish a marine/estuarine restoration fund.	M	VH	H
M	Develop a passive warning system for vessels to alert operators of sensitive or danger zones (shallows, reefs).	M	M	H
M	Encourage avoidance of anchorage and moorage in sensitive areas.	M	M	M
M	Identify appropriate areas for anchorage and moorings. Develop educational tools on low-impact mooring techniques.	M	M	M

Hardwood Hammock Forest



Status

Current condition: Unknown. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 979,826 acres (396,522 ha) of Hardwood Hammock Forest habitat exist, of which 16% (159,557 ac; 64,570 ha) are in existing conservation or managed areas. Another 4% (36,874 ac; 14,922 ha) are in Florida Forever projects and 6% (62,053 ac; 25,112 ha) are SHCA-designated lands. The remaining 74% (721,342 ac; 291,917 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Xeric Hammock, Maritime Hammock, Slope Forest, Prairie Hammock, Upland Hardwood Forest

This class includes the major upland hardwood associations that occur statewide on fairly rich sandy soils. Variations in species composition and the local or spatial distributions of these communities are due in part to differences in soil moisture regimes, soil type, and geographic location within the state. Mesic and xeric variations are included within this association.

The mesic hammock community represents the climax vegetation type within many areas of northern and central Florida. Characteristic species in the extreme north include American beech, southern magnolia, Shumard oak, white oak, mockernut hickory, pignut hickory, sourgum, basswood, white ash, mulberry, and spruce pine. Mesic hammocks of the peninsula are less diverse due to the absence of hardwood species that are adapted to more northerly climates, and are

characterized by laurel oak, hop hornbeam, blue beech, sweetgum, cabbage palm, American holly, and southern magnolia.

Xeric hammocks occur on deep, well-drained, sandy soils where fire has been absent for long periods of time. These open, dry hammocks contain live oak, sand-live oak, bluejack oak, blackjack oak, southern red oak, sand-post oak, and pignut hickory.

Also included in this category are cabbage palm-live oak hammocks. This class is characterized by cabbage palms and live oaks occurring in small clumps within prairie communities. These hammocks typically have an open understory which may include such species as wax myrtle, water oak, and saw palmetto. Cabbage palm-live oak hammocks are also often found bordering large lakes and rivers, and are distributed throughout the prairie region of south central Florida and extend northward in the St. Johns River basin. Cabbage palms often form a fringe around hardwood “islands” located within improved pastures.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Sorex longirostris eionis</i> | Homosassa Shrew |
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Microtus pinetorum</i> ssp. | Pine Vole |
| • <i>Tamias striatus</i> | Eastern Chipmunk |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulæ</i> | Florida Long-tailed Weasel |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius</i> ssp. | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|--------------------------------------|----------------------------|
| • <i>Colinus virginianus</i> | Northern Bobwhite |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Buteo platypterus</i> | Broad-winged Hawk |
| • <i>Buteo brachyurus</i> | Short-tailed Hawk |
| • <i>Caracara cheriway audubonii</i> | Audubon's Crested Caracara |
| • <i>Scolopax minor</i> | American Woodcock |
| • <i>Columbina passerina</i> | Common Ground-Dove |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Colaptes auratus</i> | Northern Flicker |
| • <i>Tyrannus dominicensis</i> | Gray Kingbird |
| • <i>Vireo altiloquus</i> | Black-whiskered Vireo |
| • <i>Sitta carolinensis</i> | White-breasted Nuthatch |
| • <i>Hylocichla mustelina</i> | Wood Thrush |
| • <i>Helmitheros vermivorum</i> | Worm-eating Warbler |

- *Parkesia motacilla* Louisiana Waterthrush
- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Protonotaria citrea* Prothonotary Warbler
- *Limnothlypis swainsonii* Swainson's Warbler
- *Geothlypis formosa* Kentucky Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga kirtlandii* Kirtland's Warbler
- *Setophaga cerulea* Cerulean Warbler
- *Setophaga castanea* Bay-breasted Warbler
- *Setophaga petechia gundlachi* Cuban Yellow Warbler
- *Setophaga dominica stoddardi* Stoddard's Yellow-throated Warbler
- *Setophaga discolor discolor* Prairie Warbler
- *Setophaga discolor paludicola* Florida Prairie Warbler
- *Cardellina canadensis* Canada Warbler
- *Passerina ciris* Painted Bunting

Amphibians

- *Lithobates capito* Gopher Frog
- *Lithobates okaloosae* Florida Bog Frog
- *Pseudacris ornata* Ornate Chorus Frog
- *Ambystoma tigrinum* Eastern Tiger Salamander
- *Desmognathus apalachicola* Apalachicola Dusky Salamander
- *Desmognathus auriculatus* Southern Dusky Salamander
- *Desmognathus cf. conanti* Eglin Ravine Spotted Dusky Salamander
- *Desmognathus monticola* Seal Salamander
- *Hemidactylium scutatum* Four-toed Salamander
- *Notophthalmus perstriatus* Striped Newt

Reptiles

- *Alligator mississippiensis* American Alligator
- *Anolis carolinensis seminolus* Southern Green Anole
- *Plestiodon anthracinus pluvialis* Southern Coal Skink
- *Plestiodon egregius lividus* Blue-tailed Mole Skink
- *Plestiodon egregius onocrepis* Peninsula Mole Skink
- *Rhineura floridana* Florida Wormlizard
- *Sceloporus woodi* Florida Scrub Lizard
- *Agkistrodon contortrix contortrix* Southern Copperhead
- *Cemophora coccinea coccinea* Florida Scarletsnake
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis calligaster* Yellow-bellied Kingsnake
- *Lampropeltis extenuata* Short-tailed Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Tantilla coronata* Southeastern Crowned Snake
- *Tantilla relicta* Florida Crowned Snake
- *Virginia valeriae valeriae* Eastern Smooth Earthsnake (Highlands Co.)
- *Gopherus polyphemus* Gopher Tortoise

- *Terrapene carolina*

Eastern Box Turtle

Invertebrates

- | | |
|---------------------------------|------------------------------------|
| • <i>Sphodros rufipes</i> | Red-legged Purse-web Spider |
| • <i>Cyclocosmia torreya</i> | Torreya Trap-door Spider |
| • <i>Myrmekeiaphila torreya</i> | A Trapdoor Spider |
| • <i>Chinattus parvulus</i> | Little Mountain Jumping Spider |
| • <i>Tettigidea empedonepia</i> | Torreya Pygmy Grasshopper |
| • <i>Cicindela sexguttata</i> | Six-spotted Tiger Beetle |
| • <i>Mycotrupes gaigei</i> | North Peninsular Mycotrupes Beetle |
| • <i>Ataenius brevicollis</i> | An Ataenius Beetle |
| • <i>Phanaeus triangularis</i> | Floodplain Phanaeus Scarab Beetle |
| • <i>Phyllophaga clemens</i> | Clemens' June Beetle |
| • <i>Achalarus lyciades</i> | Hoary Edge |
| • <i>Autochton cellus</i> | Golden-banded Skipper |
| • <i>Megathymus cofaqui</i> | Cofaqui Skipper |
| • <i>Megathymus yuccae</i> | Yucca Skipper |
| • <i>Staphylus hayhurstii</i> | Scalloped Sooty Wing |
| • <i>Callophrys henrici</i> | Henry's Elfin |
| • <i>Chlosyne nycteis</i> | Silvery Checkerspot |
| • <i>Proserpinus gaurae</i> | Proud Sphinx |
| • <i>Merope tuber</i> | Earwig Scorpionfly |

Conservation Threats

Threats to Hardwood Hammock Forest habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- | | |
|---|---|
| • Conversion to agriculture | • Incompatible fire |
| • Conversion to commercial and industrial development | • Incompatible resource extraction: mining/drilling |
| • Conversion to housing and urban development | • Invasive animals |
| • Conversion to recreation areas | • Invasive plants |
| • Groundwater withdrawal | • Roads |
| | • Surface water withdrawal |

Threats specific to Hardwood Hammock Forest were limited to incompatible residential activities that include movement of fertilizer, herbicide, and invasive species from landscape maintenance, activities of people, their pets, and nuisance species, and disposal of yard and household waste.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat destruction or conversion	High
B	Altered species composition/dominance	Medium
C	Altered hydrologic regime	Medium
D	Altered community structure	Medium
E	Fragmentation of habitats, communities, ecosystems	Medium
F	Erosion/sedimentation	Low
G	Altered landscape mosaic or context	Low
H	Altered fire regime	Low
I	Habitat degradation/disturbance	Low
J	Excessive depredation and/or parasitism	Low
K	Missing key communities, functional guilds, or seral stages	Low
L	Insufficient size/extent of characteristic communities	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Conversion to commercial and industrial development	High	A, C
2	Conversion to housing and urban development	High	A, C
3	Roads	High	A, C
4	Surface water withdrawal	Medium	B
5	Incompatible resource extraction: mining/drilling	Medium	A
6	Invasive plants	Medium	B
7	Incompatible agricultural practices	Low	C
8	Conversion to recreation areas	Low	A
9	Incompatible residential activities	Low	A, B
10	Incompatible fire	Low	B
11	Invasive animals	Low	B
12	Conversion to agriculture	Low	A
13	Groundwater withdrawal	Low	B
14	Humidity and temperature changes	Low	B
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Hardwood Hammock Forest that were also identified as statewide threats (see list above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Hardwood Hammock Forest are below, though none were ranked of high priority for implementation. These actions were designed to reduce the impacts from activities of residents adjacent to this habitat.

Incompatible Residential Activities

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Expand the scale of the Florida Yards and Neighborhoods program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.	M	M	L
L	Provide incentives (through local governments) for covenants, codes, and restrictions in residential areas that address issues of pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and light-use in coastal areas.	M	L	L
L	Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.	M	L	L
L	Provide incentives (through local governments) (e.g., fast track, density breaks) for developers that produce on-site, site-specific educational materials and standards that are maintained by homeowner associations.	M	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Promote and fund continuing education courses for landscape maintenance industry that include appropriate use of chemicals, irrigation, plants, and disposal of yard waste.	H	M	M

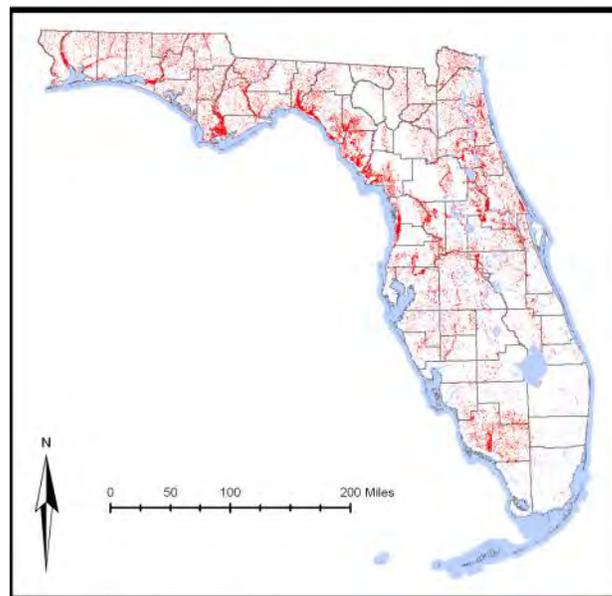
Hardwood Swamp/Mixed Wetland Forest



Status

Current condition: Good and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 3,250,491 acres (1,315,427 ha) of Hardwood Swamp/Mixed Wetland Forest habitat exist, of which 36% (1,175,787 ac; 475,824 ha) are in conservation or managed areas. Another 8% (274,280 ac; 110,997 ha) are in Florida Forever projects and 11% (346,382 ac; 140,176 ha) are in SHCA-designated lands. The remaining 45% (1,454,042 ac; 588,430 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Bottomland Forest, Basin Swamp

These wooded wetland communities are composed of either pure stands of hardwoods, or occur as a mixture of hardwoods and cypress where hardwoods achieve dominance. This association of wetland-adapted trees occurs throughout the state on organic soils and forms the forested floodplains of non-alluvial rivers, creeks, and broad lake basins. Tree species include a mixed overstory containing black gum, water tupelo, bald cypress, dahoon holly, red maple, swamp ash, cabbage palm, and sweetbay. Also included in this category are mixed wetland forest communities in which neither hardwoods nor conifers achieve dominance. The mix can include hardwoods with pine or cypress and can represent a mixed hydric site or a transition between hardwoods and conifers on hydric/mesic sites. Hardwood Swamp/Mixed Wetland Forests occur on low-lying flatlands or scattered low spots in basins and depressions that will only flood in extreme conditions. The canopy is usually dense and closed, keeping air movement and light penetration

relatively low and, thus, keeping the humidity high. Due to these damp conditions, this habitat infrequently burns.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|------------------------------|
| • <i>Blarina shermani</i> | Sherman's Short-tailed Shrew |
| • <i>Sorex longirostris eionis</i> | Homosassa Shrew |
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Microtus pinetorum</i> ssp. | Pine Vole |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Neovison vison hallimnetes</i> | Gulf Salt Marsh Mink |
| • <i>Neovison vison lutensis</i> | Atlantic Salt Marsh Mink |
| • <i>Neovison vison</i> ssp. | Mink |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|---------------------------------------|------------------------------------|
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Buteo platypterus</i> | Broad-winged Hawk |
| • <i>Buteo brachyurus</i> | Short-tailed Hawk |
| • <i>Aramus guarauna</i> | Limpkin |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Campephilus principalis</i> | Ivory-billed Woodpecker |
| • <i>Progne subis</i> | Purple Martin |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Protonotaria citrea</i> | Prothonotary Warbler |
| • <i>Limnothlypis swainsonii</i> | Swainson's Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga dominica stoddardi</i> | Stoddard's Yellow-throated Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Cardellina canadensis</i> | Canada Warbler |
| • <i>Euphagus carolinus</i> | Rusty Blackbird |

Amphibians

- *Lithobates okaloosae* Florida Bog Frog
- *Lithobates virgatipes* Carpenter Frog
- *Amphiuma pholeter* One-toed Amphiuma
- *Desmognathus auriculatus* Southern Dusky Salamander
- *Eurycea chamberlaini* Chamberlain's Dwarf Salamander
- *Hemidactylium scutatum* Four-toed Salamander
- *Pseudobranchius striatus lustricolus* Gulf Hammock Dwarf Siren
- *Pseudobranchius striatus striatus* Broad-striped Dwarf Siren
- *Stereochilus marginatus* Many-lined Salamander

Reptiles

- *Alligator mississippiensis* American Alligator
- *Anolis carolinensis seminolus* Southern Green Anole
- *Plestiodon anthracinus pluvialis* Southern Coal Skink
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Farancia erythrogramma* Rainbow Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Clemmys guttata* Spotted Turtle
- *Deirochelys reticularia* Chicken Turtle
- *Terrapene carolina* Eastern Box Turtle

Fish

- *Anguilla rostrata* American Eel
- *Pteronotropis welaka* Bluenose Shiner
- *Umbra pygmaea* Eastern Mudminnow
- *Acantharchus pomotis* Mud Sunfish

Invertebrates

- *Cicindela blanda* Sandbar Tiger Beetle
- *Cicindela hirticollis* Hairy-necked Tiger Beetle
- *Cicindela waplery* White-sand Tiger Beetle
- *Amblyscirtes aesculapius* Lace-winged Roadside Skipper
- *Amblyscirtes hegon* Pepper and Salt Skipper
- *Autochton cellus* Golden-banded Skipper
- *Megathymus cofaqui* Cofaqui Skipper
- *Megathymus yuccae* Yucca Skipper
- *Poanes viator zizaniae* Broad-winged Skipper
- *Poanes yehl* Yehl Skipper
- *Staphylus hayhurstii* Scalloped Sooty Wing
- *Callophrys augustinus* Brown Elfin
- *Callophrys henrici* Henry's Elfin
- *Feniseca tarquinius* Harvester
- *Satyrium kingi* King's Hairstreak
- *Satyrium liparops floridensis* Sparkleberry Hairstreak
- *Pyreferra ceromatica* Ceromatic Noctuid Moth
- *Anthanassa texana seminole* Seminole Crescent
- *Chlosyne nycteis* Silvery Checkerspot
- *Enodia portlandia floralae* Florida Pearly Eye

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
4	Invasive animals	Medium	B, C
5	Roads	Medium	A, D, E, F, H
6	Incompatible fire	Medium	C, H
7	Conversion to agriculture	Medium	D, E
8	Conversion to housing and urban development	Medium	D, E
9	New dams	Medium	B, C, G
10	Incompatible vegetation harvest	Low	B, C
11	Groundwater withdrawal	Low	A
12	Dam operations	Low	B, C
13	Management of nature–water control structures	Low	A
14	Incompatible recreational activities	Low	C, E
15	Incompatible grazing and ranching	Low	C
16	Incompatible animal harvest	Low	C
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Hardwood Swamp/Mixed Wetland Forest that were also identified as statewide threats (surface water withdrawal and diversion, invasive plants, incompatible forestry practices (also see actions below), invasive animals, roads, incompatible fire, conversion to agriculture (also see actions below), conversion to housing and urban development (also see actions below), groundwater withdrawal, incompatible recreational activities) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Hardwood Swamp/Mixed Wetland Forest are below. These actions were designed to restore more natural fire and hydrological regimes, the latter through alteration of both local surface water drainage and retrofitting and restoring existing water control structures.

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Encourage incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands, and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.	M	M	H

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage tax or other incentives, such as density transfers, for environmentally friendly comprehensive development plans for projects that front on rivers and floodplains.	M	L	VH

Dam Operations

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Coordinate interstate Action Plan actions to ensure that all fish and wildlife resources in all states are protected when changing dam operations in shared basins. (USFWS)	M	H	L
L	Coordinate multiagency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.	H	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Work with all affected parties to reassess the value in implementing the U.S. Forest Service (USFS) plan to remove Rodman Dam and restore impacted aquatic and wetland habitat.	H	M	H
Overall Rank	Research	Feasibility	Benefits	Cost
H	Determine the appropriate hydrological flows and levels for water reservations on the Apalachicola, Yellow, Ochlockonee, and other interstate rivers using the ESWM (Ecologically Sustainable Water Management) approach.	M	H	H

Management of Nature – Water Control Structures

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Explore options for enhancing economic benefits to landowners that improve or remove water control structures.	VH	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Work with affected parties to reassess the value in implementing the USFS plan to remove Rodman Dam and restore the lower Ocklawaha River.	VH	L	VH
L	Establish a fund for fish and aquatic wildlife passage research and improvements to existing dams and other water control structures to facilitate movement of migratory species (e.g., Apalachicola Woodruff Dam work).	H	L	VH
L	Encourage incentive-based programs to replace or retrofit existing stop log or manually controlled structures with V-notch weirs in agricultural drainage systems. Give priority to those control structures that are identified as acting as barriers to wildlife movement or sheet flow.	H	L	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Form an interagency task force to streamline the permitting process for wetland restoration projects on private lands and public lands that involve removing small, local water control structures.	VH	M	M
Overall Rank	Research	Feasibility	Benefits	Cost
M	Fund research to identify the habitat needs and movement requirements of native SGCN aquatic species, inventory water control structures, and identify the extent to which particular existing water control structures negatively affect species ecology.	VH	L	M

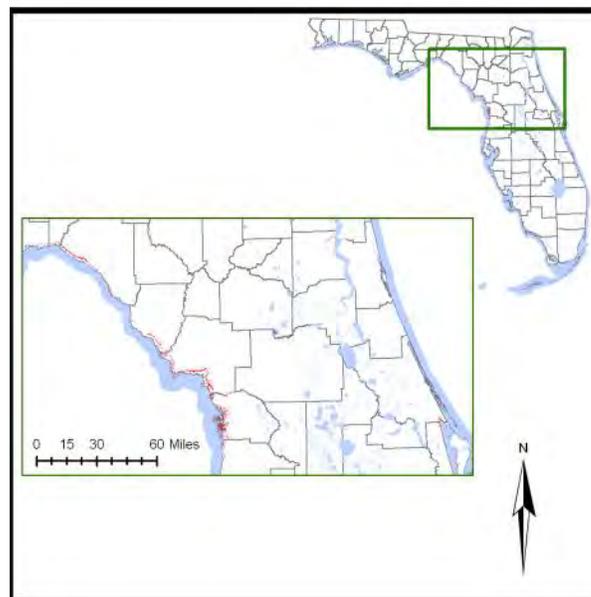
Hydric Hammock



Status

Current condition: Good and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 35,341 acres (14,302 ha) of Hydric Hammock habitat exist, of which 75% (26,409 ac; 10,687 ha) are in existing conservation or managed areas. Another 9% (3,271 ac; 1,324 ha) are in Florida Forever projects, and 2% (691 ac; 280 ha) are in SHCA-designated lands. The remaining 14% (4,970 ac; 2,011 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Hydric Hammock

Hydric Hammock occurs on soils that are poorly drained or have high water tables. This association is a still-water wetland, flooded less frequently and for shorter periods of time than mixed hardwood and cypress swamps. Outcrops of limestone are common in the Gulf coastal area. Typical plant species include laurel oak, live oak, cabbage palm, southern red cedar, and sweetgum. Canopy closure is typically 75 to 90 %. The sub-canopy layer and ground layer vegetation is highly variable between sites. Wax myrtle is the most frequent shrub in Hydric Hammock. Other shrubs include yaupon, dahoon, and swamp dogwood. Ground cover may be absent or consist of a dense growth of ferns, sedges, grasses, and greenbriars. Sites are usually between mesic hammocks or pine flatwoods and river swamp, wet prairie, or marsh. Hydric Hammock is found in a narrow band along parts of the Gulf coast and along the St. Johns River where it often extends to the edge of coastal salt marshes.

Associated Species of Greatest Conservation Need

Mammals

- *Corynorhinus rafinesquii* Rafinesque's Big-eared Bat
- *Lasiurus borealis borealis* Red Bat
- *Lasiurus intermedius floridanus* Northern Yellow Bat
- *Lasiurus seminolus* Seminole Bat
- *Myotis austroriparius* Southeastern Myotis
- *Perimyotis subflavus* Tricolored Bat
- *Lontra canadensis lataxina* River Otter
- *Neovison vison halilimnetes* Gulf Salt Marsh Mink
- *Ursus americanus floridanus* Florida Black Bear

Birds

- *Colinus virginianus* Northern Bobwhite
- *Elanoides forficatus* Swallow-tailed Kite
- *Buteo brachyurus* Short-tailed Hawk
- *Caracara cheriway audubonii* Audubon's Crested Caracara
- *Megascops asio* Eastern Screech-Owl
- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Limnothlypis swainsonii* Swainson's Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga castanea* Bay-breasted Warbler
- *Setophaga dominica stoddardi* Stoddard's Yellow-throated Warbler
- *Setophaga discolor discolor* Prairie Warbler
- *Cardellina canadensis* Canada Warbler
- *Passerina ciris* Painted Bunting

Amphibians

- *Amphiuma pholeter* One-toed Amphiuma
- *Desmognathus auriculatus* Southern Dusky Salamander
- *Pseudobranchius striatus lustricolus* Gulf Hammock Dwarf Siren

Reptiles

- *Alligator mississippiensis* American Alligator
- *Anolis carolinensis seminolus* Southern Green Anole
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Farancia erytrogramma* Rainbow Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Clemmys guttata* Spotted Turtle
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Amblyscirtes aesculapius* Lace-winged Roadside Skipper
- *Euphyes dukesi calhouni* Calhoun's Skipper
- *Anthanassa texana seminole* Seminole Crescent
- *Enodia portlandia floralae* Florida Pearly Eye
- *Satyrodes appalachia* Appalachian Brown

Conservation Threats

Threats to Hydric Hammock habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Climate variability
- Invasive plants

Habitat-specific threats to Hydric Hammock were identified because of potential military use of a new area along the Big Bend coastline that includes significant occurrences of this habitat.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	High
B	Habitat destruction or conversion	High
C	Altered hydrologic regime	Medium
D	Altered community structure	Medium
E	Erosion/sedimentation	Medium
F	Altered water quality of surface water or aquifer: nutrients	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Sea level rise	High	A, B
2	Invasive plants	Medium	A
3	Military activities	Low	A, B
Statewide Threat Rank of Habitat		Medium	

Conservation Actions

Actions to abate the threats to Hydric Hammock that were also identified as statewide threats (climate variability, invasive plants) are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions were developed to ensure that any expansion of military activity into this habitat would be sensitive to and appropriately mitigate for impacts to the habitat and SGCN it supports.

Military Activities

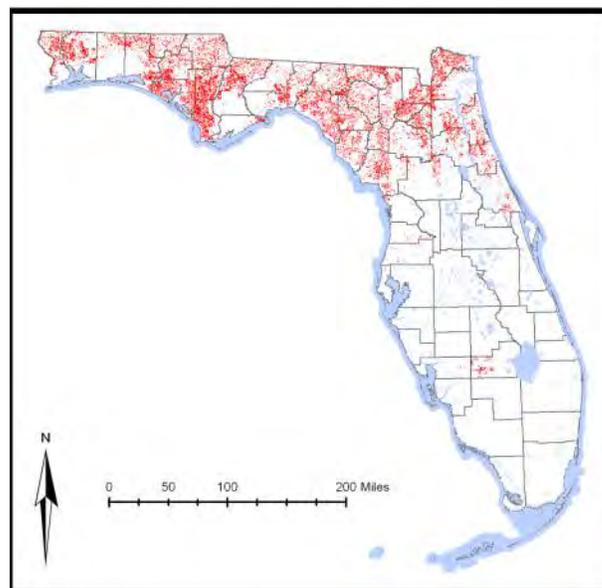
Overall Rank	Capacity Building	<i>Feasibility</i>	<i>Benefits</i>	Cost
H	Establish a permanent consultative group of multi-agency wildlife and habitat professionals that work with USDOD on development of any statewide plans for base expansion, increased usage, and growth or closure needs to enhance positive, or minimize any negative, impacts on wildlife and conservation lands.	M	H	M
Overall Rank	Land/Water Protection	<i>Feasibility</i>	<i>Benefits</i>	Cost
H	Encourage voluntary mitigation for any loss or degradation of Hydric Hammock habitat from military activities through acquisition of habitat protecting the same species that would be impacted.	VH	M	H

Industrial/Commercial Pineland



Status

Current condition: Good and declining. According to the best available GIS information at this time (Appendix C: GIS Data Tables), 3,363,024 acres (1,360,968 ha) of Industrial/Commercial Pineland are in Florida. Of that total, 19% (634,848 acres; 256,914 ha) are in existing conservation or managed areas, 11% (358,029 acres; 144,889 ha) are on private lands encompassed by Florida Forever projects, 6% (196,264 acres; 79,425 ha) are within SCHAs-identified lands, and the remaining 65% (2,173,883 acres; 879,739 ha) are within other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

This category includes industrial and commercial pine plantations that are almost exclusively artificially produced through silvicultural practices. Due to a climate conducive to rapid growth, Florida is part of one of the most productive timber-producing regions in the world; Florida's timberlands are a major contributor to the state's economy and provide critical water recharge areas within Florida. Industrial/Commercial Pineland habitat is characterized by high density, even-aged, single-species stands, planted in rows at regular intervals, across large areas. This habitat includes sites predominantly planted to slash pine, although longleaf pine and loblolly pine tracts also occur. Also included in this category are sand pine plantations, which often are planted on sites with poorer soils; many of these areas occur on intensively prepared sites. Ground cover and shrub vegetation on Industrial/Commercial Pineland sites vary with the growth stage of the pine trees and management techniques used at the site. On early or recently planted sites,

ground cover and shrub vegetation may be excessively dense, and may include species such as palmetto, gallberry, and wax myrtle. As the trees become taller and canopy cover becomes complete, ground cover and shrub vegetation becomes sparse. As Industrial/Commercial Pineland sites approach maturity other vegetation may disappear and the ground cover may consist of a thick layer of pine needles and other litter. Industrial/Commercial Pineland may provide habitat for a variety of species depending upon the growth stage of the forest and the management practices employed on-site. Species such as the Florida panther and the black bear may use this habitat as a corridor between primary habitats.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Sorex longirostris eionis</i> | Homosassa Shrew |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Microtus pinetorum</i> ssp. | Pine Vole |
| • <i>Sciurus niger niger</i> | Southeastern Fox Squirrel |
| • <i>Sciurus niger shermani</i> | Sherman's Fox Squirrel |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulæ</i> | Florida Long-tailed Weasel |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius</i> ssp. | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|--------------------------------------|-------------------------------|
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Columbina passerina</i> | Common Ground-Dove |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Chordeiles minor</i> | Common Nighthawk |
| • <i>Caprimulgus carolinensis</i> | Chuck-will's-widow |
| • <i>Caprimulgus vociferus</i> | Eastern Whip-poor-will |
| • <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Colaptes auratus</i> | Northern Flicker |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Limnothlypis swainsonii</i> | Swainson's Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Peucaea aestivalis</i> | Bachman's Sparrow |
| • <i>Euphagus cyanocephalus</i> | Brewer's Blackbird |

Invertebrates

- | | |
|----------------------------|--------------------|
| • <i>Callophrys niphon</i> | Eastern Pine Elfin |
|----------------------------|--------------------|

Conservation Threats

Threats to Industrial/Commercial Pineland habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Incompatible forestry practices
- Roads

Although intensively managing pine stands alters the native habitat conditions and reduces habitat quality for some SGCN, other species sometimes benefit from these conditions. Threats specific to Commercial/Industrial Pineland apply to loss of habitat quality for SGCN requiring a less altered pineland environment. Such losses in habitat quality vary by species and may result from inappropriate application of BMPs or other management actions that are not compatible with habitat needs for the species. These management actions may include bedding and other site preparation, dense stocking of single-age monocultures, short rotation lengths, overuse of herbicide instead of fire or other alternatives for vegetation management, major hydrological alterations, and insufficient invasive control efforts.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat degradation/disturbance	High
B	Habitat destruction or conversion	High
C	Low genetic diversity in pines	Low

The sources of the stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible forestry practices	High	A
2	Conversion to housing and urban development	High	B
3	Conversion to commercial and industrial development	High	B
4	Roads	Medium	B
Statewide Threat Rank of Habitat		High	

Conservation Actions

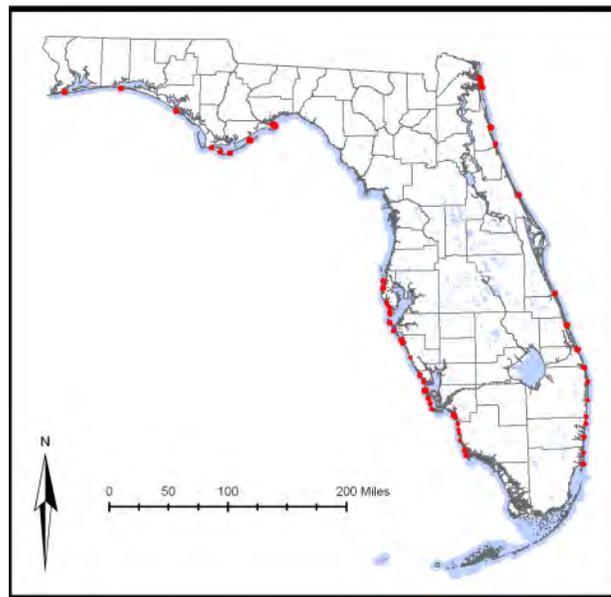
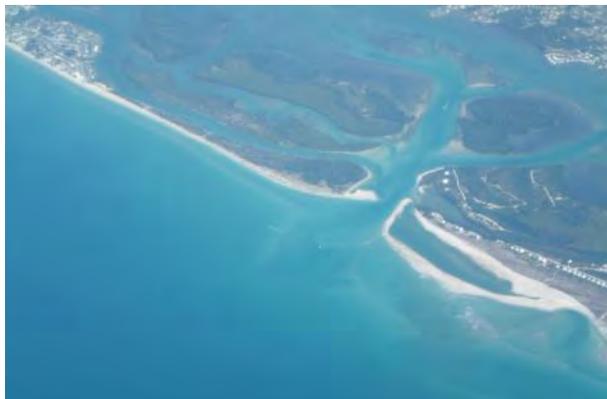
Actions to abate the threats to Industrial/Commercial Pineland that were also identified as statewide threats (incompatible forestry practices [see habitat specific actions below], conversion to housing and urban development, conversion to commercial and industrial development, roads) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Industrial/Commercial Pineland are below. These actions were designed to increase management consistency with habitat for wildlife SGCN and control of Japanese climbing fern where pine straw is harvested, but none were ranked as of high priority for implementation.

Incompatible Forestry Practices

Overall Rank	Economic and Other Incentives	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Provide incentives for increasing rotation length, reducing tree densities, and improving native ground cover on industrial and non-industrial private forest (NIPF) ownerships. Use incentive programs to compensate forest managers and owners for any profit lost due to use of longer rotations.	H	L	L
Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Promote and encourage full and comprehensive utilization of the Sustainable Forestry Initiative (SFI).	M	M	L
Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Research on alternatives to bedding for silvicultural production.	H	L	M
L	Research on productivity loss if bedding is not implemented (to identify whether subsidies might be necessary to reimburse for productivity loss)	H	L	L

Inlet



Status

Current condition: Unknown.

Due to the lack of sufficient map data for this habitat category, no acreage estimates are currently available.

Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

Inlets are natural or man-made cuts in the shoreline that link coastal and inland water bodies. This habitat is defined as the subtidal area within a two-kilometer radius of the central part (i.e., throat) of the Inlet. These features tend to be hot spots of biodiversity and are critical in the recruitment of many fish and invertebrate species. Inlets provide habitat for the settling larvae from coastal areas and provide an emigration conduit for outgoing juveniles. They also are essential spawning habitat for several marine fishes.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee
- *Eubalaena glacialis* (incl. *australis*) North Atlantic Right Whale

Birds

- *Anas rubripes* American Black Duck
- *Aythya marila* Greater Scaup
- *Gavia stellata* Red-throated Loon

- *Gavia immer*
 - *Podiceps auritus*
 - *Sula dactylatra*
 - *Pelecanus occidentalis*
 - *Ardea herodias*
 - *Ardea alba*
 - *Egretta caerulea*
 - *Egretta rufescens*
 - *Butorides virescens*
 - *Nycticorax nycticorax*
 - *Platalea ajaja*
 - *Pandion haliaetus*
 - *Haliaeetus leucocephalus*
 - *Pluvialis squatarola*
 - *Pluvialis dominica*
 - *Charadrius nivosus*
 - *Charadrius wilsonia*
 - *Charadrius melodus*
 - *Haematopus palliatus*
 - *Recurvirostra americana*
 - *Tringa semipalmata semipalmata*
 - *Tringa semipalmata inornata*
 - *Tringa flavipes*
 - *Numenius americanus*
 - *Limosa fedoa*
 - *Arenaria interpres*
 - *Calidris alba*
 - *Calidris alpina*
 - *Calidris himantopus*
 - *Limnodromus griseus*
 - *Limnodromus scolopaceus*
 - *Phalaropus tricolor*
 - *Sternula antillarum*
 - *Gelochelidon nilotica*
 - *Hydroprogne caspia*
 - *Chlidonias niger*
 - *Sterna dougallii*
 - *Thalasseus maximus*
 - *Thalasseus sandvicensis*
 - *Rynchops niger*
- Common Loon
 - Horned Grebe
 - Masked Booby
 - Brown Pelican
 - Great Blue Heron
 - Great Egret
 - Little Blue Heron
 - Reddish Egret
 - Green Heron
 - Black-crowned Night-Heron
 - Roseate Spoonbill
 - Osprey
 - Bald Eagle
 - Black-bellied Plover
 - American Golden-Plover
 - Snowy Plover
 - Wilson's Plover
 - Piping Plover
 - American Oystercatcher
 - American Avocet
 - Eastern Willet
 - Western Willet
 - Lesser Yellowlegs
 - Long-billed Curlew
 - Marbled Godwit
 - Ruddy Turnstone
 - Sanderling
 - Dunlin
 - Stilt Sandpiper
 - Short-billed Dowitcher
 - Long-billed Dowitcher
 - Wilson's Phalarope
 - Least Tern
 - Gull-billed Tern
 - Caspian Tern
 - Black Tern
 - Roseate Tern
 - Royal Tern
 - Sandwich Tern
 - Black Skimmer

Reptiles

- *Crocodylus acutus*
 - *Nerodia clarkii clarkii*
 - *Nerodia clarkii compressicauda*
 - *Nerodia clarkii taeniata*
 - *Caretta caretta*
 - *Chelonia mydas*
 - *Eretmochelys imbricata*
 - *Lepidochelys kempii*
 - *Malaclemys terrapin*
- American Crocodile
 - Gulf Saltmarsh Watersnake
 - Mangrove Saltmarsh Watersnake
 - Atlantic Saltmarsh Watersnake
 - Loggerhead Sea Turtle
 - Green Sea Turtle
 - Hawksbill Sea Turtle
 - Kemp's Ridley Sea Turtle
 - Diamond-backed Terrapin

Fish

- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Anguilla rostrata* American Eel
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Galeocerdo cuvier* Tiger Shark
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Ctenogobius pseudofasciatus* Slashcheek Goby
- *Epinephelus itajara* Goliath Grouper

Invertebrates

- *Crassostrea virginica* Eastern Oyster
- *Cassis tuberosa* King Helmet
- *Elysia clarki* Lettuce Sea Slug
- *Elysia picta* Painted Elysia
- *Cardisoma guanhumi* Great Land Crab (Blue Land Crab)
- *Aratus pisonii* Mangrove Crab
- *Lysmata wurdemanni* Peppermint Shrimp
- *Luidia senegalensis* Nine-armed Sea Star
- *Oreaster reticulatus* Cushion Star, Bahama Star
- *Diadema antillarum* Long-spined Urchin

Conservation Threats

Threats to the Inlet habitats that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Industrial spills
- Invasive animals
- Invasive plants

- Management of nature (beach nourishment and impoundments)
- Nutrient loads (urban)
- Roads, bridges and causeways
- Surface water and groundwater withdrawal
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat disturbance	High
B	Altered species composition	Medium
C	Altered structure	Medium
D	Altered water quality—physical, chemistry	Medium
E	Erosion	Medium
F	Habitat destruction	Medium
G	Altered hydrologic regime	Medium
H	Keystone species missing or lacking in abundance	Medium
I	Sedimentation	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Channel modification/shipping lanes	High	A, D, E, F, G, I
2	Shoreline hardening	High	C, E, F, I
3	Dam operations/incompatible release of water: (quality, quantity, timing)	High	A, D, G, I
4	Disruption of longshore transport of sediments	High	E, I
5	Coastal development	High	B, C, D, F, G
6	Management of nature (beach nourishment, impoundments)	High	A, B, I
7	Boating impacts	High	A
8	Incompatible recreational activities	High	A
9	Light pollution	High	B
10	Industrial spills	Medium	A
11	Harmful algal blooms	Medium	B
12	Road, bridges and causeways	Medium	C, F, G
13	Inadequate stormwater management	Medium	B, D, G
14	Incompatible industrial operations	Medium	B, F
15	Invasive plants	Medium	B
16	Incompatible fishing pressure	Medium	B, H
17	Acoustic pollution	Medium	A

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
18	Vessel impacts	Medium	A, F
19	Utility corridors	Medium	A
20	Fishing gear impacts	Medium	A
21	Military activities	Medium	A
22	Invasive animals	Medium	A, B
23	Surface water withdrawal	Medium	D
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

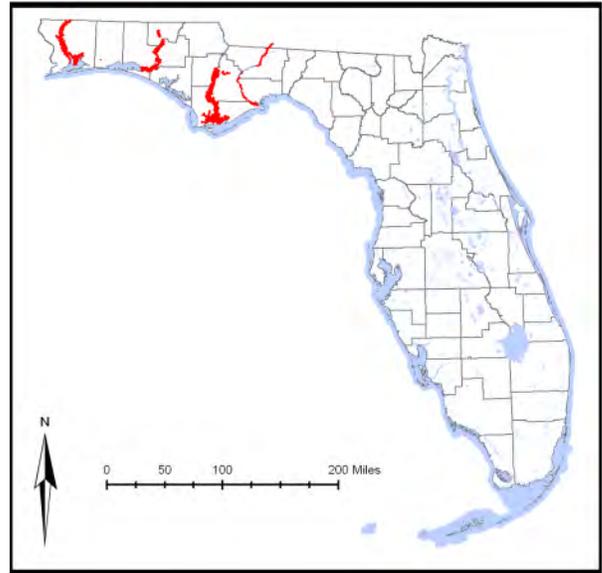
Actions to abate the threats to Inlet that were also identified as statewide threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Many of the threats to the Inlet habitat category are the same as for several other marine and estuarine habitats. Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Beach/Surf Zone](#), [Coastal Strand](#), [Coral Reef](#), [Hard Bottom](#), [Mangrove Swamp](#), [Seagrass](#), [Coastal Tidal River or Stream](#)).

Large Alluvial Stream



Status

Current condition: Good and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,019 miles (1,640 km) of Large Alluvial Stream habitat exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Alluvial Stream, River Floodplain Lake, Swamp Lake

Alluvial streams originate in high uplands that are composed of sand and silt based clays, thereby giving these streams a natural high turbidity. These streams only occur in the north region of Florida and are characterized as having meandering channels with a mix of sand bottom, sand and gravel, and areas of bedrock or shoals. Large Alluvial Streams have flow rates and sediment loads that range from low to high (flood) stages, consequently causing water depth and other water quality parameters to fluctuate substantially with seasonal rainfall patterns. Flood stages which overflow the banks and inundate the adjacent floodplain and Bottomland Hardwood Forest communities usually occur one or two times each year during winter or early spring. Due to the high natural turbidity of these streams there is minimal vegetation which is mostly confined to channel edges or backwaters. Typical plants include spatterdock, duckweed, American lotus, and water hyssop. Examples of this stream category include the Escambia, Choctawhatchee, and Apalachicola rivers.

Associated Species of Greatest Conservation Need

Mammals

- *Corynorhinus rafinesquii* Rafinesque's Big-eared Bat
- *Eptesicus fuscus* Big Brown Bat

- *Lasiurus borealis borealis* Red Bat
- *Lasiurus cinereus cinereus* Hoary Bat
- *Lasiurus intermedius floridanus* Northern Yellow Bat
- *Lasiurus seminolus* Seminole Bat
- *Myotis austroriparius* Southeastern Myotis
- *Myotis grisescens* Gray Bat
- *Perimyotis subflavus* Tricolored Bat
- *Lontra canadensis lataxina* River Otter
- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Mycteria americana* Wood Stork
- *Ixobrychus exilis* Least Bittern
- *Ardea herodias* Great Blue Heron
- *Ardea alba* Great Egret
- *Egretta thula* Snowy Egret
- *Egretta caerulea* Little Blue Heron
- *Egretta tricolor* Tricolored Heron
- *Butorides virescens* Green Heron
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Plegadis falcinellus* Glossy Ibis
- *Pandion haliaetus* Osprey
- *Elanoides forficatus* Swallow-tailed Kite
- *Haliaeetus leucocephalus* Bald Eagle
- *Aramus guarauna* Limpkin
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Recurvirostra americana* American Avocet
- *Tringa solitaria* Solitary Sandpiper
- *Tringa flavipes* Lesser Yellowlegs
- *Tryngites subruficollis* Buff-breasted Sandpiper
- *Protonotaria citrea* Prothonotary Warbler

Amphibians

- *Amphiuma pholeter* One-toed Amphiuma
- *Desmognathus auriculatus* Southern Dusky Salamander

Reptiles

- *Alligator mississippiensis* American Alligator
- *Farancia erythrogramma* Rainbow Snake
- *Apalone mutica calvata* Gulf Coast Smooth Softshell
- *Apalone spinifera aspera* Gulf Coast Spiny Softshell
- *Graptemys barbouri* Barbour's Map Turtle
- *Graptemys ernsti* Escambia Map Turtle
- *Macrochelys temminckii* Alligator Snapping Turtle
- *Pseudemys nelsoni* Florida Red-bellied Cooter (Panhandle Population)
- *Pseudemys suwanniensis* Suwannee Cooter

Fish

- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Anguilla rostrata* American Eel
- *Alosa aestivalis* Blueback Herring

• <i>Alosa alabamae</i>	Alabama Shad
• <i>Cyprinella callitaenia</i>	Bluestripe Shiner
• <i>Hybognathus hayi</i>	Cypress Minnow
• <i>Luxilus chrysocephalus</i>	Striped Shiner
• <i>Lythrurus atrapiculus</i>	Blacktip Shiner
• <i>Macrhybopsis</i> n. sp. cf. <i>aestivalis</i>	Florida Chub/Speckled Chub
• <i>Moxostoma</i> n. sp. cf. <i>poecilurum</i>	Grayfin Redhorse
• <i>Moxostoma carinatum</i>	River Redhorse
• <i>Nocomis leptcephalus</i>	Bluehead Chub
• <i>Notropis baileyi</i>	Rough Shiner
• <i>Notropis harperi</i>	Redeye Chub
• <i>Notropis melanostomus</i>	Blackmouth Shiner
• <i>Fundulus blairae</i>	Lowland Topminnow
• <i>Pristis pectinata</i>	Smalltooth Sawfish
• <i>Pristis pristis</i>	Largetooth Sawfish
• <i>Umbra pygmaea</i>	Eastern Mudminnow
• <i>Atractosteus spatula</i>	Alligator Gar
• <i>Agonostomus monticola</i>	Mountain Mullet
• <i>Acantharchus pomotis</i>	Mud Sunfish
• <i>Crystallaria asprella</i>	Crystal Darter
• <i>Enneacanthus chaetodon</i>	Black Banded Sunfish
• <i>Etheostoma histrio</i>	Harlequin Darter
• <i>Etheostoma olmstedi</i>	Tessellated Darter
• <i>Etheostoma parvipinne</i>	Goldstripe Darter
• <i>Etheostoma proeliare</i>	Cypress Darter
• <i>Micropterus cataractae</i>	Shoal Bass
• <i>Percina austroperca</i>	Southern Logperch
• <i>Percina vigil</i>	Saddleback Darter
• <i>Ameiurus brunneus</i>	Snail Bullhead
• <i>Ameiurus serracanthus</i>	Spotted Bullhead

Invertebrates

• <i>Alasmidonta triangulata</i>	Southern Elktoe
• <i>Alasmidonta wrightiana</i>	Ochlockonee Arcmussel
• <i>Amblema neislerii</i>	Fat Three-ridge Mussel
• <i>Anodonta heardi</i>	Apalachicola Floater
• <i>Anodonta suborbiculata</i>	Flat Floater
• <i>Anodontoides radiatus</i>	Rayed Creekshell
• <i>Elliptio arctata</i>	Delicate Spike
• <i>Elliptio chipolaensis</i>	Chipola Slabshell
• <i>Elliptio mcMichaeli</i>	Fluted Elephant-ear
• <i>Elliptio purpurella</i>	Inflated Spike
• <i>Elliptioideus sloatianus</i>	Purple Bankclimber
• <i>Fusconaia burkei</i>	Tapered Pigtoe
• <i>Fusconaia escambia</i>	Narrow Pigtoe
• <i>Fusconaia rotulata</i>	Round Ebonyshell
• <i>Glebula rotundata</i>	Round Pearlshell
• <i>Hamiota australis</i>	Southern Sandshell
• <i>Lampsilis floridensis</i>	Yellow Sandshell
• <i>Lampsilis ornata</i>	Southern Pocketbook
• <i>Medionidus acutissimus</i>	Alabama Moccasinshell
• <i>Medionidus penicillatus</i>	Gulf Moccasinshell

• <i>Medionidus walkeri</i>	Suwannee Moccasinshell
• <i>Megalonaias nervosa</i>	Washboard
• <i>Pleurobema strodeanum</i>	Fuzzy Pigtoe
• <i>Ptychobranhus jonesi</i>	Southern Kidneyshell
• <i>Quadrula infucata</i>	Sculptured Pigtoe
• <i>Utterbackia peggyae</i>	Florida Floater
• <i>Villosa choctawensis</i>	Choctaw Bean
• <i>Villosa villosa</i>	Downy Rainbow
• <i>Elimia albanyensis</i>	Black-crested Elimia Snail
• <i>Elimia clenchi</i>	Clench's Goniobasis
• <i>Cambarus miltus</i>	Rusty Grave Digger
• <i>Macrobrachium acanthurus</i>	Cinnamon River Shrimp
• <i>Macrobrachium carcinus</i>	Big Claw River Shrimp
• <i>Macrobrachium ohione</i>	Ohio River Shrimp
• <i>Acentrella parvula</i>	A Mayfly
• <i>Proclleon rufostriatum</i>	A Mayfly
• <i>Baetisca becki</i>	A Mayfly
• <i>Baetisca escambiensis</i>	A Mayfly
• <i>Baetisca gibbera</i>	A Mayfly
• <i>Attenella attenuata</i>	Hirsute Mayfly
• <i>Dannella simplex</i>	A Mayfly
• <i>Macdunnoa brunnea</i>	A Mayfly
• <i>Asioplax dolani</i>	A Mayfly
• <i>Isonychia sicca</i>	A Mayfly
• <i>Hetaerina americana</i>	American Rubyspot
• <i>Neurocordulia molesta</i>	Smoky Shadowfly
• <i>Erpetogomphus designatus</i>	Eastern Ringtail
• <i>Gomphus hybridus</i>	Cocoa Clubtail
• <i>Ophiogomphus australis</i>	Southern Snaketail
• <i>Stylurus laurae</i>	Laura's Clubtail
• <i>Stylurus potulentus</i>	Yellow-sided Clubtail
• <i>Stylurus townesi</i>	Towne's Clubtail
• <i>Amphinemura nigritta</i>	A Stonefly
• <i>Helopicus subvarians</i>	A Stonefly
• <i>Hydroperla phormidia</i>	A Stonefly
• <i>Taeniopteryx burksi</i>	Eastern Willowfly
• <i>Poanes viator zizaniae</i>	Broad-winged Skipper

Conservation Threats

Threats to the Large Alluvial Stream habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Groundwater withdrawal
- Incompatible forestry practices
- Incompatible recreational activities
- Invasive animals
- Surface water withdrawal and diversion

Existing dams and associated water withdrawal pose a serious source of stress to the alluvial stream habitat on the Apalachicola River and a potential future threat on several additional rivers. Dams and other activities, including incompatible forestry practices and channel modification, can appreciably alter sediment dynamics in this habitat. Additional threats specific to this habitat include dam operations and management of nature (i.e., water control structures/dams and levees, especially on the large interstate rivers of the Florida panhandle, as well as channel modification for the Apalachicola River specifically).

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	Medium
B	Altered community structure	Medium
C	Habitat destruction or conversion	Medium
D	Fragmentation of habitats, communities, ecosystems	Medium
E	Altered hydrologic regime	Medium
F	Erosion/sedimentation	Medium
G	Altered water quality of surface water or aquifer: nutrients	Low
H	Altered water quality of surface water or aquifer: contaminants	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Dam operations	High	A, B, C, D, E, F
2	Management of nature–water control structures	High	A, B, C, D, E, F
3	Channel modification/shipping lanes	High	A, B, C, D, E, F
4	Invasive animals	Medium	A, B, C, F
5	Surface water withdrawal	Medium	D, E
6	Groundwater withdrawal	Low	E
7	Incompatible forestry practices	Low	A, B, C, D, E, F
8	Chemicals and toxins	Low	A
9	Incompatible recreational activities	Low	A, B, C, F
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Large Alluvial Stream that were also identified as statewide threats (invasive animals, surface water withdrawal and diversion, groundwater withdrawal, incompatible forestry practices, chemicals and toxins, incompatible recreational activities) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Large Alluvial Stream and a few other habitats, and are listed below. Additional actions were developed to address threats specific to this habitat. These actions were intended to reduce the impacts of dams and dam operations on movement and survival of aquatic species by retrofitting and restoring existing structures or by setting limits on the magnitude, duration, and frequency of downstream water releases required to support aquatic habitat.

Dam operations

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Coordinate interstate Action Plan actions to ensure that all fish and wildlife resources in all states are protected when changing dam operations in shared basins. (USFWS)	M	H	L
L	Coordinate multiagency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.	H	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Raise the intake water from the Ochlockonee Dam to increase downstream dissolved oxygen content to natural levels.	VH	M	H
Overall Rank	Research	Feasibility	Benefits	Cost
H	Determine the appropriate hydrological flows and levels for water reservations on the Apalachicola, Yellow, Ochlockonee, and other interstate rivers using the ESWM (Ecologically Sustainable Water Management) approach.	M	H	H
M	Complete research on anadromous fish passage implementation and effectiveness on the Apalachicola River. Expand research to Lake Talquin Dam.	H	M	H
M	Evaluate cumulative impacts of small rural impoundments on fish and wildlife.	M	M	M
L	Evaluate feasibility of incentive programs to remove small rural impoundments.	H	L	L

Management of nature – water control structures

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Explore funding sources for fish and aquatic wildlife passage research and improvements to existing dams and other water control structures to facilitate movement of migratory species (e.g., Apalachicola Woodruff Dam work).	H	L	VH
Overall Rank	Research	Feasibility	Benefits	Cost
M	Fund research to identify the habitat needs and movement requirements of native SGCN aquatic species, inventory water control structures, and identify the extent to which particular existing water control structures negatively affect species ecology.	VH	L	M
L	Fund research to investigate the cumulative impacts of small farm ponds on low-order streams in north Florida to determine the effectiveness of existing regulations and recommend changes to the regulatory/permitting process aimed at reducing cumulative impacts.	M	L	M

Chemicals and toxins

Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Encourage voluntary incentives for private landowners to minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M

Mangrove Swamp



Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 588,434 acres (238,131 ha) of Mangrove Swamp habitat exist, of which 88% (515,783 ac; 208,730 ha) are in existing conservation or managed areas. Another 2% (10,376 ac; 4,199 ha) are in Florida Forever projects and 3% (16,997 ac; 6,878 ha) are in SHCA-designated lands. The remaining 7% (45,278 ac; 18,323 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Tidal Swamp

Mangroves form dense, brackish-water swamps along low-energy shorelines and in protected, tidally influenced bays of southern Florida. This community type is composed of freeze-sensitive tree species and, with some limited exceptions, mangroves which are distributed south of Cedar Key on the Gulf coast and south of St. Augustine on the Atlantic coast. These swamp communities are usually composed of red mangrove, black mangrove, and white mangrove. Depending on slopes and amounts of disturbance, mangrove swamps may progress in zones of single species from seaward (red mangrove) to landward (white mangrove) areas. Buttonwoods usually occur in areas above high tide. Often vines, such as rubber vines and morning-glory, clamber over mangroves, especially at swamp edges.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|-------------------------------|
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Sylvilagus palustris hefneri</i> | Lower Keys Marsh Rabbit |
| • <i>Oryzomys palustris natator</i> | Silver Rice Rat |
| • <i>Oryzomys palustris planirostris</i> | Pine Island Marsh Rice Rat |
| • <i>Oryzomys palustris sanibeli</i> | Sanibel Island Marsh Rice Rat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Procyon lotor auspicatus</i> | Key Vaca Raccoon |
| • <i>Procyon lotor incautus</i> | Key West Raccoon |
| • <i>Procyon lotor inesperatus</i> | Matecumbe Key Raccoon |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |
| • <i>Odocoileus virginianus clavium</i> | Key Deer |

Birds

- | | |
|---|----------------------------|
| • <i>Anas fulvigula</i> | Mottled Duck |
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Fregata magnificens</i> | Magnificent Frigatebird |
| • <i>Pelecanus occidentalis</i> | Brown Pelican |
| • <i>Ixobrychus exilis</i> | Least Bittern |
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea herodias occidentalis</i> | Great White Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Egretta tricolor</i> | Tricolored Heron |
| • <i>Egretta rufescens</i> | Reddish Egret |
| • <i>Butorides virescens</i> | Green Heron |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Eudocimus albus</i> | White Ibis |
| • <i>Plegadis falcinellus</i> | Glossy Ibis |
| • <i>Platalea ajaja</i> | Roseate Spoonbill |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Rallus longirostris insularum</i> | Mangrove Clapper Rail |
| • <i>Rallus longirostris scottii</i> | Florida Clapper Rail |
| • <i>Haematopus palliatus</i> | American Oystercatcher |
| • <i>Recurvirostra americana</i> | American Avocet |
| • <i>Tringa semipalmata semipalmata</i> | Eastern Willet |
| • <i>Tringa flavipes</i> | Lesser Yellowlegs |
| • <i>Anous stolidus</i> | Brown Noddy |
| • <i>Hydroprogne caspia</i> | Caspian Tern |
| • <i>Patagioenas leucocephala</i> | White-crowned Pigeon |
| • <i>Coccyzus minor</i> | Mangrove Cuckoo |
| • <i>Tyrannus dominicensis</i> | Gray Kingbird |
| • <i>Vireo altiloquus</i> | Black-whiskered Vireo |

- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga castanea* Bay-breasted Warbler
- *Setophaga petechia gundlachi* Cuban Yellow Warbler
- *Setophaga discolor discolor* Prairie Warbler
- *Setophaga discolor paludicola* Florida Prairie Warbler
- *Cardellina canadensis* Canada Warbler

Reptiles

- *Alligator mississippiensis* American Alligator
- *Crocodylus acutus* American Crocodile
- *Drymarchon couperi* Eastern Indigo Snake
- *Nerodia clarkii clarkii* Gulf Saltmarsh Watersnake
- *Nerodia clarkii compressicauda* Mangrove Saltmarsh Watersnake
- *Nerodia clarkii taeniata* Atlantic Saltmarsh Watersnake
- *Pantherophis guttatus* Red Cornsnake (Lower Keys population)
- *Thamnophis sauritus sackenii* Peninsula Ribbonsnake (Lower Keys Population)
- *Caretta caretta* Loggerhead Sea Turtle
- *Deirochelys reticularia* Chicken Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Menidia conchorum* Key Silverside
- *Gambusia rhizophorae* Mangrove Gambusia
- *Rivulus marmoratus* Mangrove Rivulus
- *Negaprion brevirostris* Lemon Shark
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Lutjanus mahogoni* Mahogany Snapper

Invertebrates

- *Agaricia agaricites* Lettuce Coral
- *Diploria clivosa* Knobby Brain Coral
- *Elysia clarki* Lettuce Sea Slug
- *Thermocyclops parvus* A Copepod
- *Aratus pisonii* Mangrove Crab
- *Goniopsis cruentata* Mangrove Crab
- *Heterachthes sablensis* Mangrove Long-horned Beetle
- *Photuris brunnipennis floridana* Everglades Brownwing Firefly
- *Aphrissa statira* Statira
- *Kricogonia lyside* Lyside Sulphur
- *Oreaster reticulatus* Cushion Star, Bahama Star
- *Echinaster echinophorus* Thorny Sea Star
- *Holothuria mexicana* Donkey Dung Sea Cucumber

Conservation Threats

Habitat-specific threats to Mangrove Swamp include reduction in freshwater flows from dam operations, lack of tidal fluctuation caused by mosquito impoundments, loss of mangroves from inappropriate pruning by coastal property owners, and coastal development.

Threats to Mangrove Swamp habitats that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Incompatible wildlife and fisheries management strategies
- Industrial Spills
- Invasive animals
- Invasive plants
- Management of nature (beach nourishment and impoundments)
- Nutrient loads–urban
- Roads, bridges and causeways
- Shoreline hardening
- Surface water and groundwater withdrawal
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered hydrologic regime	Very High
B	Habitat destruction	Very High
C	Altered structure	High
D	Altered water quality–contaminants	High
E	Altered weather regime/sea level rise	High
F	Altered species composition	High
G	Habitat disturbance	High
H	Habitat fragmentation	High

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Coastal development	Very High	A,B, C, D, G, H
2	Roads, bridges and causeways	High	A, B, D, F, G, H
3	Harmful algal blooms	High	B, F, G
4	Incompatible industrial operations	High	B, D, F, G, H
5	Invasive plants	High	B, C, F, G

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
6	Shoreline hardening	High	A, B, F, G, H
7	Invasive animals	High	B, F, G
8	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, B, D, F, G
9	Incompatible wildlife and fisheries management strategies	High	B,C
10	Climate variability	High	A, B, E, H
11	Parasites/pathogens	High	B, F, G
12	Channel modification/shipping lanes	High	A, B, F, G, H
13	Incompatible aquaculture operations	High	B, H
14	Chemicals and toxins	High	B, D, F, G
15	Nutrient loads (all sources)	High	D, F, G
16	Acoustic pollution	High	B
17	Inadequate stormwater management	Medium	A, B, D, F, G
18	Industrial spills	Medium	B, D, F, G
19	Boating impacts	Medium	B, C, F, G, H
20	Incompatible fishing pressure	Medium	F, G, H
21	Solid waste	Medium	B, C, G, H
22	Management of nature (beach nourishment, impoundments)	Medium	A, B, F, G
23	Fishing gear impacts	Medium	B, C, G
24	Surface water withdrawal	Medium	A, F, G
25	Utility corridors	Medium	B, C, G
26	Groundwater withdrawal	Medium	A, F, G
27	Incompatible recreational activities	Medium	B, D, F, G
28	Thermal pollution	Medium	F, G
29	Placement of artificial structures	Medium	B, C
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Mangrove Swamp that were also identified as statewide marine and estuarine threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. However, experts identified outcomes to reduce damaging mangrove trimming, restore appropriate freshwater flows, and reconnect existing salt marsh/mangrove

impoundments to tide and manage to maximize resource values while maintaining adequate levels of mosquito control.

Highest ranked actions identified for abating this source of stress focus on:

- Improving the detection of pathogens, parasites, and biotoxins in marine organisms and the ability to rehabilitate impacted animals

Additional actions included:

- Providing training on appropriate mangrove trimming to landscape maintenance and wetlands professionals
- Evaluating whether parasites are indicators of estuarine and marine health.

The following actions, organized by action type were identified to abate this threat:

Climate Change

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Using GIS, identify modifications to mangroves and marshes, use restoration techniques to reverse modifications, and include consideration of sea level rise in restoration goal.	L	M	VH

Coastal Development

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Issue continuing education credits for proper mangrove trimming. This could be for professional wetland scientists, certified ecologists, landscape architects, arborists, landscapers. Improve knowledge of mangroves through certification program. Link with herbicide application CEU's to ensure increased participation.	VH	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Improve understanding of watercraft speed limits/zones, and work with all affected parties to explore options for reassessing speed zones.	H	M	M

Parasites/Pathogens

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Improve capabilities for/sophistication of inspection, recognition, and treatment of aquatic organism diseases and parasites.	VH	M	M
H	Continue and support response teams/hotlines associated with disease outbreak, trauma, strandings, and mortality events for fish and wildlife species.	VH	M	M
L	Expand the number and capabilities of rehabilitation facilities for diseased marine mammals and reptiles.	H	L	VH
Overall Rank	Research	Feasibility	Benefits	Cost
H	Conduct additional research for aquatic wildlife parasites and diseases. and the impacts of biotoxins on fish and wildlife resources.	VH	M	H
H	Synthesize and consolidate understanding, and identification of gaps in understanding, of marine flora/fauna diseases, pathogens, biotoxins, including slime mold on seagrasses and oyster disease.	VH	M	L
M	Research and examine use of parasites as indicators of estuarine and marine health.	VH	L	M

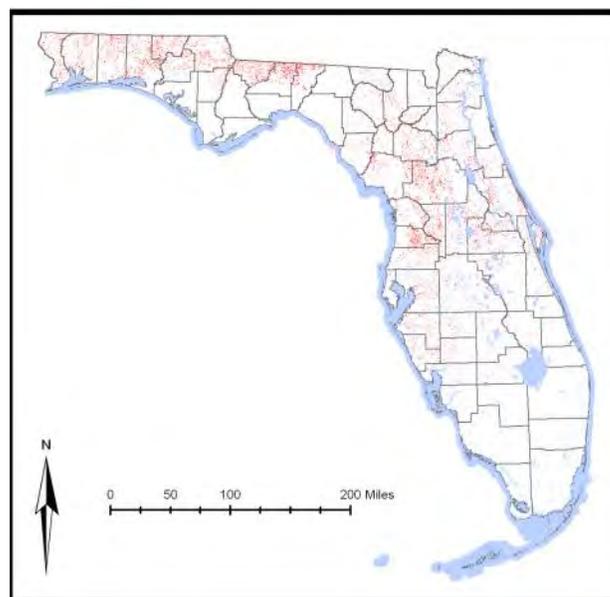
Mixed Hardwood-Pine Forest



Status

Current condition: Good and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 879,766 acres (356,029 ha) of Mixed Hardwood-Pine Forest habitat exist, of which 16% (141,495 ac; 57,261 ha) are in conservation or managed areas. Another 3% (30,783 ac; 12,457 ha) are in Florida Forever projects and 6% (49,009 ac; 19,833 ha) are in SHCA-designated lands. The remaining 75% (658,479 ac; 266,477 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Upland Mixed Forest

This community is the southern extension of the Piedmont southern mixed hardwoods, and occurs mainly on the rolling hills of sandy clay soils of the northern Panhandle. Younger stands may be predominantly pines, whereas a complex of various hardwoods become co-dominants as the system matures over time through plant succession. The overstory consists of shortleaf and loblolly pine, American beech, mockernut hickory, southern red oak, water oak, American holly, and dogwood.

Also included in this category are other upland forests that occur statewide and contain a mixture of conifers and hardwoods as the co-dominant overstory component. These communities contain well developed associations of longleaf pine, slash pine, and loblolly pine in mixed company with live oak, laurel oak, and water oak, together with other hardwood species characteristic of the Hardwood Hammock Forest community type. In this habitat, the ground is usually covered with a thick layer of leaf mulch which helps in the retention of moisture. Adding to

the mesic condition is a thick canopy with low air flow and light penetration. Due to this damp environment, Mixed Hardwood-Pine Forests seldom burn.

Associated Species of Greatest Conservation Need

Mammals

• <i>Blarina shermani</i>	Sherman's Short-tailed Shrew
• <i>Sorex longirostris eionis</i>	Homosassa Shrew
• <i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat
• <i>Eptesicus fuscus</i>	Big Brown Bat
• <i>Lasiurus borealis borealis</i>	Red Bat
• <i>Lasiurus cinereus cinereus</i>	Hoary Bat
• <i>Lasiurus intermedius floridanus</i>	Northern Yellow Bat
• <i>Lasiurus seminolus</i>	Seminole Bat
• <i>Myotis austroriparius</i>	Southeastern Myotis
• <i>Myotis grisescens</i>	Gray Bat
• <i>Perimyotis subflavus</i>	Tricolored Bat
• <i>Microtus pinetorum</i> ssp.	Pine Vole
• <i>Sciurus niger niger</i>	Southeastern Fox Squirrel
• <i>Sciurus niger shermani</i>	Sherman's Fox Squirrel
• <i>Tamias striatus</i>	Eastern Chipmunk
• <i>Mustela frenata olivacea</i>	Southeastern Weasel
• <i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel
• <i>Puma concolor coryi</i>	Florida Panther
• <i>Ursus americanus floridanus</i>	Florida Black Bear

Birds

• <i>Colinus virginianus</i>	Northern Bobwhite
• <i>Ictinia mississippiensis</i>	Mississippi Kite
• <i>Haliaeetus leucocephalus</i>	Bald Eagle
• <i>Buteo platypterus</i>	Broad-winged Hawk
• <i>Scolopax minor</i>	American Woodcock
• <i>Megascops asio</i>	Eastern Screech-Owl
• <i>Chordeiles minor</i>	Common Nighthawk
• <i>Caprimulgus carolinensis</i>	Chuck-will's-widow
• <i>Caprimulgus vociferus</i>	Eastern Whip-poor-will
• <i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker
• <i>Picoides villosus</i>	Hairy Woodpecker
• <i>Colaptes auratus</i>	Northern Flicker
• <i>Progne subis</i>	Purple Martin
• <i>Hylocichla mustelina</i>	Wood Thrush
• <i>Helmitheros vermivorum</i>	Worm-eating Warbler
• <i>Parkesia motacilla</i>	Louisiana Waterthrush
• <i>Vermivora chrysoptera</i>	Golden-winged Warbler
• <i>Vermivora cyanoptera</i>	Blue-winged Warbler
• <i>Geothlypis formosa</i>	Kentucky Warbler
• <i>Setophaga ruticilla</i>	American Redstart
• <i>Setophaga cerulea</i>	Cerulean Warbler
• <i>Setophaga castanea</i>	Bay-breasted Warbler
• <i>Setophaga dominica stoddardi</i>	Stoddard's Yellow-throated Warbler
• <i>Setophaga discolor discolor</i>	Prairie Warbler
• <i>Cardellina canadensis</i>	Canada Warbler

Amphibians

- *Lithobates capito* Gopher Frog
- *Pseudacris ornata* Ornate Chorus Frog
- *Ambystoma tigrinum* Eastern Tiger Salamander
- *Desmognathus apalachicola* Apalachicola Dusky Salamander
- *Desmognathus auriculatus* Southern Dusky Salamander
- *Desmognathus* cf. *conanti* Eglin Ravine Spotted Dusky Salamander
- *Desmognathus monticola* Seal Salamander
- *Eurycea chamberlaini* Chamberlain's Dwarf Salamander
- *Hemidactylium scutatum* Four-toed Salamander

Reptiles

- *Anolis carolinensis seminolus* Southern Green Anole
- *Agkistrodon contortrix contortrix* Southern Copperhead
- *Cemophora coccinea coccinea* Florida Scarletsnake
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis extenuata* Short-tailed Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Tantilla coronata* Southeastern Crowned Snake
- *Tantilla relicta* Florida Crowned Snake
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Macrobrachium acanthurus* Cinnamon River Shrimp
- *Macrobrachium carcinus* Big Claw River Shrimp
- *Macrobrachium ohione* Ohio River Shrimp
- *Achalarus lyciades* Hoary Edge
- *Autochton cellus* Golden-banded Skipper
- *Erynnis baptisiae* Wild Indigo Duskywing
- *Nastra neamathla* Neamathla Skipper
- *Callophrys henrici* Henry's Elfin
- *Callophrys niphon* Eastern Pine Elfin
- *Cupido comyntas* Eastern Tailed Blue
- *Satyrrium titus* Coral Hairstreak
- *Catocala grisatra* Grisatra Underwing
- *Idia gopheri* Gopher Tortoise Noctuid Moth
- *Proserpinus gaurae* Proud Sphinx

Conservation Threats

Because of serious problems interpreting this habitat in the workshops, no threats could be identified and hence no conservation actions were developed. As identified in TNC's Final Report (Gordon et al. 2005), it is recommended that the mapping for this habitat be revisited and/or the habitat itself re-classified. In all three of the regional threats workshops, experts concurred that Mixed Hardwood-Pine Forest is not a habitat unto itself. When experts examined the distribution of

this cover type, they suggested that it represents either areas of degraded pinelands into which hardwoods have invaded and require fire or other restoration to reduce the hardwoods, or floodplain forest and other hardwood-dominated systems into which pines have invaded, perhaps because of altered hydrology. The experts suggested that each pixel of this habitat type be reclassified the same as the adjacent pixel of a hardwood or pineland site, and the assumption was made that they adequately covered the stresses and sources for these areas when they assessed the other cover types. It is recommended that the threats and conservation actions for the habitats identified as more accurately depicting this cover type should be extrapolated to this “habitat” or that this habitat be eliminated as a separate category and/or subsumed into other habitats.

While threats to its conservation as well as remedial actions were identified during earlier workshops, the Mixed Hardwood-Pine Forest habitat category was not addressed in TNC workshops that generated tables of ranked threats and actions, as seen in most other habitat categories. The decision to not rank threats and actions for this habitat was made (1) to maximize discussion time for higher-priority habitats and (2) because of some disagreement over recognition of this habitat type as important to wildlife conservation. Therefore, threats and actions are presented as simple bulleted lists, arranged in alphabetical order, with no prioritization.

The following stresses threaten this habitat:

- Altered community structure
- Altered landscape mosaic or context
- Altered fire regime
- Altered species composition/dominance
- Fragmentation of habitats, communities, ecosystems
- Habitat degradation/disturbance
- Habitat destruction or conversion
- Insufficient size/extent of characteristic communities or ecosystems
- Missing key communities, functional guilds, or seral stages

The sources of stress, or threats, were used to generate conservation actions.

- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Conversion to recreation areas
- Incompatible fire
- Incompatible forestry practices
- Incompatible recreational activities
- Incompatible wildlife and fisheries management
- Invasive animals
- Invasive plants
- Roads

Conservation Actions

Actions to abate threats to Hardwood-Pine Forest were designed to increase the awareness and appreciation of this habitat by professionals and the public. Many actions point to the need for more information and definition of this habitat. All threats were also identified as statewide (see sources of stress above) and are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Specific actions to abate threats that were identified for Mixed Hardwood-Pine Forest habitat are below, though none were prioritized for implementation.

Land/Water Protection

- Support and encourage land protection that utilize easements

Land/Water/Species Management

- Encourage use of the “master logger program” and expand to smaller timber companies
- Develop a plan to fund management programs long term after reclamation—include invasive flora and fauna

Law and Policy

- Minimize connectivity impacts to wildlife through supporting effective land-use planning

Research, Education and Awareness

- Better define and map the current condition, and develop management practices to achieve the future condition of this habitat
- Research plans for restoration of this habitat and its hydrology
- Research management practices for controlling invasive species
- Educate landowners about management practices for controlling invasive species
- Increase public/private training and awareness about value of these lands
- Continue to educate landowners about the proper use of BMPs

Economic and Other Incentives

- Provide landowner incentive (public and private) for protection and restoration of habitat

Capacity Building

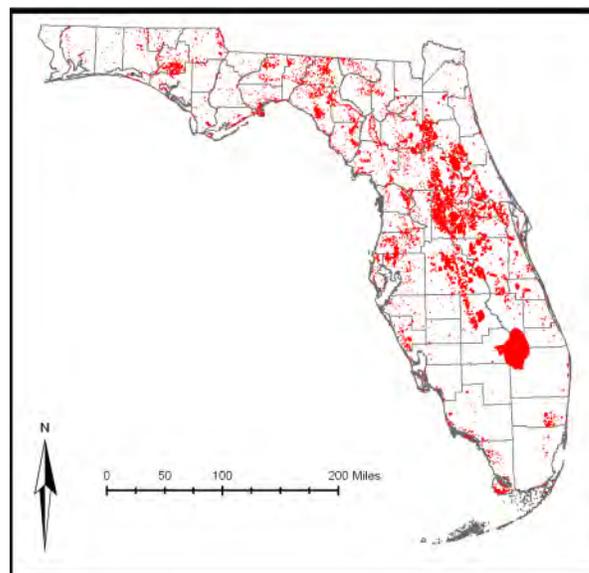
- Form and facilitate partnerships, alliances, and networks of organizations willing to research, conserve and manage this habitat

Natural Lake



Status

Current condition: Good and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,510,216 acres (611,163 ha) of Natural Lake habitat exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Clastic Upland Lake, Sandhill Lake, Sinkhole Lake

Florida has approximately 7,800 Natural Lakes with a surface area of one acre (0.4 ha) or more. Very few of these lakes were formed by riverine processes. However, the great majority were formed or enlarged by dissolution of the underlying limestone by acidic surface waters. Slumping of the overburden resulted in a surface depression. Most Natural Lakes in Florida retain an intimate connection with groundwater, and lack a natural surface outflow. They may be connected to aquatic caves by underground fissures or bedding planes, and thus provide additional habitat for animal species found in those subterranean habitats, or they may have bottom substrates of silt or sand. Most of these lakes have highly variable water levels. Despite their origin, many Florida lakes are not alkaline, and are vulnerable to acidification. They also commonly are nutrient-deficient, thus are vulnerable to nutrient inputs.

Florida's lakes are usually less than 45 feet (14 m) deep, with sand, silt, or organic bottom substrates. Depending on the water chemistry, vegetation in the lakes can vary from nonexistent, to a fringe of emergent plants at the shoreline, to a complete covering of floating plants. Indeed, introduced aquatic weeds are a major threat to this habitat. Some Florida lakes have held water continuously for 8,000 years, and two exceed 30,000 years in age.

This habitat category is comprised exclusively of standing water bodies of natural origin, some of which have been altered by the construction of water control structures. Natural Lakes are essentially permanent, although many of them dry completely during droughts.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |

Birds

- | | |
|------------------------------------|----------------------------|
| • <i>Anas rubripes</i> | American Black Duck |
| • <i>Anas fulvigula</i> | Mottled Duck |
| • <i>Aythya marila</i> | Greater Scaup |
| • <i>Gavia immer</i> | Common Loon |
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Pelecanus occidentalis</i> | Brown Pelican |
| • <i>Botaurus lentiginosus</i> | American Bittern |
| • <i>Ixobrychus exilis</i> | Least Bittern |
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Egretta tricolor</i> | Tricolored Heron |
| • <i>Egretta rufescens</i> | Reddish Egret |
| • <i>Butorides virescens</i> | Green Heron |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Eudocimus albus</i> | White Ibis |
| • <i>Plegadis falcinellus</i> | Glossy Ibis |
| • <i>Platalea ajaja</i> | Roseate Spoonbill |
| • <i>Pandion haliaetus</i> | Osprey |
| • <i>Rostrhamus sociabilis</i> | Snail Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Rallus elegans</i> | King Rail |
| • <i>Porphyrio martinica</i> | Purple Gallinule |
| • <i>Aramus guarauna</i> | Limpkin |
| • <i>Grus canadensis pratensis</i> | Florida Sandhill Crane |
| • <i>Grus americana</i> | Whooping Crane |
| • <i>Tringa solitaria</i> | Solitary Sandpiper |

- *Tringa flavipes*
- *Tryngites subruficollis*
- *Limnodromus scolopaceus*
- *Phalaropus tricolor*
- *Chlidonias niger*
- *Rynchops niger*
- *Euphagus cyanocephalus*

Lesser Yellowlegs
Buff-breasted Sandpiper
Long-billed Dowitcher
Wilson's Phalarope
Black Tern
Black Skimmer
Brewer's Blackbird

Amphibians

- *Lithobates capito*
- *Lithobates virgatipes*
- *Ambystoma tigrinum*
- *Desmognathus auriculatus*

Gopher Frog
Carpenter Frog
Eastern Tiger Salamander
Southern Dusky Salamander

Reptiles

- *Alligator mississippiensis*
- *Farancia erythrogramma*
- *Nerodia cyclopion*
- *Seminatrix pygaea cyclus*
- *Apalone mutica calvata*
- *Apalone spinifera aspera*
- *Deirochelys reticularia*
- *Macrochelys temminckii*
- *Pseudemys nelsoni*

American Alligator
Rainbow Snake
Mississippi Green Watersnake
Southern Florida Swampsnake
Gulf Coast Smooth Softshell
Gulf Coast Spiny Softshell
Chicken Turtle
Alligator Snapping Turtle
Florida Red-bellied Cooter (Panhandle Population)

Fish

- *Anguilla rostrata*
- *Cyprinodon variegatus hubbsi*
- *Acantharchus pomotis*
- *Enneacanthus chaetodon*

American Eel
Lake Eustis Pupfish
Mud Sunfish
Black Banded Sunfish

Invertebrates

- *Amblema plicata*
- *Anodonta hartfieldorum*
- *Anodonta heardi*
- *Utterbackia peggyae*
- *Utterbackia peninsularis*
- *Cambarellus schmitti*
- *Macrobrachium acanthurus*
- *Macrobrachium carcinus*
- *Macrobrachium ohione*
- *Anax amazili*
- *Nehalennia pallidula*
- *Epithea spinosa*
- *Gomphus vastus*
- *Progomphus alachuensis*
- *Progomphus bellei*
- *Lestes inaequalis*
- *Lestes spumarius*
- *Libellula jesseana*
- *Nannothemis bella*
- *Hydroptila berneri*

Threeridge
Cypress Floater
Apalachicola Floater
Florida Floater
Peninsular Floater
A Crayfish
Cinnamon River Shrimp
Big Claw River Shrimp
Ohio River Shrimp
Amazon Darner
Everglades Sprite
Robust Tongtail
Cobra Clubtail
Tawny Sanddragon
Belle, Belle's Sanddragon
Elegant Spreadwing
Antillean Spreadwing
Purple Skimmer
Elfin Skimmer
Berner's Microcaddisfly

- *Orthotrichia curta* Short Orthotrichian Microcaddisfly
- *Orthotrichia instabilis* Changeable Orthotrichian Microcaddisfly
- *Oxyethira florida* Florida Cream And Brown Microcaddisfly
- *Ceraclea limnetes* Sandhill Lake Caddisfly
- *Nectopsyche tavara* Tavares White Miller Caddisfly
- *Oecetis parva* Little Oecetis Longhorned Caddisfly
- *Oecetis porteri* Porter's Long-horn Caddisfly
- *Triaenodes dendyi* A Caddisfly
- *Triaenodes florida* Floridian Triaenode Caddisfly
- *Triaenodes furcellus* Little-fork Triaenode Caddisfly
- *Cernotina truncona* Florida Cernotinan Caddisfly
- *Poanes viator zizaniae* Broad-winged Skipper

Conservation Threats

Threats to the Natural Lake habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Conversion to agriculture
- Conversion to commercial/industrial development
- Conversion to housing and urban development
- Groundwater withdrawal
- Incompatible recreational activities
- Invasive animals
- Invasive plants
- Nutrient loads–agriculture
- Nutrient loads–urban
- Surface water withdrawal and diversion

Many of the threats to this habitat stem directly or indirectly from lakefront development which is ubiquitous on natural lakes throughout Florida. Like many wetland habitats, Natural Lakes, even those relatively unaffected by direct threats, suffer from an altered landscape context as surrounding uplands have been developed for housing and agricultural development. Additional threats specific to this habitat include the operation of dams or control structures, especially on lakes in central and south Florida.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered landscape mosaic or context	High
B	Altered hydrologic regime	High
C	Altered species composition/dominance	High
D	Altered water quality of surface water or aquifer: nutrients	High
E	Erosion/sedimentation	Medium
F	Altered community structure	Medium
G	Habitat degradation/disturbance	Medium
H	Insufficient size/extent of characteristic communities or ecosystems	Medium
I	Habitat destruction or conversion	Medium
J	Altered water quality of surface water or aquifer: contaminants	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Invasive plants	High	C
2	Dam operations	High	B, C
3	Nutrient loads–urban	High	C, D, E, F
4	Conversion to housing and urban development	High	A, C, D, F, I
5	Surface water withdrawal	Medium	B, C
6	Nutrient loads–agriculture	Medium	C, D, E, F
7	Invasive animals	Medium	C
8	Conversion to commercial and industrial development	Medium	A, C, D, I
9	Conversion to agriculture	Medium	A, H
10	Chemicals and toxins	Medium	J
11	Groundwater withdrawal	Low	B
12	Incompatible recreational activities	Low	G
13	Incompatible residential activities	Low	G
14	Management of nature–aquatic plant treatment	Low	F
15	Incompatible agricultural practices	Low	B, C, D, E
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Natural Lakes that were also identified as statewide threats (invasive plants, nutrient loads–urban, conversion to housing and urban development, surface water withdrawal and diversion, nutrient loads–agriculture, invasive animals, conversion to commercial/industrial development, conversion to agriculture, chemicals and toxins, groundwater withdrawal, incompatible recreational activities) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Natural Lakes and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to improve the condition of lake-fringe wetland habitat by managing lake levels to more closely resemble a natural hydrologic regime, maintain the amounts of littoral vegetation on lake edges necessary to sustain ecosystem function, improve the compatibility of lakefront development with wildlife habitat conservation, and increase our knowledge of the impact of chemicals and toxins on lake ecosystems.

Dam Operations

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Coordinate interstate Action Plan actions to ensure that all fish and wildlife resources in all states are protected when changing dam operations in shared basins (USFWS).	M	H	L
L	Coordinate multiagency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.	H	L	M
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Integrate lake management activities to coordinate multiple species and habitat conservation, restoration, and invasive plant management (FWC).	H	M	M
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Continue developing and implementing hydrologic management plans that restore the natural seasonal fluctuation to lakes in order to successfully manage sediment-dwelling wildlife.	M	H	L
Overall Rank	Research	Feasibility	Benefits	Cost
L	Develop a position paper on the impacts of lake level stabilization and absence of dry-season drawdown on littoral zone vegetation and dependent wildlife, and sediment accumulation in managed natural lakes.	H	L	L
L	Evaluate feasibility of incentive programs to remove small rural impoundments.	H	L	L

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage conservation of lake frontage, riparian habitats and their floodplains.	M	L	VH

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands, and create market-based incentives to compensate private landowners for the environmental services they provide to the state through management that increases water storage and nutrient reduction.	M	M	H

Chemicals and Toxins

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop management techniques and recommendations for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M
L	Develop management techniques and design protocols to minimize exposure of wading birds and other wetland wildlife to contaminants.	H	L	M

Overall Rank	Research	Feasibility	Benefits	Cost
L	Conduct research defining appropriate sediment quality standards for the various aquatic and marine systems. Fund research defining the relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H
L	Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems. Fund research defining the relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H

Incompatible Recreational Activities

Overall Rank	Policy	Feasibility	Benefits	Cost
H	Identify a specified percentage of littoral vegetation clearing that does not reduce lake ecological integrity, and explore incentives for reaching that percentage on public and private lands.	M	H	M

Incompatible Residential Activities

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Expand the scale of the Florida Yards and Neighborhoods program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.	M	M	L
L	Support incentives for residential property owners to resolve issues of incompatible use of Natural Lakes, including pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and lighting in coastal areas.	M	L	L
L	Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.	M	L	L
L	Develop a voluntary program directed at developers to provide on-site site-specific educational materials and recommendations to homeowner associations about incompatible residential activities.	M	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Encourage and support continuing education opportunities for landscape maintenance industry that includes appropriate use of chemicals, irrigation, plants, and disposal of yard waste.	H	M	M
L	Develop and implement management techniques for management of shoreline vegetation to reduce movement of sediment into water bodies.	M	L	M
Overall Rank	Policy	Feasibility	Benefits	Cost
L	Develop and promote management techniques that allow homeowners not to exceed recommended safe pesticide levels.	L	L	L

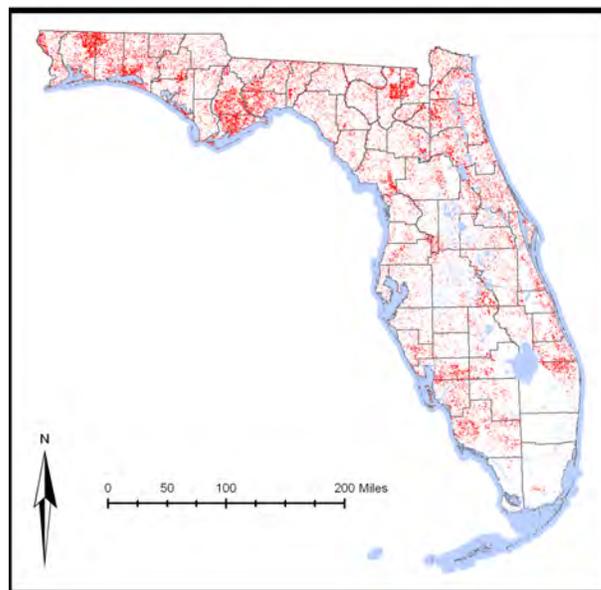
Natural Pineland



Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 3,095,165 acres (1,252,569 ha) of Natural Pinelands are present in Florida. Of that total, 30% (917,949 acres; 371,481 ha) are in existing conservation or managed areas, 7% (206,899 acres; 83,729 ha) are on private lands encompassed by Florida Forever projects, 8% (235,176 acres; 95,172 ha) are SCHAs-identified lands, and the remaining 56% (1,735,141 acres; 702,187 ha) are within other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Mesic Flatwoods, Scrubby Flatwoods, Wet Flatwoods, Upland Pine Forest

This category includes natural pine forests, excluding pine rocklands, sandhills, and sand pine scrub, which are listed as separate categories. Natural Pineland habitats include mesic, hydric and scrubby flatwoods, and upland pine forests. Before human settlement, much of north and central Florida was covered by Natural Pineland. Much of this habitat type has been altered by humans as a result of conversion to agriculture and pine plantations, alteration of fire regimes, and introduced species. Pine flatwoods occur on flat sandy terrain where the overstory is characterized by longleaf pine, slash pine, or pond pine. The type of pineland habitat present is usually related to soil differences and small variations in topography. Hydroperiod is an important factor determining what kind of pineland is represented. Generally, flatwoods dominated by longleaf pine occur on

well-drained sites while pond pine-dominated sites occur in poorly drained areas, and slash pine-dominated sites occupy intermediate or moderately moist areas. The understory and ground cover within these three communities are somewhat similar and include several common species such as saw palmetto, gallberry, wax myrtle, and a wide variety of grasses and herbs. Generally, wiregrass and runner oak dominate longleaf pine sites; fetterbush and bay trees are found in pond pine areas, while saw palmetto, gallberry, and rusty lyonia occupy slash pine flatwoods sites. Scrubby flatwoods habitat typically occurs on drier ridges, many of which formed originally on or near old coastal dunes. Longleaf pine or slash pine dominates the overstory, whereas the ground cover is similar to that present in xeric oak scrub habitat. Cypress domes, bay heads, titi swamps, and freshwater marshes are commonly interspersed in isolated depressions throughout natural pineland habitats. A wide variety of animals utilize this habitat including the white-tailed deer, eastern diamondback rattlesnake, red-cockaded woodpecker, and pine woods tree frog. Fire is an important factor that helps to maintain and shape Natural Pineland communities; almost all of the plants and animals found here are adapted to having fires occur at least every one to eight years.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Sorex longirostris eionis</i> | Homosassa Shrew |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Microtus pinetorum</i> ssp. | Pine Vole |
| • <i>Podomys floridanus</i> | Florida Mouse |
| • <i>Sciurus niger avicennia</i> | Big Cypress Fox Squirrel |
| • <i>Sciurus niger niger</i> | Southeastern Fox Squirrel |
| • <i>Sciurus niger shermani</i> | Sherman's Fox Squirrel |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulae</i> | Florida Long-tailed Weasel |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Neovison vison halilimnetes</i> | Gulf Salt Marsh Mink |
| • <i>Neovison vison lutensis</i> | Atlantic Salt Marsh Mink |
| • <i>Neovison vison</i> ssp. | Mink |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius</i> ssp. | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |
| • <i>Odocoileus virginianus clavium</i> | Key Deer |

Birds

- | | |
|-----------------------------------|-------------------------------|
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Buteo brachyurus</i> | Short-tailed Hawk |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Scolopax minor</i> | American Woodcock |

- *Columbina passerina* Common Ground-Dove
- *Megascops asio* Eastern Screech-Owl
- *Chordeiles minor* Common Nighthawk
- *Caprimulgus carolinensis* Chuck-will's-widow
- *Caprimulgus vociferus* Eastern Whip-poor-will
- *Melanerpes erythrocephalus* Red-headed Woodpecker
- *Picoides villosus* Hairy Woodpecker
- *Picoides borealis* Red-cockaded Woodpecker
- *Colaptes auratus* Northern Flicker
- *Aphelocoma coerulescens* Florida Scrub-Jay
- *Sitta carolinensis* White-breasted Nuthatch
- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Limnothlypis swainsonii* Swainson's Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga castanea* Bay-breasted Warbler
- *Setophaga dominica stoddardi* Stoddard's Yellow-throated Warbler
- *Setophaga discolor discolor* Prairie Warbler
- *Peucaea aestivalis* Bachman's Sparrow
- *Ammodramus henslowii* Henslow's Sparrow

Amphibians

- *Hyla andersonii* Pine Barrens Treefrog
- *Lithobates capito* Gopher Frog
- *Lithobates okaloosae* Florida Bog Frog
- *Lithobates virgatipes* Carpenter Frog
- *Pseudacris ornata* Ornate Chorus Frog
- *Ambystoma bishopi* Reticulated Flatwoods Salamander
- *Ambystoma cingulatum* Frosted Flatwoods Salamander
- *Ambystoma tigrinum* Eastern Tiger Salamander
- *Amphiuma pholeter* One-toed Amphiuma
- *Eurycea chamberlaini* Chamberlain's Dwarf Salamander
- *Eurycea* cf. *quadridigitata* Bog Dwarf Salamander
- *Notophthalmus perstriatus* Striped Newt
- *Stereochilus marginatus* Many-lined Salamander

Reptiles

- *Anolis carolinensis seminolus* Southern Green Anole
- *Plestiodon anthracinus pluvialis* Southern Coal Skink
- *Plestiodon egregius insularis* Cedar Key Mole Skink
- *Plestiodon egregius onocrepis* Peninsula Mole Skink
- *Plestiodon reynoldsi* Florida Sand Skink
- *Rhineura floridana* Florida Wormlizard
- *Sceloporus woodi* Florida Scrub Lizard
- *Agkistrodon contortrix contortrix* Southern Copperhead
- *Cemophora coccinea coccinea* Florida Scarletsnake
- *Crotalus adamanteus* Eastern Diamond-backed Rattlesnake
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis calligaster* Yellow-bellied Kingsnake

- *Lampropeltis extenuata* Short-tailed Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Pituophis melanoleucus mugitus* Florida Pinesnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Tantilla coronata* Southeastern Crowned Snake
- *Tantilla relicta* Florida Crowned Snake
- *Virginia valeriae valeriae* Eastern Smooth Earthsnake (Highlands Co.)
- *Clemmys guttata* Spotted Turtle
- *Deirochelys reticularia* Chicken Turtle
- *Gopherus polyphemus* Gopher Tortoise
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Procambarus apalachicola* A Crayfish
- *Procambarus capillatus* A Crayfish
- *Procambarus econfinae* Panama City Crayfish
- *Procambarus escambiensis* A Crayfish
- *Procambarus latipleurum* A Crayfish
- *Procambarus rathbunae* Combelaw Crayfish
- *Procambarus rogersi rogersi* A Crayfish
- *Sminthurus floridanus* Florida Sminthurus Springtail
- *Cicindela nigrilor* Autumn Tiger Beetle
- *Cicindela rufiventris rufiventris* Eastern Red-bellied Tiger Beetle
- *Cicindela scabrosa* Scrub Tiger Beetle
- *Cicindela sexguttata* Six-spotted Tiger Beetle
- *Typocerus fulvocinctus* Yellow-banded Typocerus Long-horned Beetle
- *Mycotrupes cartwrighti* Cartwright's Mycotrupes Beetle
- *Mycotrupes pedester* Southwest Florida Mycotrupes Beetle
- *Geopsammodius relictilus* Relictual Tiny Sand-loving Scarab
- *Phyllophaga clemens* Clemens' June Beetle
- *Achalarus lyciades* Hoary Edge
- *Amblyscirtes alternata* Dusky Roadside-skipper
- *Atrytonopsis loammi* Loammi Skipper
- *Erynnis baptisiae* Wild Indigo Duskywing
- *Erynnis martialis* Mottled Duskywing
- *Hesperia meskei straton* Eastern Meske's Skipper
- *Megathymus cofaqui* Cofaqui Skipper
- *Megathymus yuccae* Yucca Skipper
- *Nastra neamathla* Neamathla Skipper
- *Polites baracoa* Baracoa Skipper
- *Callophrys irus* Frosted Elfin
- *Callophrys niphon* Eastern Pine Elfin
- *Cupido comyntas* Eastern Tailed Blue
- *Catocala grisatra* Grisatra Underwing
- *Idia gopheri* Gopher Tortoise Noctuid Moth
- *Neonympha helicta dadeensis* Helicta Satyr (Miami-Dade Subspecies)
- *Merycomyia brunnea* Brown Merycomyian Tabanid Fly

Conservation Threats

Threats to Natural Pineland habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to agriculture
- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Conversion to recreation areas
- Groundwater withdrawal
- Incompatible fire
- Incompatible forestry practices
- Incompatible recreational activities
- Incompatible resource extraction: mining/drilling
- Invasive animals
- Invasive plants
- Roads
- Surface water withdrawal

Threats specific to Natural Pinelands included the siting of utility corridors through this habitat, particularly on public lands, which results in fragmentation and loss of habitat. This habitat is also threatened by conversion to more intensive land uses and insufficient management of invasive plant species such as Japanese climbing fern.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered fire regime	High
B	Altered hydrologic regime	High
C	Habitat destruction or conversion	High
D	Altered community structure	High
E	Altered species composition/dominance	High
F	Fragmentation of habitats, communities, ecosystems	High
G	Insufficient size/extent of characteristic communities or ecosystems	High
H	Altered landscape mosaic or context	Medium
I	Keystone species missing or lacking in abundance	Low
J	Missing key communities, functional guilds, or seral stages	Low
K	Altered soil structure and/or chemistry	Low
L	Excessive depredation and/or parasitism	Low
M	Habitat degradation/disturbance	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Roads	Very High	A, B, C, D, E, F, G, H
2	Conversion to housing and urban development	Very High	A, B, C, F, G, H
3	Surface water withdrawal	High	A, B, C, D, E, F

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
4	Incompatible fire	High	A, B, C, D, E, H
5	Conversion to commercial and industrial development	High	A, B, C, F, G, H
6	Invasive plants	High	A, B, D, E
7	Incompatible recreational activities	High	A, B, C, D, E, F
8	Incompatible forestry practices	High	A, B, C, D, E, F
9	Groundwater withdrawal	Medium	A, B, D, E
10	Conversion to recreation areas	Medium	A, B, C, F, G
11	Utility corridors	Medium	A, B, C, D, E, F, G
12	Conversion to agriculture	Low	H
13	Incompatible grazing and ranching	Low	A
14	Invasive animals	Low	D, E
15	Incompatible resources extraction: mining/drilling	Low	C, F, H
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Natural Pinelands that were also identified as statewide threats (see list above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Natural Pineland habitat are below. These actions were designed to reduce habitat loss and fragmentation from utility rights-of-way and conversion to more intensive silviculture on public lands. Control of Japanese climbing fern was also identified as necessary where pine straw is harvested.

Invasive Plants

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Educate the forest management consulting community about the illegality of selling pine straw bales contaminated with Japanese climbing fern, and appropriate control methods.	H	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Create a system where landowners can voluntarily have their plantations certified as Lygodium-free. Provide incentive programs so that landowners increase profits by having certified pine straw.	M	L	L

Utility Corridors

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Develop private-public partnerships that facilitate placement of utilities on existing FDOT rights-of-way and vice-versa to minimize their cumulative impacts on habitats.	M	M	L
M	Provide data on sensitive habitats to utilities and Florida Public Service Commission (FPSC) early in the utility siting and planning process to minimize conflicts between wildlife, important habitats, and utility corridors.	VH	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Encourage language (e.g., Efficient Transportation Decision Making, ETDM) in utility siting process for co-location that minimizes fragmentation of natural areas.	M	M	L
Overall Rank	Policy	Feasibility	Benefits	Cost
VH	Explore options to reduce fragmentation of public lands caused by incompatible utility placement and land use. Promote awareness of this issue and encourage compatible alternate routes and land uses.	M	VH	H

Conversion to Agriculture

Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
M	Explore opportunities to encourage avoidance of converting natural habitats on public conservation lands to other uses.	M	M	L

Pelagic



Status

Current condition: Unknown. Due to the lack of sufficient map data for this habitat category, no acreage estimates are currently available.

Habitat Description

FNAI type: None

The Pelagic environment includes the waters lying over the continental shelf (neritic zone) and waters beyond the continental shelf. The Pelagic community lives in the water column above the seafloor and below the surface. This community does not depend on the seabed, although its members may visit it occasionally. The community consists of free-swimming creatures known as nekton and less- or non-motile plankton.

In Florida, this environment extends three nautical miles off of the Florida east coast and nine nautical miles off of the Florida Gulf coast. Maximum depths vary from approximately 30 feet (9 m) in the Gulf of Mexico to more than 1,000 feet (304 m) off of the Florida Keys and southeast Florida.

Associated Species of Greatest Conservation Need

Mammals

- *Eubalaena glacialis* (incl. *australis*) North Atlantic Right Whale

Birds

- *Aythya marila* Greater Scaup
- *Aythya affinis* Lesser Scaup
- *Gavia stellata* Red-throated Loon

- *Gavia immer*
- *Podiceps auritus*
- *Pterodroma hasitata*
- *Calonectris diomedea*
- *Puffinus gravis*
- *Puffinus griseus*
- *Puffinus lherminieri*
- *Oceanodroma castro*
- *Fregata magnificens*
- *Sula leucogaster*
- *Pelecanus occidentalis*
- *Anous stolidus*
- *Onychoprion fuscatus*
- *Onychoprion anaethetus*
- *Gelochelidon nilotica*
- *Hydroprogne caspia*
- *Sterna dougallii*
- *Thalasseus maximus*

- Common Loon
- Horned Grebe
- Black-capped Petrel
- Cory's Shearwater
- Great Shearwater
- Sooty Shearwater
- Audubon's Shearwater
- Band-rumped Storm-Petrel
- Magnificent Frigatebird
- Brown Booby
- Brown Pelican
- Brown Noddy
- Sooty Tern
- Bridled Tern
- Gull-billed Tern
- Caspian Tern
- Roseate Tern
- Royal Tern

Reptiles

- *Caretta caretta*
- *Chelonia mydas*
- *Dermochelys coriacea*
- *Eretmochelys imbricata*
- *Lepidochelys kempii*

- Loggerhead Sea Turtle
- Green Sea Turtle
- Leatherback Sea Turtle
- Hawksbill Sea Turtle
- Kemp's Ridley Sea Turtle

Fish

- *Acipenser oxyrinchus desotoi*
- *Acipenser oxyrinchus oxyrinchus*
- *Anguilla rostrata*
- *Alosa aestivalis*
- *Alosa alabamae*
- *Aetobatus narinari*
- *Alopias superciliosus*
- *Carcharhinus falciformis*
- *Carcharhinus obscurus*
- *Carcharhinus perezii*
- *Carcharhinus signatus*
- *Carcharias taurus*
- *Carcharodon carcharias*
- *Cetorhinus maximus*
- *Galeocerdo cuvier*
- *Heptranchias perlo*
- *Isurus paucus*
- *Manta birostris*
- *Negaprion brevirostris*
- *Rhincodon typus*
- *Sphyrna lewini*
- *Sphyrna mokarran*
- *Sphyrna zygaena*
- *Squalus acanthias*
- *Agonostomus monticola*

- Gulf of Mexico Sturgeon
- Atlantic Sturgeon
- American Eel
- Blueback Herring
- Alabama Shad
- Spotted Eagle Ray
- Bigeye Thresher Shark
- Silky Shark
- Dusky Shark
- Reef Shark
- Night Shark
- Sand Tiger Shark
- White Shark
- Basking Shark
- Tiger Shark
- Sevengill, Perlon, 1-fin Shark
- Longfin Mako Shark
- Giant Manta Ray
- Lemon Shark
- Whale Shark
- Scalloped Hammerhead
- Great Hammerhead
- Smooth Hammerhead
- Cape Shark, Piked Dogfish, Spurdog
- Mountain Mullet

- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper
- *Epinephelus nigritus* Warsaw Grouper
- *Syngnathus pelagicus* Sargassum Pipefish

Conservation Threats

Threats to the Pelagic habitats that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible wildlife and fisheries management strategies
- Invasive animals
- Key predator/herbivore loss
- Nutrient loads–urban

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered primary productivity	High
B	Altered species composition	High
C	Altered water quality–nutrients	High
D	Altered water quality–physical, chemistry	High
E	Missing key communities or functional guilds/trophic shift	High
F	Keystone species missing or lacking in abundance	High

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Harmful algal blooms	High	A, B, C, E
2	Inadequate stormwater management	High	A, B, C, D
3	Key predator/herbivore losses	High	B, E, F
4	Nutrient loads–all sources	Medium	A, C, E
5	Incompatible fishing pressure	Medium	B, F
6	Invasive animals	Medium	B
7	Placement of artificial structures	Low	B
8	Incompatible aquaculture operations	Low	C
9	Channel modification/shipping lanes	Low	D
10	Incompatible industrial operations	Low	B
11	Incompatible wildlife and fisheries management strategies	Low	B, F
12	Vessel impacts	Low	

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
13	Acoustic impacts	Low	
14	Fishing gear impacts	Low	
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Pelagic habitats that were also identified as statewide threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Many of the threats to Pelagic habitats are the same as for several other marine and estuarine habitats. Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Coral Reef](#), [Hard Bottom](#), [Seagrass](#)).

Pine Rockland



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 2,959 acres (1,197 ha) of Pine Rockland habitat exist, of which 77% (2,275 ac; 921 ha) are in existing conservation or managed areas. Another 13% (382 ac; 155 ha) are Florida Forever projects and 1% (25 ac; 10 ha) are SHCA-identified lands. The remaining 9% (277 ac; 112 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Pine Rocklands

Pine Rockland is a unique type of pine flatwoods that is found exclusively on limestone substrate in the Florida Keys, the Big Cypress Swamp, and the Miami Rock Ridge (the limestone outcropping that rises from the Everglades to heights of 23 feet (7 m) above sea level). The overstory of Pine Rockland habitat contains a single canopy species, South Florida slash pine. The dominant pines tower over a savanna-like understory of saw palmettos, locust berry, willow bastic, beauty berry, broom grasses, silver palms, and a rich herbaceous layer. This community is often associated with rockland hammock and other short-hydroperiod freshwater wetland communities. These sub-tropical pine trees and understory plants have adapted to seasonal wildfires and the lack of soil on the exposed limerock. Pine Rockland communities are globally imperiled and support federal and state listed plant species, such as deltoid spurge and Small's milkwort which only occur in this habitat.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|--------------------------|
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Sylvilagus palustris hefneri</i> | Lower Keys Marsh Rabbit |
| • <i>Sciurus niger avicennia</i> | Big Cypress Fox Squirrel |
| • <i>Sigmodon hispidus exsputus</i> | Lower Keys Cotton Rat |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Procyon lotor auspicatus</i> | Key Vaca Raccoon |
| • <i>Procyon lotor incautus</i> | Key West Raccoon |
| • <i>Procyon lotor inesperatus</i> | Matecumbe Key Raccoon |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius ssp.</i> | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |
| • <i>Odocoileus virginianus clavium</i> | Key Deer |

Birds

- | | |
|---------------------------------------|-------------------------------|
| • <i>Colinus virginianus</i> | Northern Bobwhite |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Coccyzus minor</i> | Mangrove Cuckoo |
| • <i>Chordeiles minor</i> | Common Nighthawk |
| • <i>Caprimulgus carolinensis</i> | Chuck-will's-widow |
| • <i>Caprimulgus vociferus</i> | Eastern Whip-poor-will |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Picoides borealis</i> | Red-cockaded Woodpecker |
| • <i>Tyrannus dominicensis</i> | Gray Kingbird |
| • <i>Lanius ludovicianus</i> | Loggerhead Shrike |
| • <i>Vireo altiloquus</i> | Black-whiskered Vireo |
| • <i>Sitta pusilla</i> | Brown-headed Nuthatch |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga petechia gundlachi</i> | Cuban Yellow Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Cardellina canadensis</i> | Canada Warbler |

Reptiles

- | | |
|--|---------------------------------------|
| • <i>Plestiodon egregius egregius</i> | Florida Keys Mole Skink |
| • <i>Sphaerodactylus notatus notatus</i> | Florida Reef Gecko |
| • <i>Cemophora coccinea coccinea</i> | Florida Scarletsnake |
| • <i>Crotalus adamanteus</i> | Eastern Diamond-backed Rattlesnake |
| • <i>Diadophis punctatus acricus</i> | Key Ring-necked Snake |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Pantherophis guttatus</i> | Red Cornsnake (Lower Keys population) |

- *Storeria victa* Florida Brownsnake (Keys Population)
- *Tantilla oolitica* Rim Rock Crowned Snake
- *Thamnophis sauritus sackenii* Peninsula Ribbonsnake (Lower Keys Population)
- *Deirochelys reticularia* Chicken Turtle
- *Gopherus polyphemus* Gopher Tortoise
- *Kinosternon baurii* Striped Mud Turtle (Lower Keys Population)
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Thermocyclops parvus* A Copepod
- *Nehalennia minuta* Tropical Sprite
- *Gryllus cayensis* South Florida Taciturn Wood Cricket
- *Belocephalus micranopy* Big Pine Key Conehead Katydid
- *Belocephalus sleighti* Keys Short-winged Conehead Katydid
- *Cicindela scabrosa floridana* Miami Tiger Beetle
- *Stizocera floridana* Florida Privet Long-horned Beetle
- *Anomala robinsoni* Robinson's Anomala Scarab Beetle
- *Pseudocharis minima* Lesser Wasp Moth
- *Epargyreus zestos* Zestos Skipper
- *Ephyriades brunnea floridensis* Florida Duskywing
- *Euphyes pilatka klotsi* Klots' Skipper
- *Hesperia meskei pinocayo* Rockland Grass Skipper- Keys Race
- *Polites baracoa* Baracoa Skipper
- *Cyclargus ammon* Nickerbean Blue
- *Eumaeus atala* Atala
- *Ministrymon azia* Gray Ministreak
- *Strymon acis bartrami* Bartram's Scrub-hairstreak
- *Anaea troglodyta floridalis* Florida Leafwing
- *Anthanassa frisia* Cuban Crescent
- *Merycomyia brunnea* Brown Merycomyian Tabanid Fly

Conservation Threats

Threats to Pine Rockland habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Incompatible fire
- Invasive animals
- Invasive plants
- Roads

Threats specific to Pine Rockland were limited to incompatible residential activities that include movement of fertilizer, herbicide, and invasive species from landscape maintenance, activities of people, their pets, and nuisance species, and disposal of yard and household waste.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered fire regime	High
B	Altered landscape mosaic or context	High
C	Habitat destruction or conversion	High
D	Fragmentation of habitats, communities, ecosystems	Medium
E	Altered community structure	Medium
F	Altered species composition/dominance	Medium
G	Excessive depredation and/or parasitism	Medium
H	Insufficient size/extent of characteristic communities or ecosystems	Medium
I	Habitat degradation/disturbance	Medium
J	Altered hydrologic regime	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Roads	High	A, B, C
2	Conversion to housing and urban development	High	A, B, C
3	Conversion to commercial and industrial development	High	A, B, C
4	Incompatible fire	Medium	A, B, C
5	Invasive plants	Low	A, B, C
6	Invasive animals	Low	B
7	Chemicals and toxins	Low	B
8	Incompatible residential activities	Low	A, C
9	Incompatible agricultural practices	Low	B
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Pine Rockland that were also identified as statewide threats (roads, conversion to housing and urban development, incompatible fire, invasive plants, invasive animals, chemicals and toxins) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Pine Rockland habitat are below, although none were ranked of high priority for implementation. These actions were designed to reduce the impacts from activities of residents adjacent to this habitat.

Incompatible Residential Activities

Overall Rank	Economic and Other Incentives	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Expand the scale of the Florida Yards and Neighborhoods program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.	M	M	L
L	Support incentives for residential property owners to resolve issues of incompatible use, including pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and lighting use in coastal areas.	M	L	L
L	Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.	M	L	L
L	Develop a voluntary program directed at developers to provide on-site site-specific educational materials and recommendations to homeowner associations about incompatible residential activities.	M	L	L
Overall Rank	Education and Awareness	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Implement and fund continuing education courses for the landscape maintenance industry that includes appropriate use of chemicals, irrigation, plants, and disposal of yard waste.	H	M	M

Reservoir/Managed Lake



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 601,902 acres (243,581 ha) of Reservoir/Managed Lake habitat exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

This habitat category consists exclusively of man-made standing water bodies, each created by the damming of a flowing stream or excavation within a terrestrial habitat. These landscape features range from farm ponds and borrow pits of less than one acre (0.4 ha) to municipal reservoirs of more than 30,000 acres (12,141 ha). Reservoir/Managed Lake habitats are essentially permanent, although some of them dry completely during droughts.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |

- *Tadarida brasiliensis cynocephala* Brazilian Free-tailed Bat
- *Lontra canadensis lataxina* River Otter
- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Anas rubripes* American Black Duck
- *Anas fulvigula* Mottled Duck
- *Aythya marila* Greater Scaup
- *Aythya affinis* Lesser Scaup
- *Gavia immer* Common Loon
- *Mycteria americana* Wood Stork
- *Pelecanus occidentalis* Brown Pelican
- *Botaurus lentiginosus* American Bittern
- *Ixobrychus exilis* Least Bittern
- *Ardea herodias* Great Blue Heron
- *Ardea alba* Great Egret
- *Egretta thula* Snowy Egret
- *Egretta caerulea* Little Blue Heron
- *Egretta tricolor* Tricolored Heron
- *Egretta rufescens* Reddish Egret
- *Butorides virescens* Green Heron
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Eudocimus albus* White Ibis
- *Plegadis falcinellus* Glossy Ibis
- *Platalea ajaja* Roseate Spoonbill
- *Pandion haliaetus* Osprey
- *Rostrhamus sociabilis* Snail Kite
- *Haliaeetus leucocephalus* Bald Eagle
- *Falco columbarius* Merlin
- *Falco peregrinus* Peregrine Falcon
- *Rallus elegans* King Rail
- *Porphyrio martinica* Purple Gallinule
- *Aramus guarauna* Limpkin
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Grus americana* Whooping Crane
- *Recurvirostra americana* American Avocet
- *Tringa solitaria* Solitary Sandpiper
- *Tringa flavipes* Lesser Yellowlegs
- *Tryngites subruficollis* Buff-breasted Sandpiper
- *Limnodromus scolopaceus* Long-billed Dowitcher
- *Phalaropus tricolor* Wilson's Phalarope
- *Sternula antillarum* Least Tern
- *Hydroprogne caspia* Caspian Tern
- *Chlidonias niger* Black Tern
- *Euphagus cyanocephalus* Brewer's Blackbird

Reptiles

- *Alligator mississippiensis* American Alligator
- *Farancia erythrogramma* Rainbow Snake
- *Nerodia cyclopion* Mississippi Green Watersnake
- *Apalone mutica calvata* Gulf Coast Smooth Softshell

- *Graptemys barbouri* Barbour's Map Turtle
- *Macrochelys temminckii* Alligator Snapping Turtle
- *Pseudemys suwanniensis* Suwannee Cooter

Fish

- *Anguilla rostrata* American Eel
- *Cyprinodon variegatus hubbsi* Lake Eustis Pupfish
- *Acantharchus pomotis* Mud Sunfish

Invertebrates

- *Utterbackia peggyae* Florida Floater
- *Utterbackia peninsularis* Peninsular Floater
- *Villosa amygdala* Florida Rainbow
- *Procambarus latipleurum* A Crayfish
- *Macrobrachium acanthurus* Cinnamon River Shrimp
- *Macrobrachium carcinus* Big Claw River Shrimp
- *Macrobrachium ohione* Ohio River Shrimp
- *Poanes viator zizaniae* Broad-winged Skipper

Conservation Threats

Threats to the Reservoir/Managed Lake habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- [Chemicals and toxins](#)
- [Incompatible forestry practices](#)
- [Incompatible recreational activities](#)
- [Invasive animals](#)
- [Invasive plants](#)
- [Nutrient loads–agriculture](#)
- [Nutrient loads–urban](#)

Threats specific to Reservoir/Managed Lake, as well as other habitats, include runoff from chemicals and toxins. Reservoirs are created for multiple purposes, some of which may be incompatible with their role as wildlife habitat. At the same time, reservoirs, especially instream impoundments, were themselves identified as important sources of fragmentation, altered hydrology, and other stresses to river and stream habitats.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	High
B	Altered water quality of surface water or aquifer: contaminants	High
C	Erosion/sedimentation	High
D	Altered water quality of surface water or aquifer: nutrients	High

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Nutrient loads–urban	High	A, D
2	Invasive animals	High	A
3	Incompatible recreational activities	High	A, B, C, D
4	Invasive plants	High	A
5	Incompatible construction practices	Medium	C, D
6	Nutrient loads–agriculture	Medium	A, D
7	Chemicals and toxins	Medium	B
8	Incompatible agricultural practices	Medium	B, C
9	Incompatible forestry practices	Low	C
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Reservoir/Managed Lake habitats that were also identified as statewide threats (nutrient loads–urban, invasive animals, incompatible recreational activities, invasive plants, nutrient loads–agriculture, chemicals and toxins, incompatible forestry practices) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Reservoir/Managed Lake and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to prevent degradation of water quality in reservoirs, prevent excessive withdrawal of water from reservoirs that would exacerbate the downstream hydrologic alteration caused by the dam, prevent reservoirs from becoming points of introduction or refugia for invasive species, operate dams such that the timing, frequency, duration, and magnitude of releases are compatible with the hydrologic needs of downstream aquatic habitat, operate and/or retrofit dams and other structures to facilitate movement of anadromous fishes through and upstream of reservoirs.

Chemicals and Toxins

Overall Rank	Planning and Standards	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Develop and encourage use of recommendations for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M
L	Develop management techniques and design protocols to minimize exposure of wading birds and other wetland wildlife to contaminants.	H	L	M
Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Evaluate cumulative impacts of small rural impoundments on fish and wildlife.	M	M	M
L	Conduct research defining appropriate sediment quality standards for the various aquatic and marine systems. Fund research defining the relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H
L	Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems. Fund research defining the relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H

Salt Marsh



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 442,577 acres (179,105 ha) of Salt Marsh habitat exist, of which 71% (316,033 ac; 127,894 ha) are in conservation or managed areas. Another 6% (26,740 ac; 10,821 ha) are in Florida Forever projects and 8% (33,222 ac; 13,444 ha) are in SHCA-designated lands. The remaining 15% (66,582 ac; 26,945 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Tidal Marsh

Salt Marsh is vegetated almost completely by herbaceous plants, primarily grasses, sedges, and rushes. This community type occurs within the intertidal zone of coastal areas and may be infrequently (high marsh) to frequently (low marsh) inundated by salt or brackish water. Salt Marsh develops where wave energies are low and where mangroves are absent. Mangroves may extirpate shade-intolerant marsh species. The size of a Salt Marsh depends on the extent of the intertidal zone in which it occurs. Salt Marshes of larger sizes are usually dissected by numerous tidal creeks. Areas that have low topographic relief and relatively high tidal ranges are likely to have larger Salt Marsh extents. Within Salt Marsh, plant species are often distributed unevenly, especially in transitional areas. Species distributions are affected by biotic and abiotic variables such as elevation, substrate type, degree of slope, wave energy, competing species, and salinity. Smooth cordgrass typically occupies the lower elevations and is usually adjacent to tidal creeks and pools. Needlerush dominates the slightly less frequently inundated zone. Vegetation at the higher

elevations forms transitional areas to uplands and may contain species such as marsh-hay, glassworts, saltwort, saltgrass, sea ox-eye daises, marsh-elder, and saltbush as well as many other species.

The Salt Marsh habitat is among the most productive communities in the world. Primary production is greatly affected by soil salinity and tidal frequency. Salt Marshes vary in extent and species composition throughout Florida and support diverse local faunas.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|-------------------------------|
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Sylvilagus palustris hefneri</i> | Lower Keys Marsh Rabbit |
| • <i>Microtus pennsylvanicus dukecampbelli</i> | Florida Salt Marsh Vole |
| • <i>Neofiber alleni</i> ssp. | Round-tailed Muskrat |
| • <i>Oryzomys palustris natator</i> | Silver Rice Rat |
| • <i>Oryzomys palustris planirostris</i> | Pine Island Marsh Rice Rat |
| • <i>Oryzomys palustris sanibeli</i> | Sanibel Island Marsh Rice Rat |
| • <i>Sigmodon hispidus exsputus</i> | Lower Keys Cotton Rat |
| • <i>Sigmodon hispidus insulicola</i> | Insular Cotton Rat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Procyon lotor auspicatus</i> | Key Vaca Raccoon |
| • <i>Procyon lotor incautus</i> | Key West Raccoon |
| • <i>Procyon lotor inesperatus</i> | Matecumbe Key Raccoon |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |

Birds

- | | |
|--|----------------------------|
| • <i>Anas rubripes</i> | American Black Duck |
| • <i>Anas fulvigula</i> | Mottled Duck |
| • <i>Aythya affinis</i> | Lesser Scaup |
| • <i>Mycteria americana</i> | Wood Stork |
| • <i>Pelecanus occidentalis</i> | Brown Pelican |
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea herodias occidentalis</i> | Great White Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Egretta tricolor</i> | Tricolored Heron |
| • <i>Egretta rufescens</i> | Reddish Egret |
| • <i>Butorides virescens</i> | Green Heron |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Eudocimus albus</i> | White Ibis |
| • <i>Platalea ajaja</i> | Roseate Spoonbill |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco columbarius</i> | Merlin |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Laterallus jamaicensis</i> | Black Rail |
| • <i>Rallus longirostris insularum</i> | Mangrove Clapper Rail |
| • <i>Rallus longirostris scottii</i> | Florida Clapper Rail |

• <i>Pluvialis squatarola</i>	Black-bellied Plover
• <i>Pluvialis dominica</i>	American Golden-Plover
• <i>Haematopus palliatus</i>	American Oystercatcher
• <i>Recurvirostra americana</i>	American Avocet
• <i>Tringa semipalmata semipalmata</i>	Eastern Willet
• <i>Tringa semipalmata inornata</i>	Western Willet
• <i>Tringa flavipes</i>	Lesser Yellowlegs
• <i>Numenius phaeopus</i>	Whimbrel
• <i>Numenius americanus</i>	Long-billed Curlew
• <i>Limosa fedoa</i>	Marbled Godwit
• <i>Arenaria interpres</i>	Ruddy Turnstone
• <i>Calidris canutus</i>	Red Knot
• <i>Calidris canutus rufa</i>	Red Knot (rufa)
• <i>Calidris mauri</i>	Western Sandpiper
• <i>Limnodromus griseus</i>	Short-billed Dowitcher
• <i>Limnodromus scolopaceus</i>	Long-billed Dowitcher
• <i>Sternula antillarum</i>	Least Tern
• <i>Gelochelidon nilotica</i>	Gull-billed Tern
• <i>Hydroprogne caspia</i>	Caspian Tern
• <i>Chlidonias niger</i>	Black Tern
• <i>Thalasseus maximus</i>	Royal Tern
• <i>Rynchops niger</i>	Black Skimmer
• <i>Asio flammeus</i>	Short-eared Owl
• <i>Cistothorus palustris griseus</i>	Worthington's Marsh Wren
• <i>Cistothorus palustris marianae</i>	Marian's Marsh Wren
• <i>Ammodramus caudacutus</i>	Saltmarsh Sparrow
• <i>Ammodramus maritimus fisheri</i>	Louisiana Seaside Sparrow
• <i>Ammodramus maritimus macgillivraii</i>	Macgillivray's Seaside Sparrow
• <i>Ammodramus maritimus peninsulae</i>	Scott's Seaside Sparrow
• <i>Ammodramus maritimus junicolus</i>	Wakulla Seaside Sparrow
• <i>Euphagus carolinus</i>	Rusty Blackbird

Reptiles

• <i>Alligator mississippiensis</i>	American Alligator
• <i>Crocodylus acutus</i>	American Crocodile
• <i>Crotalus adamanteus</i>	Eastern Diamond-backed Rattlesnake
• <i>Drymarchon couperi</i>	Eastern Indigo Snake
• <i>Farancia erythrogramma</i>	Rainbow Snake
• <i>Lampropeltis getula</i>	Eastern Kingsnake
• <i>Nerodia clarkii clarkii</i>	Gulf Saltmarsh Watersnake
• <i>Nerodia clarkii compressicauda</i>	Mangrove Saltmarsh Watersnake
• <i>Nerodia clarkii taeniata</i>	Atlantic Saltmarsh Watersnake
• <i>Storeria dekayi limnetes</i>	Marsh Brownsnake
• <i>Thamnophis sauritus sackenii</i>	Peninsula Ribbonsnake (Lower Keys Population)
• <i>Caretta caretta</i>	Loggerhead Sea Turtle
• <i>Chelonia mydas</i>	Green Sea Turtle
• <i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle
• <i>Malaclemys terrapin</i>	Diamond-backed Terrapin
• <i>Pseudemys suwanniensis</i>	Suwannee Cooter
• <i>Terrapene carolina</i>	Eastern Box Turtle

Fish

- *Menidia conchorum* Key Silveride
- *Fundulus jenkinsi* Saltmarsh Topminnow
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Awaous banana* River Goby
- *Ctenogobius pseudofasciatus* Slashcheek Goby
- *Microphis brachyurus* Opossum Pipefish

Invertebrates

- *Uca pugnax* Mud Fiddler
- *Cicindela severa* A Tiger Beetle
- *Cicindela striga* Elusive Tiger Beetle
- *Tetracha floridana* A Tiger Beetle
- *Micronaspis floridana* Florida Intertidal Firefly
- *Poanes viator zizaniae* Broad-winged Skipper
- *Aphrissa statira* Statira
- *Kricogonia lyside* Lyside Sulphur

Conservation Threats

Threats to Salt Marsh habitats that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Incompatible industrial operations
- Incompatible wildlife and fisheries management strategies
- Invasive plants
- Industrial spills
- Management of nature (beach nourishment and impoundments)
- Military activities
- Roads, bridges and causeways
- Shoreline hardening
- Surface water and groundwater withdrawal
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat destruction	Very High
B	Habitat fragmentation	Very High
C	Sedimentation	Very High
D	Altered structure	Medium
E	Altered water quality–contaminants	Medium
F	Altered water quality–physical, chemistry	Medium
G	Altered weather regime/sea level rise	Medium
H	Erosion	Medium

Stresses		Habitat Stress Rank
I	Altered hydrologic regime	Medium
J	Altered primary productivity	Medium
K	Altered species composition	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Coastal development	Very High	A, B, C, E, I, K
2	Roads, bridges and causeways	High	A, B, I, K
3	Incompatible industrial operations	High	A, B, E, I, K
4	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, C, D, E, F, H, I, J, K
5	Climate variability	High	D, G, H, K
6	Inadequate stormwater management	High	A, B, C, D, E, F, I, J, K
7	Surface water withdrawal	High	D, F, I, K
8	Channel modification/shipping lanes	High	A, B, C, F, H
9	Incompatible wildlife and fisheries management strategies	High	A, B, I, K
10	Management of nature (beach nourishment, impoundments)	High	A, B, D, E, K
11	Disruption of longshore transport of sediments	High	C, H
12	Invasive plants	Medium	A, B, D, J, K
13	Shoreline hardening	Medium	A, B
14	Chemicals and toxins	Medium	E
15	Industrial spills	Medium	E
16	Utility corridors	Medium	A, B
17	Boating impacts	Medium	A, H
18	Military activities	Low	A
19	Vessel impacts	Low	A
20	Placement of artificial structures	Low	A
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Salt Marsh habitats that were also identified as statewide threats (see list above), are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Many of the threats to Salt Marsh are the same as for several other marine and estuarine habitats.

Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Coastal Tidal River or Stream](#), [Seagrass](#), [Mangrove Swamp](#), [Coral Reef](#), [Beach/Surf Zone](#)).

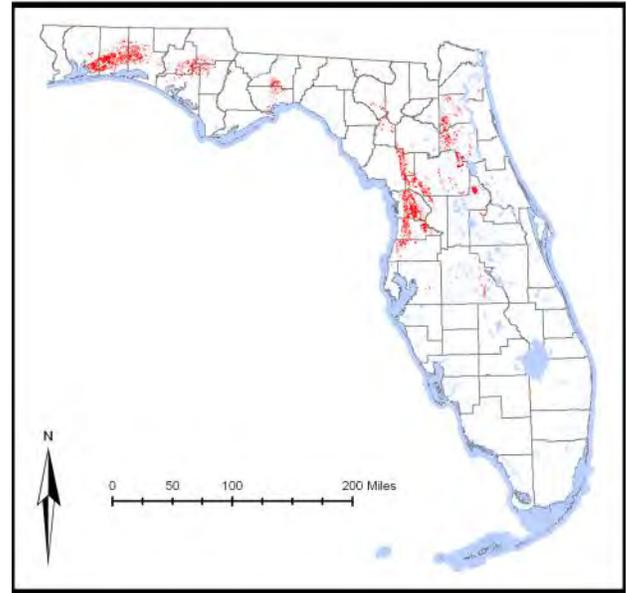
Sandhill



Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 753,547 acres (304,950 ha) of Sandhill habitat exist, of which 46% (348,512 ac; 141,038 ha) are in conservation or managed areas. Another 5% (35,052 ac; 14,185 ha) are in Florida Forever projects and 5% (34,517; 13,969 ha) are in SHCA-designated lands. The remaining 45% (335,466; 135,758 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Sandhill

Sandhill communities occur only in north and central Florida in areas of gently rolling terrain on deep, well-drained, mostly yellow, sterile sands. This xeric community is dominated by an overstory of widely spaced, scattered longleaf pine, along with an understory of turkey oak, sand post oak, and bluejack oak. The park-like ground cover consists of various grasses and herbs, including wiregrass, lopsided Indian grass, bluestems, blazing star, partridge pea, beggars tick, milk pea, queen's delight, and others. Due to the poor water retention properties of the soils and open canopy, temperature and humidity fluctuate rapidly and frequently in this habitat compared to high-moisture closed-canopy forests. However, many temporary wetlands are found throughout Sandhill landscapes and are an integral part of this habitat type, providing breeding and foraging habitat for many wildlife species. Sandhill is a community that is sustained by ground fires with short return intervals to reduce hardwood intrusion and to promote flowering of many grasses and herbs. In the absence of fire, Sandhill will eventually succeed into a xeric hammock. Sand pine can quickly invade Sandhills where seed sources are available and fires are suppressed.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Geomys pinetis pinetis</i> | Southeastern Pocket Gopher |
| • <i>Podomys floridanus</i> | Florida Mouse |
| • <i>Sciurus niger niger</i> | Southeastern Fox Squirrel |
| • <i>Sciurus niger shermani</i> | Sherman's Fox Squirrel |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulæ</i> | Florida Long-tailed Weasel |
| • <i>Spilogale putorius ssp.</i> | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|--|-------------------------------|
| • <i>Colinus virginianus</i> | Northern Bobwhite |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Columbina passerina</i> | Common Ground-Dove |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Athene cunicularia</i> | Burrowing Owl |
| • <i>Chordeiles minor</i> | Common Nighthawk |
| • <i>Caprimulgus carolinensis</i> | Chuck-will's-widow |
| • <i>Caprimulgus vociferus</i> | Eastern Whip-poor-will |
| • <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Picoides borealis</i> | Red-cockaded Woodpecker |
| • <i>Colaptes auratus</i> | Northern Flicker |
| • <i>Sitta pusilla</i> | Brown-headed Nuthatch |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Peucaea aestivalis</i> | Bachman's Sparrow |
| • <i>Ammodramus savannarum pratensis</i> | Grasshopper Sparrow |

Amphibians

- | | |
|-------------------------------------|--------------------------|
| • <i>Hyla andersonii</i> | Pine Barrens Treefrog |
| • <i>Lithobates capito</i> | Gopher Frog |
| • <i>Pseudacris ornata</i> | Ornate Chorus Frog |
| • <i>Ambystoma tigrinum</i> | Eastern Tiger Salamander |
| • <i>Eurycea cf. quadridigitata</i> | Bog Dwarf Salamander |
| • <i>Notophthalmus perstriatus</i> | Striped Newt |

Reptiles

- | | |
|--|------------------------|
| • <i>Anolis carolinensis seminolus</i> | Southern Green Anole |
| • <i>Plestiodon egregius lividus</i> | Blue-tailed Mole Skink |

- *Plestiodon egregius onocrepis*
 - *Plestiodon reynoldsi*
 - *Rhineura floridana*
 - *Sceloporus woodi*
 - *Cemophora coccinea coccinea*
 - *Crotalus adamanteus*
 - *Crotalus horridus*
 - *Drymarchon couperi*
 - *Heterodon platirhinos*
 - *Heterodon simus*
 - *Lampropeltis calligaster*
 - *Lampropeltis extenuata*
 - *Lampropeltis getula*
 - *Pituophis melanoleucus mugitus*
 - *Tantilla coronata*
 - *Tantilla relicta*
 - *Virginia valeriae valeriae*
 - *Deirochelys reticularia*
 - *Gopherus polyphemus*
 - *Terrapene carolina*
- Peninsula Mole Skink
 - Florida Sand Skink
 - Florida Wormlizard
 - Florida Scrub Lizard
 - Florida Scarletsnake
 - Eastern Diamond-backed Rattlesnake
 - Timber Rattlesnake
 - Eastern Indigo Snake
 - Eastern Hog-nosed Snake
 - Southern Hog-nosed Snake
 - Yellow-bellied Kingsnake
 - Short-tailed Snake
 - Eastern Kingsnake
 - Florida Pinesnake
 - Southeastern Crowned Snake
 - Florida Crowned Snake
 - Eastern Smooth Earthsnake (Highlands Co.)
 - Chicken Turtle
 - Gopher Tortoise
 - Eastern Box Turtle

Invertebrates

- *Geolycosa escambiensis*
 - *Geolycosa xera*
 - *Paraphrynus raptator*
 - *Progomphus alachuensis*
 - *Progomphus bellei*
 - *Libellula jesseana*
 - *Melanoplus adelogyrus*
 - *Melanoplus apalachicola*
 - *Melanoplus pygmaeus*
 - *Melanoplus querneus*
 - *Melanoplus withlacoocheensis*
 - *Schistocerca ceratiola*
 - *Cicindela highlandensis*
 - *Selonodon archboldi*
 - *Triplax alachuae*
 - *Mycotrupes gagei*
 - *Peltotrupes profundus*
 - *Chelyoxenus xerobatis*
 - *Geomysaprinus floridae*
 - *Ptomaphagus geomysi*
 - *Ptomaphagus schwarzi*
 - *Anomala exigua*
 - *Aphodius aegrotus*
 - *Aphodius baileyi*
 - *Aphodius bakeri*
 - *Aphodius dyspistus*
 - *Aphodius gambrinus*
 - *Aphodius hubbelli*
 - *Aphodius laevigatus*
 - *Aphodius pholetus*
- Escambia Wolf Spider
 - McCrone's Burrowing Wolf Spider
 - Dusky-handed Tailless Whip Scorpion
 - Tawny Sanddragon
 - Belle, Belle's Sanddragon
 - Purple Skimmer
 - Volusia Grasshopper
 - Apalachicola Grasshopper
 - Pygmy Sandhill Grasshopper
 - Larger Sandhill Grasshopper
 - Withlacoochee Melanoplus Grasshopper
 - Rosemary Grasshopper
 - Highlands Tiger Beetle
 - Archbold Cibrionid Beetle
 - Alachua Pleasing Fungus Beetle
 - North Peninsular Mycotrupes Beetle
 - Florida Deepdigger Scarab Beetle
 - Gopher Tortoise Hister Beetle
 - Equal-clawed Gopher Tortoise Hister Beetle
 - Elongate Pocket Gopher Ptomaphagus Beetle
 - Schwarz' Pocket Gopher Ptomaphagus Beetle
 - Pygmy Anomala Scarab Beetle
 - Small Pocket Gopher Aphodius Beetle
 - Bailey's Pocket Gopher Aphodius Beetle
 - Baker's Pocket Gopher Aphodius Beetle
 - Surprising Pocket Gopher Aphodius Beetle
 - Amber Pocket Gopher Aphodius Beetle
 - Hubbell's Pocket Gopher Aphodius Beetle
 - Large Pocket Gopher Aphodius Beetle
 - Rare Pocket Gopher Aphodius Beetle

• <i>Aphodius platypleurus</i>	Broad-sided Pocket Gopher Aphodius Beetle
• <i>Aphodius tanytarsus</i>	Long-clawed Pocket Gopher Aphodius Beetle
• <i>Aphodius troglodytes</i>	Gopher Tortoise Aphodius Beetle
• <i>Copris gopheri</i>	Gopher Tortoise Copris Beetle
• <i>Euphoria discicollis</i>	Pocket Gopher Flower Beetle
• <i>Geopsammodius morrissi</i>	Morris' Tiny Sand-loving Scarab
• <i>Gronocarus autumnalis</i>	Lobed Spiny Burrowing Beetle
• <i>Gronocarus inornatus</i>	Lobeless Spiny Burrowing Beetle
• <i>Hypotrichia spissipes</i>	Florida Hypotrichia Scarab Beetle
• <i>Onthophagus polyphemi polyphemi</i>	Punctate Gopher Tortoise Onthophagus Beetle
• <i>Onthophagus polyphemi sparsisetosus</i>	Smooth Gopher Tortoise Onthophagus Beetle
• <i>Phyllophaga ovalis</i>	Oval June Beetle
• <i>Phyllophaga skelleyi</i>	Skelley's June Beetle
• <i>Polyphylla gracilis</i>	Slender Polyphyllan Scarab Beetle
• <i>Polyphylla pubescens</i>	Eglin Uplands Scarab Beetle
• <i>Serica frosti</i>	Frost's Silky June Beetle
• <i>Serica pusilla</i>	Pygmy Silky June Beetle
• <i>Trigonopeltastes floridana</i>	Scrub Palmetto Flower Scarab Beetle
• <i>Philonthus gopheri</i>	A Rove Beetle
• <i>Philonthus testudo</i>	A Rove Beetle
• <i>Onychomira floridensis</i>	A Comb-clawed Beetle
• <i>Caupolicana electa</i>	A Plasterer Bee
• <i>Polyergus lucidus</i>	Shining Amazon Ant
• <i>Dasymutilla archboldi</i>	Lake Wales Ridge Velvet Ant
• <i>Photomorphus archboldi</i>	Nocturnal Scrub Velvet Ant
• <i>Ceraclea limnetes</i>	Sandhill Lake Caddisfly
• <i>Acrolophus pholeter</i>	Gopher Tortoise Acrolophus Moth
• <i>Achalarus lyciades</i>	Hoary Edge
• <i>Amblyscirtes alternata</i>	Dusky Roadside-skipper
• <i>Amblyscirtes vialis</i>	Common Roadside-skipper
• <i>Atrytone arogos arogos</i>	Arogos Skipper
• <i>Atrytonopsis loammi</i>	Loammi Skipper
• <i>Erynnis martialis</i>	Mottled Duskywing
• <i>Hesperia attalus slossonae</i>	Seminole Skipper
• <i>Hesperia meskei straton</i>	Eastern Meske's Skipper
• <i>Megathymus cofaqui</i>	Cofaqui Skipper
• <i>Megathymus yuccae</i>	Yucca Skipper
• <i>Polites origenes</i>	Crossline Skipper
• <i>Callophrys irus</i>	Frosted Elfin
• <i>Catocala grisatra</i>	Grisatra Underwing
• <i>Idia gopheri</i>	Gopher Tortoise Noctuid Moth
• <i>Panorpa rufa</i>	Red Scorpionfly

Conservation Threats

Threats to Sandhill habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Conversion to recreation areas
- Incompatible fire
- Incompatible recreational activities

- Incompatible resource extraction: mining/drilling
- Invasive animals
- Invasive plants
- Roads

Threats specific to Sandhill were identified for the pathogen-causing Upper Respiratory Tract Disease in gopher tortoises, and movement of other parasites and pathogens from pets to native wildlife. Additionally, siting of utility corridors through this habitat, particularly on public lands, was identified as a cause of fragmentation and loss of habitat. Military base closure threatens potential conservation protection for Sandhill. Insufficient management of invasive plant species, such as Japanese climbing fern and cogongrass, also threatens this habitat and others.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered fire regime	Very High
B	Habitat destruction or conversion	Very High
C	Altered species composition/dominance	High
D	Keystone species missing or lacking in abundance	High
E	Altered hydrologic regime	High
F	Altered community structure	High
G	Fragmentation of habitats, communities, ecosystems	High
H	Insufficient size/extent of characteristic communities or ecosystems	High
I	Altered soil structure and/or chemistry	High
J	Missing key communities, functional guilds, or seral stages	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible recreational activities	Very High	B, C, D, E, F, G, I
2	Conversion to housing and urban development	Very High	A, B, D, E, G, H, I
3	Roads	Very High	A, B, C, D, E, F, G, H, I
4	Incompatible fire	High	A, C, D, E, F
5	Utility corridors	High	B, C, E, G, H, I
6	Parasites/pathogens	High	C, D, F
7	Conversion to commercial and industrial development	High	A, B, D, E, G, H
8	Incompatible resource extraction: mining/drilling	Medium	B, E, G
9	Military activities	Medium	B, F, G
10	Invasive animals	Medium	C, D, F
11	Invasive plants	Medium	C, F
12	Conversion to recreation areas	Medium	B, C, D, E, G, H

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
13	Incompatible wild animal harvest	Low	C, D, F
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Sandhill that were also identified as statewide threats (incompatible recreational activities, roads, conversion to housing and urban development, incompatible fire, conversion to commercial and industrial development, incompatible resource extraction: mining/drilling, invasive animals, invasive plants (also see actions below), conversion to recreation areas) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Sandhill are below. These actions were designed to reduce the potential for spread of parasites and pathogens, with specific reference to gopher tortoises, reduce habitat loss for utility rights-of-way, and assure that the management and closure of military bases be implemented to retain critical habitat for Florida's SGCN. Control of Japanese climbing fern was also identified as necessary where pine straw is harvested.

Utility Corridors

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Develop private-public partnerships that facilitate placement of utilities on existing FDOT rights-of-way and vice-versa to minimize their cumulative impacts on habitats.	M	M	L
M	Provide data on sensitive habitats to utilities and the Public Service Commission early in the utility siting and planning process to minimize conflicts between wildlife, critical habitats, and utility corridors.	VH	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Encourage language (e.g., ETDM) in utility siting process for co-location and that minimizes fragmentation of natural areas.	M	M	L
Overall Rank	Policy	Feasibility	Benefits	Cost
VH	Explore options to reduce fragmentation of public lands caused by incompatible utility placement and land use. Promote awareness of this issue and encourage compatible alternate routes and land uses.	M	VH	H

Parasites/Pathogens

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Develop an information clearinghouse for existing and emerging pathogens and parasites and their potential impacts on Florida's wildlife.	H	M	M
M	Develop educational materials for the public about gopher tortoises and the spread of upper respiratory tract disease. (Work with the FWC, research community, and Gopher Tortoise Council).	VH	L	M

Military Activities

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Establish a permanent consultative group of multi-agency wildlife and habitat professionals that work with USDOD on development of any statewide plans for base expansion, increased usage, and growth or closure needs to enhance positive, or minimize any negative, impacts on wildlife and conservation lands.	M	H	M
Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
VH	Work to develop partnerships to encourage conservation of significant habitats on lands encompassed by federal/state base closures.	H	VH	VH
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Create a cooperative program to ensure consistent implementation of management plans on USDOD/state lands with sufficient capacity for conservation management of wildlife and habitats on military lands in Florida (e.g., prescribed fire, invasive species control, monitoring).	M	M	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Work to develop partnerships to encourage implementation of comprehensive management and mitigation plans that protect high quality habitats and natural resources.	H	M	M

Invasive Plants

Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Educate the forest management consulting community about the illegality of selling pine straw bales contaminated with Japanese climbing fern, and appropriate control methods.	H	L	L
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Create a system where landowners can voluntarily have their plantations certified as <i>Lygodium</i> -free. Provide incentive programs so that landowners increase profits by having certified pine straw.	M	L	L

Scrub



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 337,458 acres (136,564 ha) of Scrub habitat exist, of which 76% (257,015 ac; 104,010 ha) are in existing protected or managed areas. Another 3% (11,311 ac; 4,577 ha) are in Florida Forever projects, while 4% (14,031 ac; 5,678 ha) are in SHCA-designated lands. The remaining 16% (55,101 ac; 22,299 ha) are other private lands.

Habitat Description

FNAI type: Scrub

This habitat occurs on areas of deep, well-drained, infertile sandy soils that are typically white or near white. Scrub has a patchy distribution and occurs in both inland and coastal areas, from the panhandle through subtropical regions of the peninsula. The largest and most important patches of Scrub occur along the central ridge of the peninsula near Ocala and in Polk and Highlands counties. This habitat is fire-dependent; it is maintained by fires that are usually very hot or intense, but occur infrequently at intervals of 10-20 years, or more. Generally, Scrub is dominated by evergreen, or nearly evergreen, oaks and/or Florida rosemary, with or without a pine overstory. A relatively large suite of plant species is endemic to Scrub (e.g., scrub holly and inopina oak); the rarest endemic plant species are restricted to the Lake Wales area of the central ridge (e.g., pygmy fringe tree and scrub plum). Some species of wildlife also are endemic or largely restricted to Scrub habitat (e.g., Florida scrub-jay and sand skink). Several types of Scrub are recognized. Oak Scrub is a hardwood community typically consisting of clumped patches of low growing oaks interspersed with patches of bare, white sand. Pines are uncommon or absent. Oak Scrub is

dominated by myrtle oak, Chapman's oak, sand-live oak, inopina oak, scrub holly, scrub plum, scrub hickory, rosemary, scrub palmetto, and saw palmetto. Sand Pine Scrub occurs on former shorelines and islands of ancient seas. This plant community is dominated by an overstory of sand pine and has an understory of myrtle oak, Chapman's oak, sand-live oak, rusty lyonia, wild olive, scrub bay, and scrub holly. Ground cover is usually sparse to absent, especially in mature stands, and rosemary and lichens occur in some open areas. Rosemary Scrub has few or no sand pines or scrub oaks but is dominated by rosemary with scattered lichen cover, scrub hypericum, and paper nailwort. Scrubby Flatwoods, differing from Scrub by having a sparse canopy of slash pine, is addressed in the Natural Pineland habitat section. Additionally, many temporary wetlands are found throughout the Scrub landscape and are an integral part of this habitat type, providing breeding and foraging habitat for many wildlife species.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|------------------------------|
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Geomys pinetis pinetis</i> | Southeastern Pocket Gopher |
| • <i>Peromyscus polionotus allophrys</i> | Choctawhatchee Beach Mouse |
| • <i>Peromyscus polionotus leucocephalus</i> | Santa Rosa Beach Mouse |
| • <i>Peromyscus polionotus niveiventris</i> | Southeastern Beach Mouse |
| • <i>Peromyscus polionotus peninsularis</i> | St. Andrew Beach Mouse |
| • <i>Peromyscus polionotus phasma</i> | Anastasia Island Beach Mouse |
| • <i>Peromyscus polionotus trissyllepsis</i> | Perdido Key Beach Mouse |
| • <i>Podomys floridanus</i> | Florida Mouse |
| • <i>Sciurus niger shermani</i> | Sherman's Fox Squirrel |
| • <i>Mustela frenata olivacea</i> | Southeastern Weasel |
| • <i>Mustela frenata peninsulae</i> | Florida Long-tailed Weasel |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Spilogale putorius ssp.</i> | Spotted Skunk |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |

Birds

- | | |
|-------------------------------------|-------------------------------|
| • <i>Colinus virginianus</i> | Northern Bobwhite |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Falco sparverius paulus</i> | Southeastern American Kestrel |
| • <i>Columbina passerina</i> | Common Ground-Dove |
| • <i>Athene cunicularia</i> | Burrowing Owl |
| • <i>Chordeiles minor</i> | Common Nighthawk |
| • <i>Caprimulgus vociferus</i> | Eastern Whip-poor-will |
| • <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker |
| • <i>Picoides villosus</i> | Hairy Woodpecker |
| • <i>Colaptes auratus</i> | Northern Flicker |
| • <i>Lanius ludovicianus</i> | Loggerhead Shrike |
| • <i>Aphelocoma coerulescens</i> | Florida Scrub-Jay |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga kirtlandii</i> | Kirtland's Warbler |

- *Setophaga castanea*
- *Setophaga discolor discolor*
- *Cardellina canadensis*

Bay-breasted Warbler
Prairie Warbler
Canada Warbler

Amphibians

- *Lithobates capito*
- *Notophthalmus perstriatus*

Gopher Frog
Striped Newt

Reptiles

- *Anolis carolinensis seminolus*
- *Plestiodon egregius insularis*
- *Plestiodon egregius lividus*
- *Plestiodon egregius onocrepis*
- *Plestiodon reynoldsi*
- *Rhineura floridana*
- *Sceloporus woodi*
- *Cemophora coccinea coccinea*
- *Crotalus adamanteus*
- *Drymarchon couperi*
- *Heterodon platirhinos*
- *Heterodon simus*
- *Lampropeltis extenuata*
- *Pituophis melanoleucus mugitus*
- *Tantilla coronata*
- *Tantilla relicta*
- *Virginia valeriae valeriae*
- *Gopherus polyphemus*
- *Terrapene carolina*

Southern Green Anole
Cedar Key Mole Skink
Blue-tailed Mole Skink
Peninsula Mole Skink
Florida Sand Skink
Florida Wormlizard
Florida Scrub Lizard
Florida Scarletsnake
Eastern Diamond-backed Rattlesnake
Eastern Indigo Snake
Eastern Hog-nosed Snake
Southern Hog-nosed Snake
Short-tailed Snake
Florida Pinesnake
Southeastern Crowned Snake
Florida Crowned Snake
Eastern Smooth Earthsnake (Highlands Co.)
Gopher Tortoise
Eastern Box Turtle

Invertebrates

- *Praticolella bakeri*
- *Geolycosa escambiensis*
- *Geolycosa xera*
- *Lycosa ericeticola*
- *Sosippus placidus*
- *Phidippus workmani*
- *Latrodectus bishopi*
- *Floridobolus penneri*
- *Melanoplus adelogyrus*
- *Melanoplus forcipatus*
- *Melanoplus gurneyi*
- *Melanoplus indicifer*
- *Melanoplus nanciae*
- *Melanoplus ordwayae*
- *Melanoplus pygmaeus*
- *Melanoplus scapularis*
- *Melanoplus tequesta*
- *Schistocerca ceratiola*
- *Telamona archboldi*
- *Keltonia robusta*
- *Keltonia rubrofemorata*
- *Cicindela highlandensis*

Ridge Scrubsnail
Escambia Wolf Spider
McCrone's Burrowing Wolf Spider
Rosemary Wolf Spider
Lake Placid Funnel Wolf Spider
Workman's Jumping Spider
Red Widow Spider
Florida Scrub Millipede
Volusia Grasshopper
Broad Cercus Scrub Grasshopper
Gurney's Spurthroat Grasshopper
East Coast Scrub Grasshopper
Ocala Claw-cercus Grasshopper
Ordway Melanoplus Grasshopper
Pygmy Sandhill Grasshopper
Lesser Fork-tailed Grasshopper
Tequesta Grasshopper
Rosemary Grasshopper
Archbold's Treehopper
Conradina Mirid Bug
Scrub Wireweed Mirid Bug
Highlands Tiger Beetle

- *Cicindela nigrrior* Autumn Tiger Beetle
- *Cicindela scabrosa* Scrub Tiger Beetle
- *Aethecerinus hornii* Horn's Aethecerinus Long-horned Beetle
- *Aneflomorpha delongi* Delong's Aneflomorpha Long-horned Beetle
- *Enaphalodes archboldi* Archbold Scrub Long-horned Beetle
- *Plesioclytus relictus* Florida Relictual Long-horned Beetle
- *Romulus globosus* Round-necked Romulus Long-horned Beetle
- *Typocerus fulvocinctus* Yellow-banded Typocerus Long-horned Beetle
- *Selonodon archboldi* Archbold Cebrioid Beetle
- *Ischyryus dunedinensis* Three Spotted Pleasing Fungus Beetle
- *Triplaxalachuae* Alachua Pleasing Fungus Beetle
- *Peltotrupes profundus* Florida Deepdigger Scarab Beetle
- *Peltotrupes youngi* Ocala Deepdigger Scarab Beetle
- *Chelyoxenus xerobatis* Gopher Tortoise Hister Beetle
- *Pleotomodes needhami* Ant-loving Scrub Firefly
- *Mycterus marmoratus* Marbled Mycterus Beetle
- *Odontotaenius floridanus* Archbold Bess Beetle
- *Anomala eximia* Archbold Anomala Scarab Beetle
- *Aphodius troglodytes* Gopher Tortoise Aphodius Beetle
- *Copris gopheri* Gopher Tortoise Copris Beetle
- *Diplotaxis rufa* Red Diplotaxis Beetle
- *Geopsammodius fuscus* Dark Tiny Sand-loving Scarab
- *Geopsammodius morrissi* Morris' Tiny Sand-loving Scarab
- *Geopsammodius relictillus* Relictual Tiny Sand-loving Scarab
- *Geopsammodius withlacoochee* Withlacoochee Tiny Sand-loving Scarab
- *Haroldiataenius saramari* Sand Pine Scrub Ataenius Beetle
- *Hypotrichia spissipes* Florida Hypotrichia Scarab Beetle
- *Onthophagus aciculatulus* Sandyland Onthophagus Beetle
- *Onthophagus polyphemi polyphemi* Punctate Gopher Tortoise Onthophagus Beetle
- *Onthophagus polyphemi sparsisetosus* Smooth Gopher Tortoise Onthophagus Beetle
- *Phyllophaga elizoria* Elizoria June Beetle
- *Phyllophaga elongata* Elongate June Beetle
- *Phyllophaga okeechobea* Diurnal Scrub June Beetle
- *Phyllophaga panorpa* Southern Lake Wales Ridge June Beetle
- *Polyphylla starkae* Auburndale Scrub Scarab Beetle
- *Serica frosti* Frost's Silky June Beetle
- *Serica pusilla* Pygmy Silky June Beetle
- *Trigonopeltastes floridana* Scrub Palmetto Flower Scarab Beetle
- *Onychomira floridensis* A Comb-clawed Beetle
- *Caupolicana floridana* Giant Scrub Plasterer Bee
- *Dorymyrmex flavopectus* Bi-colored Scrub Cone Ant
- *Dasymutilla archboldi* Lake Wales Ridge Velvet Ant
- *Photomorphus archboldi* Nocturnal Scrub Velvet Ant
- *Hesperia attalus slossonae* Seminole Skipper
- *Callophrys gryneus* Olive Hairstreak
- *Ministrymon azia* Gray Ministreak
- *Idia gopheri* Gopher Tortoise Noctuid Moth
- *Asaphomyia floridensis* Florida Asaphomyian Tabanid Fly
- *Eurosta lateralis* A fruit fly

Conservation Threats

Threats to Scrub habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to agriculture
- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Conversion to recreation areas
- Incompatible fire
- Incompatible forestry practices
- Incompatible recreational activities
- Incompatible resource extraction: mining/drilling
- Invasive animals
- Invasive plants
- Roads

Threats specific to Scrub habitat include Incompatible forestry practices because this habitat supports Florida scrub-jays, which are not tolerant of dense pine stands adjacent to or within Scrub sites. Habitat-specific threats from mining includes habitat loss both when areas are mined and when dredge spoil is deposited on Scrub and mitigation activities that result in small, fragmented areas rather than more contiguous areas of this habitat. Military base closure threatens potential loss of protection of Scrub.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Fragmentation of habitats, communities, ecosystems	Very High
B	Insufficient size/extent of characteristic communities or ecosystems	Very High
C	Altered community structure	High
D	Altered fire regime	High
E	Habitat destruction or conversion	High
F	Altered soil structure and chemistry	High
G	Altered species composition/dominance	High
H	Altered landscape mosaic or context	High

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible fire	Very High	A, C, D, E, G, H
2	Conversion to housing and urban development	Very High	A, B, D, E, H
3	Roads	Very High	A, B, D, E, H
4	Incompatible forestry practices	Very High	A, C, D, E, F, G, H
5	Incompatible resource extraction: mining/drilling	Very High	A, B, E, F, H
6	Conversion to agriculture	Very High	A, B, E, H
7	Conversion to commercial and industrial	Very High	A, B, D, E, H

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
	development		
8	Management of nature – stormwater facilities	High	A, E, F, H
9	Management of nature – dredge spoil deposition	High	A, E, F
10	Conversion to recreation areas	Medium	A, D, E
11	Invasive animals	Medium	C, D, E, G
12	Incompatible recreational activities	Medium	A, C, E
13	Military activities	Medium	A, B, D, E, H
14	Invasive plants	Medium	C, G
15	Incompatible agricultural practices	Medium	F
16	Incompatible grazing and ranching	Low	C
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Scrub that were also identified as statewide threats (conversion to agriculture, conversion to commercial and industrial development, conversion to housing and urban development, conversion to recreation areas, incompatible fire, incompatible forestry practices (also see actions below), incompatible recreational activities, incompatible resource extraction: mining/drilling (also see actions below), invasive animals, invasive plants, roads) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Scrub are below. These actions were designed to reduce the impacts of adjacent incompatible forest management, mining and mine mitigation, habitat loss from public facility siting, and potential management or loss on Avon Park Air Force Range.

Incompatible Forestry Practices

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Promote importance of bird viability in management decisions on public lands where silvicultural management is in conflict with maintaining viable populations of imperiled grassland and scrub birds.	M	L	L

Incompatible Resource Extraction: Mining/Drilling

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
H	Encourage preservation of large contiguous patches of scrub and other sensitive upland habitats in lieu of current practice of protecting habitat piecemeal.	H	H	H
M	Create voluntary incentives to avoid loss of, and impacts to, SHCAs and sensitive habitats from mining, particularly wet and dry prairie, scrub, and bat caves.	H	M	H

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop a coalition of groups to identify local restoration projects where spoil material can be used.	M	L	L

Management of Nature – Stormwater/Wastewater Facilities

Overall Rank	Policy	Feasibility	Benefits	Cost
M	Promote the importance of scrub habitat and encourage placement of county or municipal water treatment facilities in other areas when imperiled species utilize proposed scrub sites.	M	M	L

Military Activities

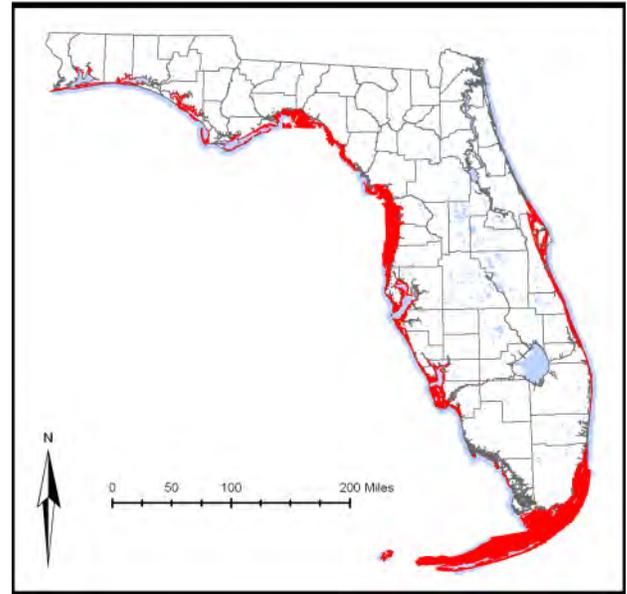
Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Establish a permanent consultative group of multi-agency wildlife and habitat professionals that work with USDOD on development of any statewide plans for base expansion, increased usage, and growth or closure needs to enhance positive, or minimize any negative impacts on wildlife and conservation lands.	M	H	M
Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
VH	Work to develop partnerships to encourage conservation of significant habitats on lands encompassed by federal/state base closures.	H	VH	VH
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Support a collaborative effort among the USFWS, Avon Park Air Force Range, Archbold Biological Station, and the FWC to develop and implement a mitigation and management plan to accommodate military needs and maintain habitat and species viability.	VH	M	VH
M	Create a cooperative program to ensure consistent implementation of management plans on USDOD lands with sufficient capacity for conservation management of wildlife and habitats on military lands in Florida (e.g., prescribed fire, invasive species control, monitoring).	M	M	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
M	Work to develop partnerships to encourage implementation of comprehensive management and mitigation plans that protect high quality habitats and natural resources.	H	M	M

Seagrass



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 2,419,458 acres (979,120 ha) of seagrass beds exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Algal Bed, Seagrass Bed, Composite Substrate

Seagrasses are marine flowering plants adapted to grow and reproduce in the underwater environment. Florida estuaries and nearshore coastal waters contain the nation's largest seagrass resources (more than two-million acres), as well as its two most extensive, contiguous seagrass beds (i.e., Florida Bay and the Big Bend region). Factors that affect the establishment and growth of seagrass include light availability, water temperature, salinity, sediment composition, nutrient levels, wave energy, and tidal range. Seagrass most often occurs in areas of low to moderate current velocities where the water is clear; thereby allowing sunlight to penetrate to the leaf blades. Seagrass communities are highly productive, faunally rich, and ecologically important systems. Hundreds to thousands of species of flora and fauna may inhabit seagrass habitats utilizing food, substrate, and shelter provided by the plants. Seagrasses also stabilize sediments and help maintain water clarity.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Aythya affinis* Lesser Scaup
- *Gavia immer* Common Loon
- *Podiceps auritus* Horned Grebe
- *Mycteria americana* Wood Stork
- *Pelecanus occidentalis* Brown Pelican
- *Ardea herodias occidentalis* Great White Heron
- *Egretta tricolor* Tricolored Heron
- *Egretta rufescens* Reddish Egret
- *Platalea ajaja* Roseate Spoonbill
- *Haliaeetus leucocephalus* Bald Eagle
- *Numenius phaeopus* Whimbrel
- *Onychoprion fuscatus* Sooty Tern
- *Sternula antillarum* Least Tern
- *Gelochelidon nilotica* Gull-billed Tern
- *Hydroprogne caspia* Caspian Tern
- *Sterna dougallii* Roseate Tern
- *Thalasseus maximus* Royal Tern
- *Thalasseus sandvicensis* Sandwich Tern
- *Rynchops niger* Black Skimmer

Reptiles

- *Crocodylus acutus* American Crocodile
- *Nerodia clarkii compressicauda* Mangrove Saltmarsh Watersnake
- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Acipenser brevirostrum* Shortnose Sturgeon
- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Menidia conchorum* Key Silverside
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Carcharhinus plumbeus* Sandbar Shark
- *Galeocerdo cuvier* Tiger Shark
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Agonostomus monticola* Mountain Mullet
- *Ctenogobius stigmaturus* Spottail Goby
- *Epinephelus itajara* Goliath Grouper
- *Lutjanus mahogoni* Mahogany Snapper
- *Microphis brachyurus* Opossum Pipefish
- *Syngnathus fuscus* Northern Pipefish

Invertebrates

- *Bartholomea annulata* Ringed (Curlique Or Corkscrew) Anemone

- *Condylactis gigantea* Giant Caribbean Anemone
- *Epicystis crucifer* Beaded (Rock) Anemone
- *Stichodactyla helianthus* Sun (Carpet) Anemone
- *Diploria clivosa* Knobby Brain Coral
- *Manicina areolata* Rose Coral
- *Solenastrea hyades* Knobby Star Coral
- *Panopea bitruncata* Atlantic Geoduck
- *Calliostoma adaelae* Keys Topsnail
- *Lithopoma americanum* American Starsnail
- *Cassis tuberosa* King Helmet
- *Cypraea cervus* Atlantic Deer Cowrie
- *Cymatium femorale* Angular Triton
- *Strombus gallus* Roostertail Conch
- *Strombus gigas* Queen Conch
- *Elysia clarki* Lettuce Sea Slug
- *Elysia picta* Painted Elysia
- *Octopus burryi* Brownstripe Octopus
- *Octopus joubini* Atlantic Pygmy Octopus
- *Lysmata wurdemanni* Peppermint Shrimp
- *Oreaster reticulatus* Cushion Star, Bahama Star
- *Diadema antillarum* Long-spined Urchin
- *Lytechinus williamsi* Jewel Urchin
- *Clypeaster rosaceus* West Indian Sea Biscuit
- *Duasmmodactyla seguroensis* A Sea Cucumber
- *Ocnus suspectus* A Sea Cucumber
- *Neothyonidium parvum* A Sea Cucumber
- *Euthyonidiella destichada* A Sea Cucumber
- *Actinopyga agassizii* Five-toothed Sea Cucumber, West Indian Sea Cucumber
- *Holothuria mexicana* Donkey Dung Sea Cucumber

Conservation Threats

The most serious threat to Florida's seagrass habitats is reduced water quality from anthropogenic nutrient loading and sometimes sediments. Non-point source pollution (e.g., stormwater run-off) is the most significant source. Other important human related threats are:

- Boat groundings and propeller scarring
- Boat wakes
- Coastal construction (including dock construction and seagrass shading from docks)
- Dredging and filling activities
- Hydrological modifications to estuarine systems that disrupt natural salinity patterns

Natural sources of seagrass loss (e.g., pathogens and large storms) are much smaller threats than human activities. Threats to Seagrass habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Boating impacts
- Channel modification/shipping lanes

- Chemicals and toxins
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible fishing pressure
- Incompatible industrial operations
- Incompatible recreational activities
- Industrial spills
- Invasive animals
- Invasive plants
- Key predator/herbivore loss
- Management of nature (beach nourishment and impoundments)
- Nutrient loads–urban
- Roads, bridges and causeways
- Shoreline hardening
- Surface water and groundwater withdrawal
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered water quality–physical, chemistry	Very High
B	Habitat destruction	Very High
C	Altered species composition	Very High
D	Sedimentation	Very High
E	Altered water quality–contaminants	High
F	Altered water quality–nutrients	High
G	Altered structure	High
H	Erosion	High
I	Altered hydrologic regime	High
J	Altered primary productivity	High
K	Habitat fragmentation	Medium
L	Habitat disturbance	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Coastal development	Very High	A, B, C, D, E, F, G, H, I, K
2	Harmful algal blooms	Very High	A, B, C, F, J
3	Inadequate stormwater management	Very High	A, B, C, D, E, F, H, J
4	Channel modification/shipping lanes	Very High	A, B, D, G, H, I, J, K
5	Nutrient loads–all sources	High	A, B, C, D, F, G, J, K
6	Incompatible industrial operations	High	A, B, C, D, E, G, H, J, K
7	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, B, C, D, E, F, H, I, J
8	Climate variability	High	B, C, G, H, I, J

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
9	Surface water withdrawal	High	A, B, C, I, J
10	Invasive plants	High	B, C, F, G, J
11	Groundwater withdrawal	High	A, B, C, I, J
12	Roads, bridges and causeways	High	A, B, C, D, E, F, G, H, I, J, K
13	Shoreline hardening	High	A, B, C, E, F, H, J
14	Invasive animals	High	B, C
15	Incompatible fishing pressure	High	C, E, G
16	Destruction of longshore transport of sediments	High	A, C, D, F, H, J
17	Management of nature (beach nourishment, impoundments)	Medium	A, B, C, D, H, I, J, K
18	Boating impacts	Medium	A, B, C, D, E, F, G, H, J, K
19	Chemicals and toxins	Medium	A, B, C, J
20	Incompatible recreational activities	Medium	A, B, C, D, E, F, G, H
21	Key predator/herbivore losses	Medium	B, C, J
22	Incompatible aquarium trade	Medium	C
23	Utility corridors	Medium	B, G, K
24	Fishing gear impacts	Medium	B, C, G
25	Industrial spills	Medium	A, B, C, E, J
26	Incompatible aquaculture operations	Medium	A, B, C, D, F, G, H, J, K
27	Vessel impacts	Medium	B, E, G
28	Parasites/pathogens	Medium	C
29	Placement of artificial structure	Medium	B, C, D, G, J
30	Thermal pollution	Medium	B, K
31	Solid Waste	Low	B, G, J
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Seagrass that were also identified as statewide threats are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Outcomes identified for this habitat address increasing the understanding of recreational boaters to reduce the likelihood of impacts to sensitive habitats, especially damage to seagrass from propellers. Assessment of the effects of pathogens on seagrasses is also necessary to increase our understanding of the scope and severity of this threat.

Highest ranked actions identified for abating this source of stress focus on:

- Improving environmental and boating safety around Seagrass
- Reducing land-based nutrient input to coastal habitats
- Improving education on ecological importance and the impacts of damage to Seagrass

Additional actions included:

- Developing and implementing access plans and Seagrass management and restoration plans

The following actions, organized by action type were identified to abate this threat:

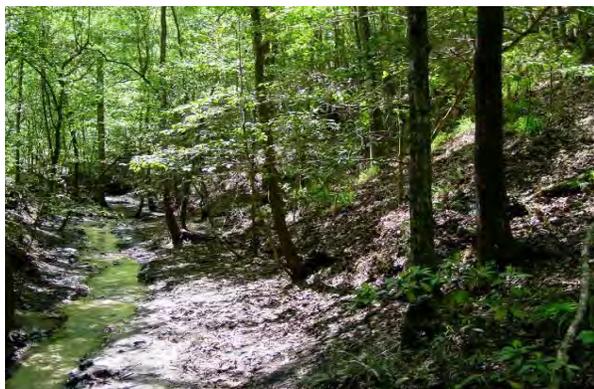
Incompatible Recreation including Boating

Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
VH	Promote understanding of environmental and boating regulations.	VH	H	VH
H	Improve understanding of and use of boating techniques that reduce the likelihood of propeller scars.	VH	M	VH
H	Assist in a multi-agency process in the identification and designation of no-motor zones in ecologically sensitive areas.	VH	M	H
M	Improve understanding of and compliance with existing regulations in sensitive fish and wildlife resource areas. Assist in the multi-agency development of management plans for those areas.	H	M	H
M	Investigate and analyze the potential of watercraft restricted areas based on environmental sensitivity and safety.	M	M	M
M	Develop and implement management/remediation activities based on synthesis of existing information on effects of use of and potential remediation of marine and estuarine habitats (see research).	M	M	M
L	Place mooring buoys at intensively used natural areas.	H	L	M
Overall Rank	Policy	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
L	Encourage multi-agency cooperation/collaboration to review and revise seagrass protection measures.	H	L	L
L	Promote knowledge of basic boat operation and navigation as a component of boat registration.	L	L	H
L	Raise awareness and understanding of impacts from propeller scarring.	L	M	M

Parasites/Pathogens

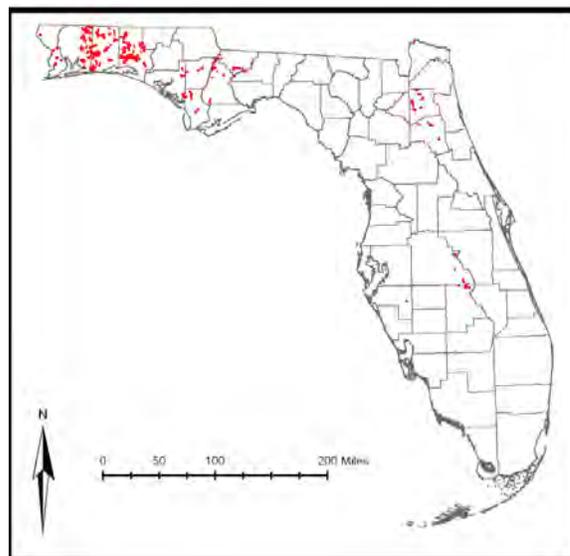
Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	<i>Cost</i>
H	Synthesize and consolidate understanding, and identification of gaps in understanding, of marine flora/fauna diseases, pathogens, biotoxins, including slime mold on seagrasses and oyster disease.	VH	M	L

Seepage/Steephead Stream



Status

Current condition: Good and declining. According to the best available GIS information at this time (see Appendix D: GIS Data Tables), 515 miles (2,639 km) of seepage/steephead stream exist.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Seepage Stream, Seepage Slope

This habitat includes seepage bogs and streams that typically have deep sand bottoms with slow, constant, percolated groundwater inflow of clear, cool, unpolluted water. Seepage/Steephead Streams are usually less than 40 feet (12 m) wide, shallow, often form the headwaters of many Alluvial and blackwater streams, and are biologically diverse. These streams are usually sheltered by a dense overstory and therefore have little to no aquatic vegetation. Green algae may occur intermittently within the stream, while mosses, ferns and liverworts can sometimes occur in clumps at the waters edge. Seepage/Steephead Streams are usually accompanied by seepage slopes. These slopes have acidic, low-nutrient soils which are constantly saturated with moisture flowing from upslope. Steephead streams are formed when drainage water begins to collect underground from a slope and flow outward to the surface. The resulting flow brings about an erosion of the slopes base, which forms a cut out in the underside of the hill. Seepage bogs exist in areas where the land gradually slopes to just above, or slightly intersects the water table. These bogs do not have regular standing water and are not as wet as swamps or marshes. Seepage bogs are dominated by low growing plant species, such as grasses and carnivorous plants, which occasionally must burn to remain healthy. Classic Florida examples are found in the Apalachicola drainage, but streams of this type also occur elsewhere in the state where there is topographic relief. This category includes seepage streams in ravines, and the hillside pitcher plant bogs found at the head of or along seepage streams on Eglin Air Force Base and Blackwater River State Forest.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |

Birds

- | | |
|-------------------------------|-----------------------|
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Catharus bicknelli</i> | Bicknell's Thrush |
| • <i>Parkesia motacilla</i> | Louisiana Waterthrush |

Amphibians

- | | |
|-------------------------------------|---------------------------------------|
| • <i>Hyla andersonii</i> | Pine Barrens Treefrog |
| • <i>Lithobates okaloosae</i> | Florida Bog Frog |
| • <i>Pseudacris ornata</i> | Ornate Chorus Frog |
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus apalachicola</i> | Apalachicola Dusky Salamander |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |
| • <i>Desmognathus cf. conanti</i> | Eglin Ravine Spotted Dusky Salamander |
| • <i>Desmognathus monticola</i> | Seal Salamander |
| • <i>Eurycea chamberlaini</i> | Chamberlain's Dwarf Salamander |
| • <i>Eurycea cf. quadridigitata</i> | Bog Dwarf Salamander |
| • <i>Hemidactylum scutatatum</i> | Four-toed Salamander |

Reptiles

- | | |
|--|---------------------|
| • <i>Plestiodon anthracinus pluvialis</i> | Southern Coal Skink |
| • <i>Agkistrodon contortrix contortrix</i> | Southern Copperhead |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Terrapene carolina</i> | Eastern Box Turtle |

Fish

- | | |
|---------------------------------|--------------------|
| • <i>Anguilla rostrata</i> | American Eel |
| • <i>Luxilus chrysocephalus</i> | Striped Shiner |
| • <i>Lythrurus atrapiculus</i> | Blacktip Shiner |
| • <i>Nocomis leptocephalus</i> | Bluehead Chub |
| • <i>Notropis baileyi</i> | Rough Shiner |
| • <i>Pteronotropis welaka</i> | Bluenose Shiner |
| • <i>Acantharchus pomotis</i> | Mud Sunfish |
| • <i>Etheostoma histrio</i> | Harlequin Darter |
| • <i>Etheostoma okaloosae</i> | Okaloosa Darter |
| • <i>Etheostoma olmstedii</i> | Tessellated Darter |
| • <i>Etheostoma parvipinne</i> | Goldstripe Darter |

Invertebrates

- *Ptychobranchnus jonesi* Southern Kidneyshell
- *Floridobia monroensis* Enterprise Siltsnail
- *Cambarus pyronotus* Fire-back Crayfish
- *Fallicambarus byersi* Lavender Burrowing Crayfish
- *Procambarus rogersi expletus* A Crayfish
- *Dipheter hageni* A Mayfly
- *Baetisca becki* A Mayfly
- *Dolania americana* American Sand-burrowing Mayfly
- *Gomphus westfalli* Westfall's Clubtail
- *Somatochlora calverti* Calvert, Calvert's Emerald
- *Somatochlora georgiana* Coppery Emerald
- *Somatochlora provocans* Treetop Emerald
- *Allocaonia starki* Slender Winter Stonefly
- *Leuctra ferruginea* A Stonefly
- *Leuctra triloba* A Stonefly
- *Amphinemura nigritta* A Stonefly
- *Acroneuria lycorias* A Stonefly
- *Eccoptura xanthenes* A Stonefly
- *Neoperla carlsoni* A Stonefly
- *Isogenoides varians* Rock Island Springfly
- *Heteroplectron americanum* A Caddisfly
- *Cheumatopsyche gordonae* Gordon's Little Sister Sedge Caddisfly
- *Cheumatopsyche petersi* Peters' Cheumatopsyche Caddisfly
- *Hydroptila apalachicola* Apalachicola Hydroptila Caddisfly
- *Hydroptila bribriae* Kriebel's Hydroptila Caddisfly
- *Hydroptila eglinensis* Saberlike Hydroptila Caddisfly
- *Hydroptila hamiltoni* Hamilton's Hydroptila Caddisfly
- *Orthotrichia curta* Short Orthotrichian Microcaddisfly
- *Oxyethira chrysocara* Gold Head Branch Caddisfly
- *Oxyethira elerobi* Elerob's Microcaddisfly
- *Oxyethira florida* Florida Cream And Brown Microcaddisfly
- *Oxyethira kelleyi* Kelly's Cream And Brown Mottled Microcaddisfly
- *Oxyethira novasota* Novasota Oxyethiran Microcaddisfly
- *Oxyethira pescadori* Pescador's Bottle-cased Caddisfly
- *Oxyethira setosa* Setose Cream And Brown Mottled Microcaddisfly
- *Lepidostoma griseum* A Caddisfly
- *Lepidostoma latipenne* A Caddisfly
- *Lepidostoma morsei* Morse's Little Plain Brown Sedge
- *Lepidostoma serratum* A Caddisfly
- *Nectopsyche paludicola* A Caddisfly
- *Oecetis daytona* Daytona Long-horned Caddisfly
- *Triaenodes bicornis* A Caddisfly
- *Triaenodes taenia* A Caddisfly
- *Psilotreta frontalis* A Caddisfly
- *Chimarra ferculata* A Caddisfly
- *Chimarra florida* Floridian Finger-net Caddisfly
- *Agrypnia vestita* Unbanded Agrypnia Caddisfly
- *Cernotina truncona* Florida Cernotinan Caddisfly
- *Nyctiophylax morsei* Morse's Dinky Light Summer Sedge
- *Polycentropus floridensis* Florida Brown Checkered Summer Sedge

- *Agarodes libalis* Spring-loving Psiloneuran Caddisfly
- *Agarodes logani* Logan's Agarodes Caddisfly
- *Agarodes ziczac* Zigzag Blackwater River Caddisfly
- *Amblyscirtes aesculapius* Lace-winged Roadside Skipper
- *Amblyscirtes hegon* Pepper and Salt Skipper
- *Amblyscirtes reversa* Reversed Roadside-skipper
- *Amblyscirtes vialis* Common Roadside-skipper
- *Autochton cellus* Golden-banded Skipper
- *Callophrys augustinus* Brown Elfin
- *Callophrys henrici* Henry's Elfin
- *Feniseca tarquinius* Harvester
- *Satyrrium kingi* King's Hairstreak
- *Satyrrium liparops floridensis* Sparkleberry Hairstreak
- *Proserpinus gaurae* Proud Sphinx

Conservation Threats

Threats to the Seepage/Steephead Stream habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to commercial/industrial development
- Conversion to housing and urban development
- Incompatible fire
- Invasive animals
- Incompatible forestry practices
- Incompatible resource extraction—mining/drilling
- Roads

Threats to this habitat are those common to most unprotected low-order of headwater stream systems in Florida and these threats include outright conversion to other land uses, especially housing, roads and commercial forests. Herbaceous seepage systems suffer from inadequate fire, often leading to succession of associated herbaceous communities to hardwood swamp wetlands. Additional threats specific to this habitat include the operation of dams or control structures on small steephead and seepage streams, especially in north Florida, where these systems have historically been utilized for small-scale water supplies or fishing impoundments.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered hydrologic regime	High
B	Altered community structure	Medium
C	Altered successional dynamics	Medium
D	Erosion/sedimentation	Medium
E	Habitat destruction or conversion	Medium
F	Altered species composition/dominance	Medium
G	Fragmentation of habitats, communities, ecosystems	Low
H	Altered water quality of surface water or aquifer: nutrients	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Invasive animals	Medium	A, D
2	Conversion to housing and urban development	Medium	A, D
3	Conversion to commercial and industrial development	Medium	A, D
4	Management of nature–water control structures	Medium	A, B
5	Roads	Medium	A, B, D
6	Incompatible resource extraction: mining/drilling	Medium	D
7	Incompatible fire	Medium	A, B, C
8	Incompatible forestry practices	Low	A, D
Statewide Threat Rank of Habitat		Medium	

Conservation Actions

Actions to abate the threats to Seepage/Steephead Stream that were also identified as statewide threats (invasive animals, conversion to housing and urban development, conversion to commercial/industrial development, roads, incompatible resource extraction: mining/drilling, incompatible fire, incompatible forestry practices) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Seepage/Steephead Stream and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Softwater Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to ensure that road crossings for these streams are designed to prevent creation of impoundments and reduce introduction of sediments, maintain natural riparian buffers in developing areas, raise awareness of the need for fire in these systems and reduce impacts caused by dams and water control structures through targeted restoration projects.

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage conservation of lake frontage, riparian habitats and their floodplains.	M	L	VH
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Support incentives program that encourages a buffer zone between new development and river, stream or floodplain edges, of a minimum distance (e.g., Farm Bill programs).	M	L	M

Management of Nature – Water Control Structures

Overall Rank	Economic and Other Incentives	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Review existing Farm Bill programs and explore options for enhancing economic benefits to landowners that improve or remove water control structures.	VH	L	L
Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	Cost
H	Encourage the development of partnerships to enhance wetland restoration projects on private lands that involve removing small, local water control structures.	VH	M	M
Overall Rank	Research	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Support research to identify the habitat needs and movement requirements of native aquatic species, inventory water control structures, and identify the extent to which particular existing water control structures negatively affect species ecology.	VH	L	M
L	Support research to investigate the cumulative impacts of small farm ponds on low-order streams in north Florida.	M	L	M

Roads

Overall Rank	Capacity Building	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Work with USFWS to improve coordination of the Technical Advisory Committee for the Stream Crossing Technical Center (SCTC).	VH	L	L
Overall Rank	Economic and Other Incentives	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Based on a stream crossing inventory and prioritization, develop funding opportunities for road stabilization projects in Florida counties.	H	L	H
Overall Rank	Education and Awareness	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Provide training to road maintenance personnel on methods for minimizing sediment movement to water bodies.	M	L	L
Overall Rank	Land/Water/Species Management	<i>Feasibility</i>	<i>Benefits</i>	Cost
L	Fund the start-up and operation of the SCTC to promote recovery and conservation of aquatic ecosystems from interactions between unpaved road-stream crossings that result in sediment movement into streams.	H	L	M

Incompatible Fire

Overall Rank	Education and Awareness	<i>Feasibility</i>	<i>Benefits</i>	Cost
M	Develop and disseminate a focused education program for ranchers and plantation owners on the value of growing season burns and burning in wetlands. Review and improve existing agency outreach materials to address these issues.	H	M	L

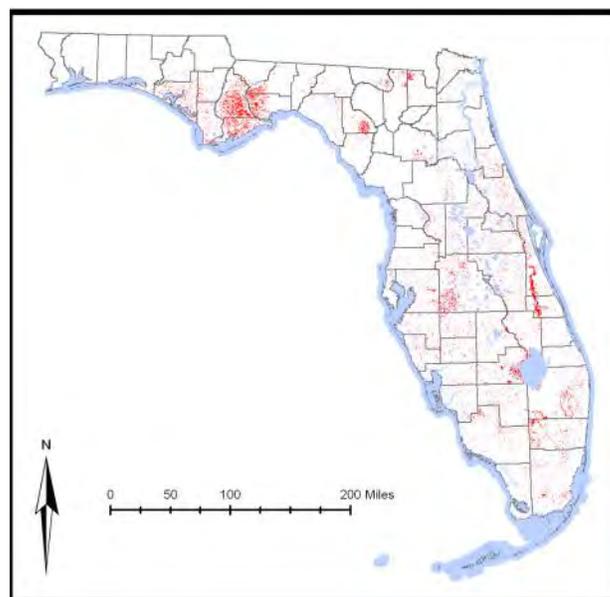
Shrub Swamp



Status

Current condition: Unknown.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 1,069,770 acres (432,921 ha) of Shrub Swamp habitat exist, of which 49% (521,957 ac; 211,229ha) are in existing conservation or managed areas. Another 7% (74,135 ac; 30,001 ha) are Florida Forever projects and 8% (88,325 ac; 35,744 ha) are SHCA-identified lands. The remaining 36% (385,353 ac; 155,947ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

Shrub Swamps are wetland communities dominated by dense, low-growing, woody shrubs or small trees. Shrub Swamps are usually characteristic of wetland areas that are experiencing environmental change, and are early to mid-successional in species complement and structure. These changes are a result of natural or man-induced perturbations due to increased or decreased hydroperiod, fire, clear cutting or land clearing, and siltation.

Shrub Swamps statewide may be dominated by one species, such as willow, or an array of opportunistic plants may form a dense, low canopy. Common species include willow, wax myrtle, primrose willow, buttonbush, and saplings of red maple, sweetbay, black gum, and other hydric tree species indicative of wooded wetlands. In northern Florida, some Shrub Swamps are a fire-maintained subclimax of Bay Swamps. These dense shrubby areas are dominated by black titi, swamp cyrilla, fetterbush, sweet pepperbush, doghobble, large gallberry, and myrtle-leaf holly.

Associated Species of Greatest Conservation Need

Mammals

- *Corynorhinus rafinesquii* Rafinesque's Big-eared Bat
- *Lontra canadensis lataxina* River Otter
- *Puma concolor coryi* Florida Panther
- *Ursus americanus floridanus* Florida Black Bear

Birds

- *Anas fulvigula* Mottled Duck
- *Ixobrychus exilis* Least Bittern
- *Egretta thula* Snowy Egret
- *Egretta caerulea* Little Blue Heron
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Rostrhamus sociabilis* Snail Kite
- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Protonotaria citrea* Prothonotary Warbler
- *Limnothlypis swainsonii* Swainson's Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga discolor discolor* Prairie Warbler
- *Cardellina canadensis* Canada Warbler
- *Euphagus carolinus* Rusty Blackbird

Amphibians

- *Hyla andersonii* Pine Barrens Treefrog
- *Lithobates okaloosae* Florida Bog Frog
- *Lithobates virgatipes* Carpenter Frog
- *Ambystoma tigrinum* Eastern Tiger Salamander
- *Pseudobranchius striatus striatus* Broad-striped Dwarf Siren
- *Stereochilus marginatus* Many-lined Salamander

Reptiles

- *Alligator mississippiensis* American Alligator
- *Anolis carolinensis seminolus* Southern Green Anole
- *Plestiodon anthracinus pluvialis* Southern Coal Skink
- *Crotalus horridus* Timber Rattlesnake
- *Drymarchon couperi* Eastern Indigo Snake
- *Lampropeltis getula* Eastern Kingsnake
- *Clemmys guttata* Spotted Turtle
- *Terrapene carolina* Eastern Box Turtle

Fish

- *Anguilla rostrata* American Eel
- *Enneacanthus chaetodon* Black Banded Sunfish

Invertebrates

- *Procambarus apalachicola* A Crayfish

• <i>Procambarus capillatus</i>	A Crayfish
• <i>Procambarus escambiensis</i>	A Crayfish
• <i>Procambarus latipleurum</i>	A Crayfish
• <i>Procambarus rogersi rogersi</i>	A Crayfish
• <i>Amblyscirtes reversa</i>	Reversed Roadside-skipper
• <i>Poanes viator zizaniae</i>	Broad-winged Skipper
• <i>Poanes yehl</i>	Yehl Skipper
• <i>Satyrium kingi</i>	King's Hairstreak
• <i>Satyrium liparops floridensis</i>	Sparkleberry Hairstreak

Conservation Threats

Because of serious problems interpreting this habitat in the workshops, threats could not be clearly identified and hence no specific conservation actions were developed by The Nature Conservancy's process (FWC 2005). Spatial extent of this habitat has increased significantly from its likely natural distribution through hydrologic alteration and fire exclusion in adjacent wetland habitats. When experts examined the distribution of this cover type, they suggested that some of the Shrub Swamp habitat, especially in north Florida, consists of heavily degraded wet flatwoods that have become dominated by willow and titi. Most of this Shrub Swamp habitat was once savanna, wet prairie, or pine flatwoods in north and central Florida. In south and central Florida a substantial amount of Shrub Swamp is associated with the freshwater marsh/wet prairie habitat where fire has been excluded. Nevertheless, Shrub Swamp is habitat for species like bears, tree frogs, migratory birds, and salamanders. If the habitat is maintained as shrub swamp, those animals that are using it, can continue using it.

This habitat is not stressed by fragmentation or development, since most is in public ownership. However, this habitat will spread if similar or adjacent areas are drained and fire suppressed. The experts agreed that the spatial extent of this habitat should not be allowed to increase as a result of these factors. Additionally, fire and management are needed so that this habitat will not succeed into Bay Swamp. As a result, the experts recommend active management to decrease the area of this habitat and restore the more natural habitats that have been overgrown by shrubs in many areas.

The recommendation of the experts was to subsume this habitat under the habitats from which it has succeeded due to fire and hydrological changes. For these reasons, threats and actions are presented as bulleted lists with no prioritization.

The following stresses threaten this habitat:

- | | |
|---|---|
| • Altered community structure | • Altered species composition/dominance |
| • Altered fire regime - timing, frequency, intensity, extent | • Altered water quality of surface water or aquifer: contaminants |
| • Altered hydrologic regime - timing, duration, frequency, extent | • Altered water quality of surface water or aquifer: nutrients |
| • Altered soil structure and chemistry | |

The sources of stress, or threats, were used to generate conservation actions.

- Ground water withdrawal
- Incompatible fire
- Invasive animals
- Invasive plants
- Surface water withdrawal

Conservation Actions

Actions to abate threats to Shrub Swamp were designed to reduce the impacts to this habitat and increase the suitability to wildlife. Most threats were statewide (incompatible fire, invasive animals, invasive plants, and surface and groundwater withdrawal).

The actions to abate threats that were identified for Shrub Swamp habitat are below, though none were prioritized for implementation.

Capacity Building

- Form and facilitate partnerships, alliances and networks of organizations willing to research, conserve and manage this habitat

Land/Water/Species Management

- Convert invasive-dominated sites into early-successional habitat, and maintain

Research, Education and Awareness

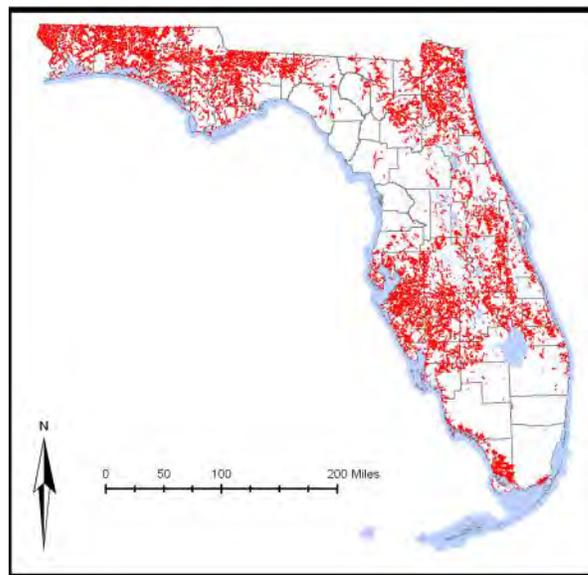
- Target education for homeowners, developers, construction contractors, and policy makers to benefit wildlife in their day-to-day activities
- Research plans for restoration of this habitat and its hydrology
- Better define and map current condition, and develop management practices to achieve the future condition of this habitat

Softwater Stream



Status

Current condition: Variable by size. Large Softwater Streams were considered good and declining, but small Softwater Streams were judged poor and declining. According to the best available GIS information at this time (See Appendix C: GIS Data Tables), 19,401 miles (31,223 km) Softwater Stream habitat exists.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Blackwater Stream

Typical Softwater Streams originate from sandy flats containing broad wetlands which collect rainfall and slowly release water into the stream. This habitat category has water with low pH, low carbonate, that may be stained by tannins and humic acids filtered from the drainage of swamps and marshes. The flow rate is usually gentle in smaller streams to moderate in larger, but is altogether influenced by seasonal local rainfall. These streams typically have sand or silt bottoms with varying amounts of aquatic vegetation. Plants include golden club, smartweed, sedges, and grasses. Softwater Streams differ from Alluvial Streams by having high, steep banks, and by lacking extensive floodplains and natural levees. This habitat is well distributed throughout Florida, except in the regions of north and central Florida dominated by Calcareous Streams, and in the Everglades/Big Cypress region of south Florida, where wetlands and coastal streams dominate the aquatic landscape. Most of the streams in this category are small natural streams originating in pinelands or swamps or small natural segments of otherwise channelized streams in south central Florida. Smaller Softwater Streams examples include Big Coldwater Creek, Pine Barren Creek, Big Escambia Creek, Big Sweetwater Creek. Large Softwater Stream examples include the Blackwater, Wacassassa, Yellow, Perdido, Econfinia, Aucilla, Sopchoppy, St. Marys, or Ochlockonee rivers.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |

Birds

- | | |
|-----------------------------------|-----------------------|
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Butorides virescens</i> | Green Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| • <i>Aramus guarauna</i> | Limpkin |
| • <i>Parkesia motacilla</i> | Louisiana Waterthrush |

Amphibians

- | | |
|-----------------------------------|---------------------------|
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |

Reptiles

- | | |
|-------------------------------------|------------------------------|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Nerodia cyclopion</i> | Mississippi Green Watersnake |
| • <i>Seminatrix pygaea cyclas</i> | Southern Florida Swampsnake |
| • <i>Apalone mutica calvata</i> | Gulf Coast Smooth Softshell |
| • <i>Apalone spinifera aspera</i> | Gulf Coast Spiny Softshell |
| • <i>Clemmys guttata</i> | Spotted Turtle |
| • <i>Graptemys barbouri</i> | Barbour's Map Turtle |
| • <i>Graptemys ernsti</i> | Escambia Map Turtle |
| • <i>Macrochelys temminckii</i> | Alligator Snapping Turtle |
| • <i>Pseudemys suwanniensis</i> | Suwannee Cooter |

Fish

- | | |
|--|-------------------------|
| • <i>Acipenser brevirostrum</i> | Shortnose Sturgeon |
| • <i>Acipenser oxyrinchus desotoi</i> | Gulf of Mexico Sturgeon |
| • <i>Acipenser oxyrinchus oxyrinchus</i> | Atlantic Sturgeon |
| • <i>Anguilla rostrata</i> | American Eel |
| • <i>Alosa aestivalis</i> | Blueback Herring |
| • <i>Alosa alabamae</i> | Alabama Shad |
| • <i>Hybognathus hayi</i> | Cypress Minnow |

- *Luxilus chrysocephalus* Striped Shiner
- *Luxilus zonistius* Bandfin Shiner
- *Lythrurus atrapiculus* Blacktip Shiner
- *Macrhybopsis* n. sp. cf. *aestivalis* Florida Chub/Speckled Chub
- *Moxostoma* n. sp. cf. *poecilurum* Grayfin Redhorse
- *Nocomis leptcephalus* Bluehead Chub
- *Notropis baileyi* Rough Shiner
- *Notropis harperi* Redeye Chub
- *Pteronotropis welaka* Bluenose Shiner
- *Cyprinodon variegatus hubbsi* Lake Eustis Pupfish
- *Fundulus blairae* Lowland Topminnow
- *Umbra pygmaea* Eastern Mudminnow
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Awaous banana* River Goby
- *Acantharchus pomotis* Mud Sunfish
- *Enneacanthus chaetodon* Black Banded Sunfish
- *Etheostoma histrio* Harlequin Darter
- *Etheostoma okaloosae* Okaloosa Darter
- *Etheostoma olmstedi* Tessellated Darter
- *Etheostoma parvipinne* Goldstripe Darter
- *Etheostoma proeliare* Cypress Darter
- *Micropterus cataractae* Shoal Bass
- *Micropterus notius* Suwannee Bass
- *Percina austroperca* Southern Logperch
- *Percina vigil* Saddleback Darter
- *Ameiurus serracanthus* Spotted Bullhead

Invertebrates

- *Alasmidonta wrightiana* Ochlockonee Arcmussel
- *Anodontooides radiatus* Rayed Creekshell
- *Elliptio arctata* Delicate Spike
- *Elliptio chipolaensis* Chipola Slabshell
- *Elliptio mcMichaeli* Fluted Elephant-ear
- *Elliptioideus sloatianus* Purple Bankclimber
- *Fusconaia burkei* Tapered Pigtoe
- *Fusconaia escambia* Narrow Pigtoe
- *Fusconaia rotulata* Round Ebonyshell
- *Hamiota subangulata* Shiny-rayed Pocketbook
- *Lampsilis floridensis* Yellow Sandshell
- *Lampsilis ornata* Southern Pocketbook
- *Medionidus simpsonianus* Ochlockonee Moccasinshell
- *Medionidus walkeri* Suwannee Moccasinshell
- *Megaloniaias nervosa* Washboard
- *Pleurobema pyriforme* Oval Pigtoe
- *Pleurobema strodeanum* Fuzzy Pigtoe
- *Ptychobranchnus jonesi* Southern Kidneyshell
- *Quadrula infucata* Sculptured Pigtoe
- *Quadrula kleiniana* Suwannee Pigtoe
- *Utterbackia peninsularis* Peninsular Floater
- *Villosa choctawensis* Choctaw Bean
- *Villosa villosa* Downy Rainbow

• <i>Elimia albanyensis</i>	Black-crested Elimia Snail
• <i>Elimia clenchi</i>	Clench's Goniobasis
• <i>Floridobia fraterna</i>	Creek Siltsnail
• <i>Cambarus miltus</i>	Rusty Grave Digger
• <i>Procambarus latipleurum</i>	A Crayfish
• <i>Procambarus pictus</i>	Black Creek Crayfish
• <i>Procambarus youngi</i>	Florida Longbeak Crayfish
• <i>Procloeon rubropictum</i>	A Mayfly
• <i>Procloeon rufostrigatum</i>	A Mayfly
• <i>Baetisca becki</i>	A Mayfly
• <i>Baetisca escambiensis</i>	A Mayfly
• <i>Baetisca gibbera</i>	A Mayfly
• <i>Baetisca obesa</i>	A Mayfly
• <i>Baetisca rogersi</i>	A Mayfly
• <i>Dolania americana</i>	American Sand-burrowing Mayfly
• <i>Sparbarus nasutus</i>	A Mayfly
• <i>Attenella attenuata</i>	Hirsute Mayfly
• <i>Dannella simplex</i>	A Mayfly
• <i>Hexagenia bilineata</i>	A Mayfly
• <i>Heptagenia flavescens</i>	A Mayfly
• <i>Macdunnoa brunnea</i>	A Mayfly
• <i>Pseudiron centralis</i>	White Sand-river Mayfly
• <i>Asioplax dolani</i>	A Mayfly
• <i>Siphloplecton brunneum</i>	A Mayfly
• <i>Siphloplecton fuscum</i>	A Mayfly
• <i>Siphloplecton simile</i>	A Mayfly
• <i>Homoeoneuria dolani</i>	Blue Sand-river Mayfly
• <i>Isonychia bernerii</i>	A Mayfly
• <i>Isonychia sicca</i>	A Mayfly
• <i>Hetaerina americana</i>	American Rubyspot
• <i>Neurocordulia molesta</i>	Smoky Shadowfly
• <i>Neurocordulia obsoleta</i>	Umber Shadowfly
• <i>Macromia alleghaniensis</i>	Allegheny River Cruiser
• <i>Allocaenia starki</i>	Slender Winter Stonefly
• <i>Alloperla prognoides</i>	A Stonefly
• <i>Leuctra cottaquilla</i>	A Stonefly
• <i>Leuctra ferruginea</i>	A Stonefly
• <i>Amphinemura nigritta</i>	A Stonefly
• <i>Tallaperla cornelia</i>	Southeastern Roachfly
• <i>Acroneuria evoluta</i>	A Stonefly
• <i>Acroneuria lycorias</i>	A Stonefly
• <i>Agneta annulipes</i>	A Stonefly
• <i>Neoperla carlsoni</i>	A Stonefly
• <i>Perlinella zwicki</i>	A Stonefly
• <i>Helopicus bogaloosa</i>	A Stonefly
• <i>Helopicus subvarians</i>	A Stonefly
• <i>Hydroperla phormidia</i>	A Stonefly
• <i>Isogenoides varians</i>	Rock Island Springfly
• <i>Pteronarcys dorsata</i>	A Stonefly
• <i>Taeniopteryx burksi</i>	Eastern Willowfly
• <i>Taeniopteryx lonicera</i>	A Stonefly
• <i>Cicindela blanda</i>	Sandbar Tiger Beetle
• <i>Cicindela hirticollis</i>	Hairy-necked Tiger Beetle

• <i>Cicindela waplery</i>	White-sand Tiger Beetle
• <i>Cheumatopsyche gordonae</i>	Gordon's Little Sister Sedge Caddisfly
• <i>Cheumatopsyche petersi</i>	Peters' Cheumatopsyche Caddisfly
• <i>Hydropsyche alabama</i>	A Caddisfly
• <i>Hydroptila alabama</i>	A Caddisfly
• <i>Hydroptila berneri</i>	Berner's Microcaddisfly
• <i>Hydroptila bribriae</i>	Kriebel's Hydroptila Caddisfly
• <i>Hydroptila molsonae</i>	Molson's Microcaddisfly
• <i>Hydroptila wakulla</i>	Wakulla Springs Vari-colored Microcaddisfly
• <i>Orthotrichia curta</i>	Short Orthotrichian Microcaddisfly
• <i>Orthotrichia dentata</i>	Dentate Orthotrichian Microcaddisfly
• <i>Orthotrichia instabilis</i>	Changeable Orthotrichian Microcaddisfly
• <i>Ochrotrichia provosti</i>	Provost's Somber Caddisfly
• <i>Oxyethira elerobi</i>	Elerob's Microcaddisfly
• <i>Oxyethira florida</i>	Florida Cream And Brown Microcaddisfly
• <i>Oxyethira kelleyi</i>	Kelly's Cream And Brown Mottled Microcaddisfly
• <i>Oxyethira novasota</i>	Novasota Oxyethiran Microcaddisfly
• <i>Oxyethira pescadori</i>	Pescador's Bottle-cased Caddisfly
• <i>Lepidostoma griseum</i>	A Caddisfly
• <i>Lepidostoma morsei</i>	Morse's Little Plain Brown Sedge
• <i>Nectopsyche paludicola</i>	A Caddisfly
• <i>Nectopsyche tavana</i>	Tavares White Miller Caddisfly
• <i>Oecetis daytona</i>	Daytona Long-horned Caddisfly
• <i>Oecetis morsei</i>	Morse's Long-horn Sedge
• <i>Triaenodes bicornis</i>	A Caddisfly
• <i>Triaenodes dendyi</i>	A Caddisfly
• <i>Triaenodes furcellus</i>	Little-fork Triaenode Caddisfly
• <i>Triaenodes lagarto</i>	A Caddisfly
• <i>Triaenodes tridonta</i>	A Caddisfly
• <i>Chimarra falcata</i>	A Caddisfly
• <i>Chimarra florida</i>	Floridian Finger-net Caddisfly
• <i>Agrypnia vestita</i>	Unbanded Agrypnia Caddisfly
• <i>Cernotina truncona</i>	Florida Cernotinan Caddisfly
• <i>Nyctiophylax morsei</i>	Morse's Dinky Light Summer Sedge
• <i>Polycentropus floridensis</i>	Florida Brown Checkered Summer Sedge
• <i>Agarodes libalis</i>	Spring-loving Psiloneuran Caddisfly
• <i>Agarodes ziczac</i>	Zigzag Blackwater River Caddisfly

Conservation Threats

Threats to the Softwater Stream habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Conversion to agriculture
- Conversion to commercial/industrial development
- Conversion to housing and urban development
- Groundwater withdrawal
- Incompatible recreational activities
- Incompatible forestry practices
- Incompatible resource extraction—mining/drilling
- Invasive animals

- Invasive plants
- Nutrient loads–agriculture
- Nutrient loads–urban
- Roads
- Surface water withdrawal and diversion

Softwater Streams, commonly known as “blackwater streams,” are among the most ubiquitous stream habitats in Florida and the Southeast. As such, they are subject to a wide variety of threats, many of them serious and statewide in scope. The majority of Softwater Streams are creeks and small rivers and are particularly vulnerable to conversion of riparian and floodplain areas to various forms of development. Softwater Streams are naturally low nutrient systems and are likewise vulnerable to even modest increases in nutrient loading. Fragmentation of this habitat occurs as a result of riparian conversion, channelization and loss of connection with floodplain wetlands. Additional threats specific to this habitat include the effects of stream channelization, operation of dams or control structures on small to medium sized Softwater Streams statewide and the impacts of sedimentation caused by road crossings and boat wakes.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Fragmentation of habitats, communities, ecosystems	High
B	Altered hydrologic regime	High
C	Altered landscape mosaic or context	High
D	Erosion/sedimentation	High
E	Altered water quality of surface water or aquifer: nutrients	High
F	Altered community structure	Medium
G	Altered species composition/dominance	Medium
H	Altered water quality of surface water or aquifer: contaminants	Medium
I	Habitat destruction or conversion	Medium
J	Altered water salinity, pH, conductivity or other physical water quality characteristics	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Surface water withdrawal	High	A, B, C, F
2	Conversion to agriculture	High	A, C, F
3	Nutrient loads - agriculture	High	E
4	Roads	High	A, D, E, I
5	Conversion to housing and urban development	High	A, C, D, I
6	Dam operations	Medium	A, B
7	Nutrient loads – urban	Medium	E
8	Incompatible resource extraction: mining/drilling	Medium	D, I
9	Chemicals and toxins	Medium	H

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
10	Conversion to commercial and industrial development	Medium	D, I
11	Invasive animals	Medium	G
12	Invasive plants	Medium	G
13	Incompatible recreational activities	Low	D, I
14	Incompatible forestry practices	Low	B, D, I
15	Groundwater withdrawal	Low	B
16	Incompatible agricultural practices	Low	B, D
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Softwater Stream that were also identified as statewide threats (surface water withdrawal and diversion, conversion to agriculture, nutrient loads–agriculture, roads, conversion to housing and urban development, nutrient loads–urban, incompatible resource extraction: mining/drilling, chemicals and toxins, conversion to commercial/industrial development, invasive animals, invasive plants, incompatible recreational activities, incompatible forestry practices, groundwater withdrawal) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Softwater Stream and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Spring and Spring Run](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. Additional actions were developed to address threats specific to this habitat. These actions are intended to prevent harm to aquatic ecosystems by setting limits on the magnitude, duration and frequency of downstream water releases required to support aquatic habitat and remediating the damage to Softwater Streams caused by channelization, dams and phosphate mining through targeted restoration projects.

Surface Water Withdrawal

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
VH	Support funding of the Kissimmee River Restoration Headwaters Revitalization Projects, and assess the value of expansion to apply to SGCN.	VH	H	VH

Conversion to Agriculture

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Encourage incentives for maintenance and conversion of lands to agricultural uses that use less water and result in lower nutrient outputs into Florida's waters and wetlands and encourage market-based incentives to compensate private landowners for the environmental services they provide to the State through management that increases water storage and nutrient reduction.	M	M	H

Roads

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
M	Work with USFWS to improve coordination of the Technical Advisory Committee for the Stream Crossing Technical Center (SCTC).	VH	L	L
Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Based on a stream crossing inventory and prioritization, develop funding opportunities for road stabilization projects in Florida counties.	H	L	H
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
L	Provide training to road maintenance personnel on methods for minimizing sediment movement to water bodies.	M	L	L
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
L	Support the start-up and operation of the Stream Crossing Technical Center (SCTC) to promote recovery and conservation of aquatic ecosystems from interactions between unpaved road-stream crossings that result in sediment movement into streams.	H	L	M

Conversion to Housing and Urban Development

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
L	Encourage conservation of lake frontage, riparian habitats and their floodplains.	M	L	VH
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Support incentives program that encourages development of and use of a buffer zone between new development and river or floodplain edges, of a minimum distance (e.g., Farm Bill programs).	M	L	M

Dam Operations

Overall Rank	Capacity Building	Feasibility	Benefits	Cost
H	Coordinate interstate Action Plan actions to ensure that all fish and wildlife resources in all states are protected when changing dams operations in shared basins. (USFWS)	M	H	L
L	Coordinate multiagency review of USACE activities, including biological aspects (fish spawn guidelines, protection of fish and wildlife resources) of water control plans for interstate water projects, fish spawn guidelines, re-establishing natural seasonal fluctuation of flows.	H	L	M

Overall Rank	Research	Feasibility	Benefits	Cost
M	Fund research to investigate the cumulative impacts of small rural impoundments on fish and wildlife	M	M	M

Incompatible Resource Extraction: Mining/Drilling

Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Fund and create incentives for completing the reclamation of impaired stream systems identified in the Non-mandatory Land Reclamation Report for phosphate mining region.	H	M	H

Chemicals and Toxins

Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop management techniques and recommendations for private landowners that minimize runoff of chemicals and toxins into wetlands and aquatic systems.	H	L	M
Overall Rank	Research	Feasibility	Benefits	Cost
L	Conduct research defining appropriate sediment quality standards for the various aquatic and marine systems. Fund research defining the relationship between sediment contamination (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine systems.	M	L	H
L	Conduct research defining standards for persistent organic contaminants for the various aquatic and marine systems. Fund research defining the relationship between contamination from organics (individually and in chemical interactions) and key biological indicators of degradation in different aquatic and marine.	M	L	H

Invasive Plants

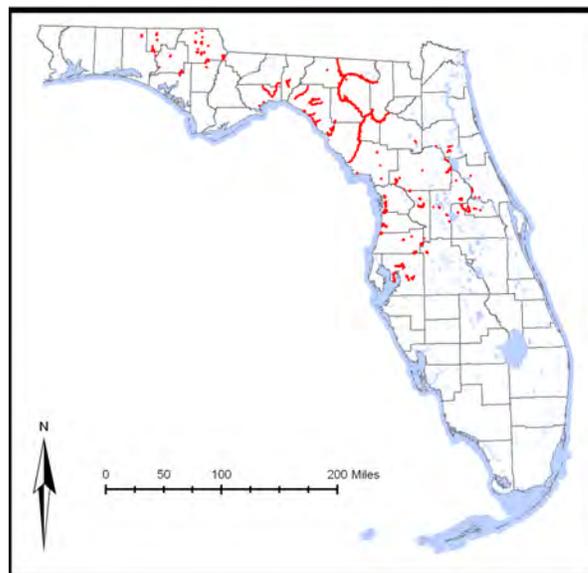
Overall Rank	Research	Feasibility	Benefits	Cost
M	Research methods for control of aquatic invasive species in flowing waters where current control methods for those species are only effective in non-flowing waters.	VH	L	M

Spring and Spring Run



Status

Current condition: Poor and declining. According to the best available GIS information at this time (Appendix C: GIS Data Tables), there are approximately 570 springs arising from the Floridian Aquifer, constituting a total spring- run length of about 572 miles (921 km).



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Spring-run Stream

This habitat is present in the north and central regions of Florida, in most of the same areas occupied by Calcareous Stream habitat, where underlying limestone is close to the surface. Spring and Spring Run often represent headwaters or low-order tributaries of, and thus share many characteristics with Calcareous Streams. The Spring and Spring Run originate from and have direct outflow as artesian openings in the underground, limestone, Floridan aquifer. Because of the calcareous nature of the limestone aquifer, the outflow from most springs carries dissolved mineral ions such as calcium, magnesium, bicarbonate, sulfate, and sodium. Springs typically have high water clarity, low sedimentation, stable channels, and openings that are less than 40 feet (12.2 m) wide. Individual springs are stable systems, with very little change in water temperature, water flow, or chemical composition, but those characteristics can vary from one spring to the next. The bottoms of spring runs are generally sand or exposed limestone along a central, stable channel. Vegetation in Spring and Spring Run consists of submerged aquatic vegetation, aquatic algae covering limestone outcroppings, and species such as tape grass, wild rice, and giant cutgrass located in the spring runs. The constant temperatures of springs provide essential habitat for manatees and some species of fish. Examples of Spring and Spring Run include Silver Springs, Manatee Springs, Spring Creek, Blue Spring, and Rainbow Springs.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|--|----------------------------|
| • <i>Corynorhinus rafinesquii</i> | Rafinesque's Big-eared Bat |
| • <i>Eptesicus fuscus</i> | Big Brown Bat |
| • <i>Lasiurus borealis borealis</i> | Red Bat |
| • <i>Lasiurus cinereus cinereus</i> | Hoary Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Myotis austroriparius</i> | Southeastern Myotis |
| • <i>Myotis grisescens</i> | Gray Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Tadarida brasiliensis cynocephala</i> | Brazilian Free-tailed Bat |
| • <i>Lontra canadensis lataxina</i> | River Otter |
| • <i>Neovison vison halilimnetes</i> | Gulf Salt Marsh Mink |
| • <i>Trichechus manatus latirostris</i> | West Indian Manatee |

Birds

- | | |
|-----------------------------------|----------------------------|
| • <i>Ixobrychus exilis</i> | Least Bittern |
| • <i>Ardea herodias</i> | Great Blue Heron |
| • <i>Ardea alba</i> | Great Egret |
| • <i>Egretta thula</i> | Snowy Egret |
| • <i>Egretta caerulea</i> | Little Blue Heron |
| • <i>Butorides virescens</i> | Green Heron |
| • <i>Nycticorax nycticorax</i> | Black-crowned Night-Heron |
| • <i>Nyctanassa violacea</i> | Yellow-crowned Night-Heron |
| • <i>Elanoides forficatus</i> | Swallow-tailed Kite |
| • <i>Ictinia mississippiensis</i> | Mississippi Kite |
| • <i>Aramus guarauna</i> | Limpkin |
| • <i>Protonotaria citrea</i> | Prothonotary Warbler |

Amphibians

- | | |
|-----------------------------------|---------------------------|
| • <i>Amphiuma pholeter</i> | One-toed Amphiuma |
| • <i>Desmognathus auriculatus</i> | Southern Dusky Salamander |

Reptiles

- | | |
|-------------------------------------|---|
| • <i>Alligator mississippiensis</i> | American Alligator |
| • <i>Farancia erythrogramma</i> | Rainbow Snake |
| • <i>Graptemys barbouri</i> | Barbour's Map Turtle |
| • <i>Macrochelys temminckii</i> | Alligator Snapping Turtle |
| • <i>Pseudemys nelsoni</i> | Florida Red-bellied Cooter (Panhandle Population) |
| • <i>Pseudemys suwanniensis</i> | Suwannee Cooter |

Fish

- | | |
|--|-------------------------|
| • <i>Acipenser brevirostrum</i> | Shortnose Sturgeon |
| • <i>Acipenser oxyrinchus desotoi</i> | Gulf of Mexico Sturgeon |
| • <i>Acipenser oxyrinchus oxyrinchus</i> | Atlantic Sturgeon |
| • <i>Anguilla rostrata</i> | American Eel |
| • <i>Alosa aestivalis</i> | Blueback Herring |
| • <i>Alosa alabamae</i> | Alabama Shad |
| • <i>Luxilus chrysocephalus</i> | Striped Shiner |

- *Luxilus zonistius*
- *Lythrurus atrapiculus*
- *Notropis harperi*
- *Cyprinodon variegatus hubbsi*
- *Atractosteus spatula*
- *Agonostomus monticola*
- *Awaous banana*
- *Acantharchus pomotis*
- *Enneacanthus chaetodon*
- *Etheostoma histrio*
- *Etheostoma okaloosae*
- *Etheostoma olmstedii*
- *Etheostoma parvipinne*
- *Micropterus cataractae*
- *Micropterus notius*
- *Percina vigil*
- *Ameiurus brunneus*
- *Ameiurus serracanthus*

- Bandfin Shiner
- Blacktip Shiner
- Redeye Chub
- Lake Eustis Pupfish
- Alligator Gar
- Mountain Mullet
- River Goby
- Mud Sunfish
- Black Banded Sunfish
- Harlequin Darter
- Okaloosa Darter
- Tessellated Darter
- Goldstripe Darter
- Shoal Bass
- Suwannee Bass
- Saddleback Darter
- Snail Bullhead
- Spotted Bullhead

Invertebrates

- *Elliptio chipolaensis*
- *Hamiota subangulata*
- *Medionidus acutissimus*
- *Medionidus penicillatus*
- *Medionidus walkeri*
- *Pleurobema pyriforme*
- *Ptychobranchus jonesi*
- *Quadrula infucata*
- *Quadrula kleiniana*
- *Villosa amygdala*
- *Villosa villosa*
- *Amnicola rhombostoma*
- *Aphaostracon asthenes*
- *Aphaostracon chalarogyrus*
- *Aphaostracon monas*
- *Aphaostracon pycnus*
- *Aphaostracon theiocrenetum*
- *Aphaostracon xynoelictum*
- *Dasyscias franzi*
- *Elimia albanyensis*
- *Elimia clenchi*
- *Floridobia alexander*
- *Floridobia helicogyra*
- *Floridobia leptospira*
- *Floridobia mica*
- *Floridobia monroensis*
- *Floridobia parva*
- *Floridobia petrifons*
- *Floridobia ponderosa*
- *Floridobia porterae*
- *Floridobia vanhyningi*
- *Floridobia wekiwae*

- Chipola Slabshell
- Shiny-rayed Pocketbook
- Alabama Moccasinshell
- Gulf Moccasinshell
- Suwannee Moccasinshell
- Oval Pigtoe
- Southern Kidneyshell
- Sculptured Pigtoe
- Suwannee Pigtoe
- Florida Rainbow
- Downy Rainbow
- Squaremouth Amnicola
- Blue Spring Hydrobe Snail
- Freemouth Hydrobe Snail
- Wekiwa Hydrobe, Wekiwa Springs Aphaostracon
- Dense Hydrobe Snail
- Clifton Springs Hydrobe Snail
- Fenney Springs Hydrobe Snail
- Shaggy Ghostsnail
- Black-crested Elimia Snail
- Clench's Goniobasis
- Alexander Spring Siltsnail
- Crystal Siltsnail
- Flatwood Siltsnail
- Ichetucknee Siltsnail
- Enterprise Siltsnail
- Pygmy Siltsnail
- Rock Springs Siltsnail
- Ponderous Spring Siltsnail
- Green Cove Spring Siltsnail
- Seminole Spring Siltsnail
- Wekiwa Siltsnail

• <i>Somatogyrus</i> sp.	Pebblesnail
• <i>Cambarellus schmitti</i>	A Crayfish
• <i>Procambarus youngi</i>	Florida Longbeak Crayfish
• <i>Macrobrachium acanthurus</i>	Cinnamon River Shrimp
• <i>Macrobrachium carcinus</i>	Big Claw River Shrimp
• <i>Macrobrachium ohione</i>	Ohio River Shrimp
• <i>Dipheter hageni</i>	A Mayfly
• <i>Caenis eglinensis</i>	Eglin Caenis Mayfly
• <i>Stenacron floridense</i>	A Mayfly
• <i>Cordulegaster obliqua fasciata</i>	Banded Spiketail
• <i>Cordulegaster sayi</i>	Say's Spiketail
• <i>Neurocordulia molesta</i>	Smoky Shadowfly
• <i>Dromogomphus armatus</i>	Southeastern Spinyleg
• <i>Gomphus geminatus</i>	Twin-striped Clubtail
• <i>Gomphus hodgesi</i>	Hodges' Clubtail
• <i>Gomphus hybridus</i>	Cocoa Clubtail
• <i>Gomphus modestus</i>	Gulf Coast Clubtail
• <i>Progomphus bellei</i>	Belle, Belle's Sanddragon
• <i>Macromia alleghaniensis</i>	Allegheny River Cruiser
• <i>Allocaonia starki</i>	Slender Winter Stonefly
• <i>Leuctra ferruginea</i>	A Stonefly
• <i>Leuctra triloba</i>	A Stonefly
• <i>Helopicus subvarians</i>	A Stonefly
• <i>Hydroperla phormidia</i>	A Stonefly
• <i>Isogenoides varians</i>	Rock Island Springfly
• <i>Spanglerogyrus albiventris</i>	Red Hills Unique Whirligig Beetle
• <i>Heteroplectron americanum</i>	A Caddisfly
• <i>Cheumatopsyche gordonae</i>	Gordon's Little Sister Sedge Caddisfly
• <i>Cheumatopsyche petersi</i>	Peters' Cheumatopsyche Caddisfly
• <i>Hydroptila apalachicola</i>	Apalachicola Hydroptila Caddisfly
• <i>Hydroptila berneri</i>	Berner's Microcaddisfly
• <i>Hydroptila bribriae</i>	Kriebel's Hydroptila Caddisfly
• <i>Hydroptila eglinensis</i>	Saberlike Hydroptila Caddisfly
• <i>Hydroptila hamiltoni</i>	Hamilton's Hydroptila Caddisfly
• <i>Hydroptila molsonae</i>	Molson's Microcaddisfly
• <i>Hydroptila okaloosa</i>	Rogue Creek Hydroptila Caddisfly
• <i>Hydroptila sarahae</i>	Sarah's Hydroptila Caddisfly
• <i>Hydroptila sykora</i>	Sykora's Hydroptila Caddisfly
• <i>Hydroptila wakulla</i>	Wakulla Springs Vari-colored Microcaddisfly
• <i>Neotrichia rasmussen</i>	Rasmussen's Neotrichia Caddisfly
• <i>Ochrotrichia apalachicola</i>	Apalachicola Ochrotrichian Caddisfly
• <i>Orthotrichia curta</i>	Short Orthotrichian Microcaddisfly
• <i>Orthotrichia dentata</i>	Dentate Orthotrichian Microcaddisfly
• <i>Ochrotrichia okaloosa</i>	Okaloosa Somber Microcaddisfly
• <i>Oxyethira chrysocara</i>	Gold Head Branch Caddisfly
• <i>Oxyethira elerobi</i>	Elerob's Microcaddisfly
• <i>Oxyethira florida</i>	Florida Cream And Brown Microcaddisfly
• <i>Oxyethira kelleyi</i>	Kelly's Cream And Brown Mottled Microcaddisfly
• <i>Oxyethira novasota</i>	Novasota Oxyethiran Microcaddisfly
• <i>Oxyethira pescadori</i>	Pescador's Bottle-cased Caddisfly
• <i>Oxyethira setosa</i>	Setose Cream And Brown Mottled Microcaddisfly
• <i>Lepidostoma morsei</i>	Morse's Little Plain Brown Sedge
• <i>Nectopsyche tavana</i>	Tavares White Miller Caddisfly

- *Oecetis daytona* Daytona Long-horned Caddisfly
- *Oecetis morsei* Morse's Long-horn Sedge
- *Oecetis parva* Little Oecetis Longhorned Caddisfly
- *Triadenodes furcellus* Little-fork Triadenode Caddisfly
- *Psilotreta frontalis* A Caddisfly
- *Chimarra florida* Floridian Finger-net Caddisfly
- *Cernotina truncona* Florida Cernotin Caddisfly
- *Nyctiophylax morsei* Morse's Dinky Light Summer Sedge
- *Polycentropus floridensis* Florida Brown Checkered Summer Sedge
- *Agarodes libalis* Spring-loving Psiloneuran Caddisfly
- *Agarodes ziczac* Zigzag Blackwater River Caddisfly

Conservation Threats

Threats to Spring and Spring Run habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Conversion to commercial/industrial development
- Conversion to recreation areas
- Groundwater withdrawal
- Incompatible forestry practices
- Incompatible recreational activities
- Invasive animals
- Invasive plants
- Nutrient loads–agriculture
- Nutrient loads–urban
- Surface water withdrawal/diversion

Nutrient loading of groundwater, perhaps in conjunction with other threats, has led to profound changes in the ecological functioning and composition of Spring and Spring Run similar to those resulting from eutrophication in lake and wetland systems. This eutrophication alters species composition and community structure, contributing to the productivity and population growth of algae and invasive plant and animal species. Increased withdrawal of groundwater in urbanizing areas of central and north Florida threatens to significantly alter the hydrology of these systems over the next five to ten years. Additional habitat-specific threats were identified, including decreased water input from recharge areas as both the impervious surface within springsheds and groundwater withdrawals increase and the presence of numerous invasive animals in the systems, especially fishes and freshwater snails, the effects of which are likely to be profound, but which are relatively less well studied than are those of invasive plants.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered species composition/dominance	Very High
B	Altered water quality of surface water or aquifer: nutrients	Very High
C	Altered community structure	High
D	Habitat destruction or conversion	High
E	Altered hydrologic regime	High
F	Erosion/sedimentation	Medium
G	Altered water quality of surface water or aquifer: contaminants	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Nutrient loads – urban	Very High	A, B, C, D
2	Invasive plants	Very High	A, C, D
3	Nutrient loads – agriculture	High	A, B, C, D
4	Invasive animals	High	A, C
5	Incompatible recreational activities	Medium	A, B, C, D, F
6	Surface water withdrawal	Medium	E
7	Groundwater withdrawal	Medium	C, D, E
8	Conversion to recreation areas	Low	A, C, D
9	Incompatible forestry practices	Low	C, D
10	Conversion to commercial and industrial development	Low	D
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Springs and Spring Run that were also identified as statewide threats (nutrient loads–urban, invasive plants, nutrient loads–agriculture, invasive animals, incompatible recreational activities, surface water diversion and withdrawal, groundwater withdrawal, conversion to recreation areas, incompatible forestry practices, conversion to commercial/industrial development) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat were only applicable to Spring and Spring Run and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Terrestrial Cave](#), and [Coastal Tidal River or Stream](#)) and are listed below. These actions were designed to prevent harm to stream ecosystems influenced by groundwater inflows by placing limits on the total permissible nutrient loads, to substantially increase the acreage of spring recharge lands protected from development, to ensure that development in unprotected springsheds is designed to maintain recharge functions, minimize groundwater withdrawals, reduce nutrient loading to groundwater and reduce recreational pressure on springs by limiting use to scientifically-based estimates of carrying capacity.

Nutrient Loads – Urban

Overall Rank	Research	Feasibility	Benefits	Cost
H	Monitor effects on groundwater ecosystems as well as biota where groundwater discharges to springs and other surface waters.	M	H	H

Invasive Plants

Overall Rank	Research	Feasibility	Benefits	Cost
M	Research methods for control of aquatic invasive species in flowing waters where current control methods for those species are only effective in non-flowing waters.	VH	L	M

Incompatible Recreational Activities

Overall Rank	Research	Feasibility	Benefits	Cost
H	Determine how variation in recreational carrying capacities affect wildlife and wildlife habitat in Spring and Spring Runs.	H	H	L

Groundwater Withdrawal

Overall Rank	Land/Water Protection	Feasibility	Benefits	Cost
VH	Support programs to conserve important natural habitats significant to watershed recharge and springs.	H	VH	VH
Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
H	Support implementation of recommendations of the Florida Springs Task Force in its report Florida's Springs: Strategies for Protection and Restoration, November 2000.	H	H	H
Overall Rank	Policy	Feasibility	Benefits	Cost
H	Explore options and alternative methods to protect submarine springs.	H	H	L

Subtidal Unconsolidated Marine/Estuary Sediment



Status

Current condition: Unknown.

Due to the lack of sufficient map data for this habitat category, no acreage estimates are currently available.

Habitat Description

FNAI type: Unconsolidated Substrate

This habitat consists of mineral based natural communities generally characterized as expansive, relatively open areas within subtidal, intertidal, and supratidal zones that are zero to less than 10 % colonized by seagrasses or corals. Substrates include coralgae, marl, mud, mud/sand, sand or shell. Types and distribution of unconsolidated sediments vary greatly throughout Florida and originate from parent sources, such as decaying plant tissues (e.g., mud) or from calcium carbonate depositions of plants or animals (e.g., coralgae, marl and shell substrates). While marl and coralgae substrates are primarily restricted to the southern portion of the state, unconsolidated sediments composed of mud, mud/sand, sand, and shell, are found throughout the coastal areas of Florida. This habitat category may support large populations of infaunal, transient planktonic and pelagic organisms (e.g., tube worms, sand dollars, mollusks, isopods, amphipods, burrowing shrimp, and an assortment of crabs). The intertidal and supratidal zones are important feeding areas for many shorebird and invertebrate species. Furthermore, infaunal organisms in subtidal zones can reach densities of the tens of thousands per meter square, making these areas important feeding grounds for many bottom feeding fish.

Associated Species of Greatest Conservation Need

Mammals

- *Trichechus manatus latirostris* West Indian Manatee

Birds

- *Ardea herodias* Great Blue Heron
- *Ardea alba* Great Egret
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Platalea ajaja* Roseate Spoonbill

Reptiles

- *Crocodylus acutus* American Crocodile
- *Nerodia clarkii clarkii* Gulf Saltmarsh Watersnake
- *Nerodia clarkii compressicauda* Mangrove Saltmarsh Watersnake
- *Seminatrix pygaea cyclas* Southern Florida Swampsnake
- *Caretta caretta* Loggerhead Sea Turtle
- *Chelonia mydas* Green Sea Turtle
- *Eretmochelys imbricata* Hawksbill Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Acipenser brevirostrum* Shortnose Sturgeon
- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon
- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Alopias superciliosus* Bigeye Thresher Shark
- *Carcharhinus obscurus* Dusky Shark
- *Carcharhinus perezii* Reef Shark
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Carcharodon carcharias* White Shark
- *Galeocerdo cuvier* Tiger Shark
- *Manta birostris* Giant Manta Ray
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Sphyrna lewini* Scalloped Hammerhead
- *Sphyrna mokarran* Great Hammerhead
- *Sphyrna zygaena* Smooth Hammerhead
- *Squalus acanthias* Cape Shark, Piked Dogfish, Spurdog
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Ctenogobius pseudofasciatus* Slashcheek Goby
- *Ctenogobius stigmaturus* Spottail Goby
- *Epinephelus drummondhayi* Speckled Hind
- *Epinephelus itajara* Goliath Grouper
- *Epinephelus nigritus* Warsaw Grouper

Invertebrates

- *Epicystis crucifer* Beaded (Rock) Anemone
- *Acropora cervicornis* Staghorn Coral

• <i>Manicina areolata</i>	Rose Coral
• <i>Solenastrea hyades</i>	Knobby Star Coral
• <i>Pseudobiceros splendidus</i>	Red-rim Flatworm, Splendid Flatworm
• <i>Crassostrea virginica</i>	Eastern Oyster
• <i>Panopea bitruncata</i>	Atlantic Geoduck
• <i>Calliostoma javanicum</i>	Chocolate-lined Topsnail
• <i>Lithopoma americanum</i>	American Starsnail
• <i>Cassis flammea</i>	Flame Helmet
• <i>Cassis tuberosa</i>	King Helmet
• <i>Cypraea cervus</i>	Atlantic Deer Cowrie
• <i>Charonia tritonis variegata</i>	Atlantic Trumpet Triton
• <i>Strombus gallus</i>	Roostertail Conch
• <i>Strombus gigas</i>	Queen Conch
• <i>Fasciolaria lilium</i>	Banded Tulip
• <i>Dolabrifera dolabrifera</i>	Warty Seacat
• <i>Cyerce cristallina</i>	Harlequin Glass-slug
• <i>Elysia clarki</i>	Lettuce Sea Slug
• <i>Elysia picta</i>	Painted Elysia
• <i>Octopus burryi</i>	Brownstripe Octopus
• <i>Octopus joubini</i>	Atlantic Pygmy Octopus
• <i>Luidia senegalensis</i>	Nine-armed Sea Star
• <i>Oreaster reticulatus</i>	Cushion Star, Bahama Star
• <i>Astropyga magnifica</i>	Magnificent Urchin
• <i>Diadema antillarum</i>	Long-spined Urchin
• <i>Clypeaster chesheri</i>	A Sea Biscuit
• <i>Clypeaster luetkeni</i>	A Sea Biscuit
• <i>Clypeaster rosaceus</i>	West Indian Sea Biscuit
• <i>Clypeaster subdepressus</i>	Sea Biscuit
• <i>Ocnus suspectus</i>	A Sea Cucumber
• <i>Havelockia inermis</i>	A Sea Cucumber
• <i>Neothyonidium parvum</i>	A Sea Cucumber
• <i>Euthyonidiella destichada</i>	A Sea Cucumber
• <i>Euthyonidiella trita</i>	A Sea Cucumber
• <i>Actinopyga agassizii</i>	Five-toothed Sea Cucumber, West Indian Sea Cucumber
• <i>Holothuria mexicana</i>	Donkey Dung Sea Cucumber
• <i>Holothuria parvula</i>	A Sea Cucumber

Conservation Threats

Threats to Subtidal Unconsolidated Marine/Estuary Sediment habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Incompatible industrial operations
- Incompatible recreational activities
- Invasive animals
- Management of nature (beach nourishment and impoundments)
- Nutrient loads–urban
- Roads, bridges and causeways
- Surface water and groundwater withdrawal

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered water quality–contaminants	High
B	Habitat disturbance	High
C	Altered species composition	Medium
D	Altered water quality–nutrients	Medium
E	Altered water quality–physical, chemistry	Medium
F	Habitat destruction	Medium
G	Altered hydrologic regime	Medium

The sources of stress, or threats, were used to generate conservation actions.

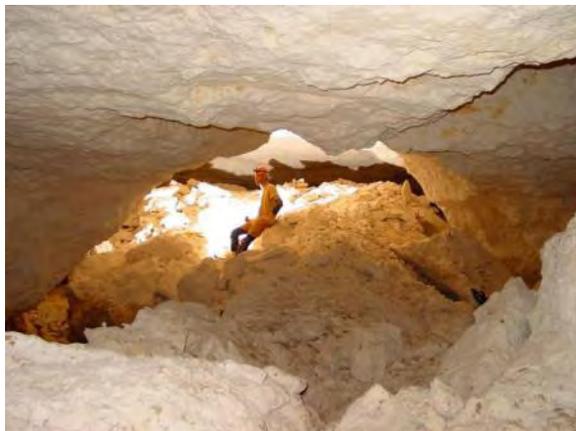
Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, B, D, E, G
2	Inadequate stormwater management	High	A, B, C, D, E, G
3	Coastal development	High	A, B, F, G
4	Chemicals and toxins	High	A, B, C
6	Incompatible industrial operations	High	A, F, G
7	Channel modification/shipping lanes	Medium	B, F, G
8	Fishing gear impacts	Medium	B, F
9	Incompatible recreational activities	Medium	B
10	Roads, bridges and causeways	Medium	B
11	Management of nature (beach nourishment, impoundments)	Medium	E
12	Boating impacts	Low	B
13	Nutrient loads	Low	C
14	Invasive animals	Low	B
15	Thermal pollution	Low	B, E
16	Solid waste	Low	B
17	Surface water withdrawal	Low	E
Statewide Threat Rank of Habitat		High	

Conservation Actions

Most threats to Subtidal Unconsolidated Marine/Estuary Sediment habitat were also identified as statewide threats (see list above). Actions to abate them are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Habitat-specific threats to Subtidal Unconsolidated Marine/Estuary Sediment are boating impacts, solid waste, and thermal pollution, which also affect

several other marine and estuarine habitats. Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Coastal Tidal River or Stream](#), [Mangrove Swamp](#), [Seagrass](#), [Subtidal Unconsolidated Marine/Estuary Sediment](#), [Tidal Flat](#)) and are not repeated here.

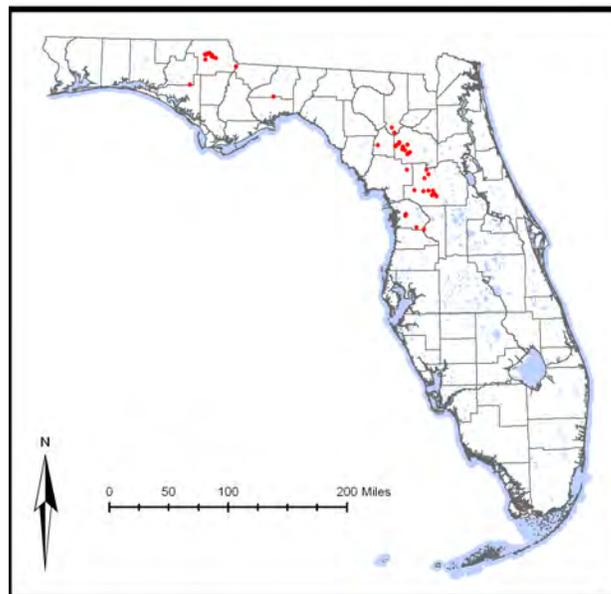
Terrestrial Cave



Status

Current condition: Poor and declining.

According to the best available GIS information at this time (see Appendix C: GIS Data Tables), several hundred Terrestrial Caves are likely to exist in Florida, although most have not been mapped. Of the Terrestrial Caves currently mapped, 19% (7) are in existing conservation or managed areas, 22% (8) are in private lands encompassed by Florida Forever project areas, and 11% (4) are in SCHA- identified lands, and the remaining 47% (17) occur in other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Terrestrial Cave

Terrestrial Caves are cavities below the surface of the ground that do not contain permanent standing water. However, some cave systems can contain both aquatic and terrestrial cave conditions with Terrestrial Cave conditions existing in fissures over standing water. Due to the rise and fall of water levels many terrestrial caves have alternately been aquatic caves. Terrestrial Caves are known to occur in at least 26 Florida counties and are limited to north and central Florida. Caves develop in areas of karst topography; water moves through underlying limestone and dissolves it and creates fissures and caverns. Caves have stable internal environments with temperature and humidity levels remaining fairly constant. In the twilight zones of caves, where some light is present, some plants may exist, although these are limited to mosses, liverworts, ferns, and algae. Beyond the twilight zone, no plants are found and the food chain is dependent on detritus and fecal matter entering the cave.

Associated Species of Greatest Conservation Need

Mammals

- *Myotis austroriparius* Southeastern Myotis
- *Myotis grisescens* Gray Bat
- *Perimyotis subflavus* Tricolored Bat

Invertebrate

- *Centromerus latidens* A Sheetweaver Spider
- *Islandiana* sp. 2 Marianna Cave Sheetweb Weaver Spider
- *Pseudosinella pecki* Peck's Cave Springtail

Conservation Threats

Threats to the Terrestrial Caves habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Incompatible recreational activities
- Incompatible resource extraction: mining/drilling

Threats specific to Terrestrial Cave also included mining activities causing destruction of habitat. Mining has been known to open up new cave habitat that was previously inaccessible to bats, but can also close off or destroy existing habitat. Habitat-specific incompatible recreation includes gating cave entrances and filling in cave openings to prevent trespass from unauthorized recreation. Caves support unique/irreplaceable species and those with very unique adaptations that may be sensitive to small increases in levels of contaminants, shifts in air temperature or food webs.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Habitat degradation/disturbance	High
B	Keystone species missing or lacking in abundance	High
C	Habitat destruction or conversion	Medium
D	Altered species composition/dominance	Low
E	Altered water and/or soil temperature	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Incompatible recreational activities	High	A, B, C
2	Solid waste	Medium	A, B, C
3	Incompatible resource extraction: mining/drilling	Medium	B, C
Statewide Threat Rank of Habitat		Medium	

Conservation Actions

Actions to abate the threats to Terrestrial Caves that were also identified as statewide threats (incompatible recreational activities, incompatible resource extraction: mining/drilling) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Several of the actions developed for a statewide threat that were only applicable to Terrestrial Caves and a few other habitats (i.e., [Aquatic Cave](#), [Calcareous Stream](#), [Cypress Swamp](#), [Freshwater Marsh and Wet Prairie](#), [Natural Lake](#), [Reservoir/Managed Lake](#), [Seepage/Steephead Stream](#), [Softwater Stream](#), [Spring and Spring Run](#), and [Coastal Tidal River or Stream](#)) and are listed below. These actions are intended to prevent harm to cave and other ecosystems influenced by groundwater by developing numeric nutrient criteria specific to cave systems and to prevent physical destruction or degradation of cave habitat from recreational activities and facilitate movement of bats and other species through upgrading or retrofitting cave entrances and infrastructure for access.

Incompatible Recreational Activities

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Provide incentives (e.g., liability limitations where appropriate management procedures have been taken), cost-sharing, or design advice to secure cave entrances with bat-friendly gates.	H	M	M

Incompatible Resource Extraction: Mining/Drilling

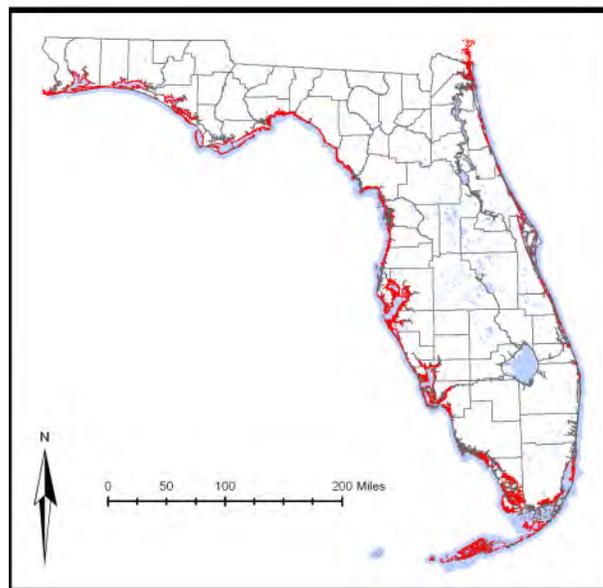
Overall Rank	Economic and Other Incentives	Feasibility	Benefits	Cost
M	Create incentives to avoid loss of, and impacts to, SHCAs and sensitive habitats from mining, particularly wet and dry prairie, scrub, and bat caves.	H	M	H

Tidal Flat



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 442,500 acres (179,073 ha) of Tidal Flat habitat exist, of which 71% (316,000 ac; 127,881 ha) are protected in reserves and easements. Another 14% (60,000 ac; 24,281 ha) are proposed for acquisition. The remaining 15% (66,500 ac; 26,912 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

Tidal flats are non-vegetated areas of sand or mud protected from wave action and composed primarily of mud transported by tidal channels. An important characteristic of the tidal flat environment is its alternating tidal cycle of submergence and exposure to the atmosphere.

Associated Species of Greatest Conservation Need

Mammals

- *Lontra canadensis lataxina*
- *Neovison vison halilimnetes*
- *Neovison vison lutensis*
- *Neovison vison* ssp.
- *Procyon lotor auspicatus*
- *Procyon lotor incautus*
- *Procyon lotor inesperatus*
- *Trichechus manatus latirostris*
- River Otter
- Gulf Salt Marsh Mink
- Atlantic Salt Marsh Mink
- Mink
- Key Vaca Raccoon
- Key West Raccoon
- Matecumbe Key Raccoon
- West Indian Manatee

Birds

- *Anas fulvigula* Mottled Duck
- *Pelecanus occidentalis* Brown Pelican
- *Ardea herodias* Great Blue Heron
- *Ardea herodias occidentalis* Great White Heron
- *Ardea alba* Great Egret
- *Egretta thula* Snowy Egret
- *Egretta tricolor* Tricolored Heron
- *Egretta rufescens* Reddish Egret
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Platalea ajaja* Roseate Spoonbill
- *Haliaeetus leucocephalus* Bald Eagle
- *Falco columbarius* Merlin
- *Falco peregrinus* Peregrine Falcon
- *Pluvialis squatarola* Black-bellied Plover
- *Pluvialis dominica* American Golden-Plover
- *Charadrius nivosus* Snowy Plover
- *Charadrius wilsonia* Wilson's Plover
- *Charadrius melodus* Piping Plover
- *Haematopus palliatus* American Oystercatcher
- *Tringa semipalmata semipalmata* Eastern Willet
- *Tringa semipalmata inornata* Western Willet
- *Tringa flavipes* Lesser Yellowlegs
- *Numenius phaeopus* Whimbrel
- *Numenius americanus* Long-billed Curlew
- *Limosa fedoa* Marbled Godwit
- *Arenaria interpres* Ruddy Turnstone
- *Calidris canutus* Red Knot
- *Calidris canutus rufa* Red Knot (rufa)
- *Calidris pusilla* Semipalmated Sandpiper
- *Calidris mauri* Western Sandpiper
- *Calidris fuscicollis* White-rumped Sandpiper
- *Calidris alpina* Dunlin
- *Calidris himantopus* Stilt Sandpiper
- *Limnodromus griseus* Short-billed Dowitcher
- *Limnodromus scolopaceus* Long-billed Dowitcher
- *Phalaropus tricolor* Wilson's Phalarope
- *Chlidonias niger* Black Tern

Reptiles

- *Crocodylus acutus* American Crocodile
- *Farancia erythrogramma* Rainbow Snake
- *Nerodia clarkii clarkii* Gulf Saltmarsh Watersnake
- *Nerodia clarkii compressicauda* Mangrove Saltmarsh Watersnake
- *Nerodia clarkii taeniata* Atlantic Saltmarsh Watersnake
- *Caretta caretta* Loggerhead Sea Turtle
- *Lepidochelys kempii* Kemp's Ridley Sea Turtle
- *Malaclemys terrapin* Diamond-backed Terrapin

Fish

- *Acipenser oxyrinchus desotoi* Gulf of Mexico Sturgeon
- *Acipenser oxyrinchus oxyrinchus* Atlantic Sturgeon

- *Alosa aestivalis* Blueback Herring
- *Alosa alabamae* Alabama Shad
- *Aetobatus narinari* Spotted Eagle Ray
- *Carcharhinus plumbeus* Sandbar Shark
- *Carcharias taurus* Sand Tiger Shark
- *Negaprion brevirostris* Lemon Shark
- *Pristis pectinata* Smalltooth Sawfish
- *Pristis pristis* Largetooth Sawfish
- *Atractosteus spatula* Alligator Gar
- *Agonostomus monticola* Mountain Mullet
- *Epinephelus itajara* Goliath Grouper

Invertebrates

- *Panopea bitruncata* Atlantic Geoduck
- *Uca minax* Red-jointed Fiddler, Brackish Water Fiddler
- *Uca pugilator* Sand Fiddler
- *Uca pugnax* Mud Fiddler
- *Cicindela togata togata* White-cloaked Tiger Beetle

Conservation Threats

Threats to Tidal Flat habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Channel modification/shipping lanes
- Chemicals and toxins
- Climate variability
- Coastal development
- Dam operations/incompatible release of water (quality, quantity, timing)
- Disruption of longshore transport of sediments
- Fishing gear impacts
- Harmful algal blooms
- Incompatible industrial operations
- Incompatible recreational activities
- Industrial spills
- Invasive animals
- Management of nature (beach nourishment and impoundments)
- Roads, bridges and causeways
- Shoreline hardening
- Surface and groundwater withdrawal
- Vessel impacts

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered water quality – physical, chemistry	Very High
B	Altered species composition	Very High
C	Altered water quality - contaminants	Very High
D	Habitat destruction	Very High
E	Habitat disturbance	Very High
F	Altered hydrological regime	Medium
G	Altered weather regime/sea level rise	Medium

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Coastal development	Very High	B, C, D, E, F
2	Incompatible industrial operations	Very High	B, C, D, E, F
3	Incompatible recreational activities	High	B, E
4	Roads, bridges and causeways	High	D, E, F
5	Inadequate stormwater management	High	A, B, C, E, F
6	Management of nature (beach nourishment, impoundments)	High	B, E, F
7	Invasive animals	High	B, E
8	Chemicals and toxins	High	C
9	Industrial spills	High	B, C
10	Dam operations/incompatible release of water (quality, quantity, timing)	High	A, C, F
11	Solid waste	Medium	E
12	Disruption of longshore transport of sediments	Medium	A, B, D, F
13	Climate variability	Medium	G
14	Shoreline hardening	Medium	D, F
15	Boating impacts	Medium	E
16	Channel modification/shipping lanes	Medium	D, E, F
17	Surface water withdrawal	Medium	A
18	Groundwater withdrawal	Medium	A
19	Vessel impacts	Medium	D, E
20	Harmful algal blooms	Medium	B
21	Fishing gear impacts	Low	E
Statewide Threat Rank of Habitat		Very High	

Conservation Actions

Actions to abate the threats to Tidal Flat habitats that were also identified as statewide threats (see list above) are in Chapter 7: Multiple Habitat Threats and Conservation Actions. Many of the threats to Tidal Flats are the same as for several other marine and estuarine habitats. Consequently, actions to abate these threats will be the same or similar to the actions recommended for abating threats to several other marine and estuarine habitats (e.g., [Beach/Surf Zone](#), [Mangrove Swamp](#), [Seagrass](#), [Coastal Tidal River or Stream](#)).

Tropical Hardwood Hammock



Status

Current condition: Poor and declining. According to the best available GIS information at this time (see Appendix C: GIS Data Tables), 15,232 acres (6,164 ha) of Tropical Hardwood Hammock habitat exist, of which 71% (10,867 ac; 4,398 ha) are in existing conservation or managed areas. Another 10% (1,470 ac; 595 ha) are Florida Forever projects and 5% (783 ac; 317 ha) are SHCA-identified lands. The remaining 14% (2,112 ac; 855 ha) are other private lands.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: Rockland Hammock

These upland hardwood forests occur only in south Florida and are characterized by tree and shrub species on the northern edge of a range that extends southward into the Caribbean. These communities are sparsely distributed along coastal uplands south of a line from about Vero Beach on the Atlantic coast to Sarasota on the Gulf coast. They occur on many tree islands in the Everglades and on uplands throughout the Florida Keys. This cold-intolerant tropical community has very high plant species diversity, sometimes containing over 35 species of trees and about 65 species of shrubs. Characteristic tropical plants include strangler fig, gumbo-limbo, mastic, bustic, lancewood, ironwoods, poisonwood, pigeon plum, Jamaica dogwood, and Bahama lysiloma. Live oak and cabbage palm are also sometimes found within this community. Tropical Hardwood Hammocks in the Florida Keys may also contain several plants, including *lignum vitae*, mahogany, thatch palms, and manchineel, which are extremely rare within the United States.

Associated Species of Greatest Conservation Need

Mammals

- | | |
|---|-------------------------|
| • <i>Eumops floridanus</i> | Florida Bonneted Bat |
| • <i>Lasiurus intermedius floridanus</i> | Northern Yellow Bat |
| • <i>Lasiurus seminolus</i> | Seminole Bat |
| • <i>Perimyotis subflavus</i> | Tricolored Bat |
| • <i>Sylvilagus palustris hefneri</i> | Lower Keys Marsh Rabbit |
| • <i>Neotoma floridana smalli</i> | Key Largo Woodrat |
| • <i>Peromyscus gossypinus allapaticola</i> | Key Largo Cotton Mouse |
| • <i>Neovison vison evergladensis</i> | Everglades Mink |
| • <i>Procyon lotor auspicatus</i> | Key Vaca Raccoon |
| • <i>Procyon lotor incautus</i> | Key West Raccoon |
| • <i>Procyon lotor inesperatus</i> | Matecumbe Key Raccoon |
| • <i>Puma concolor coryi</i> | Florida Panther |
| • <i>Ursus americanus floridanus</i> | Florida Black Bear |
| • <i>Odocoileus virginianus clavium</i> | Key Deer |

Birds

- | | |
|--|-------------------------|
| • <i>Colinus virginianus</i> | Northern Bobwhite |
| • <i>Buteo brachyurus</i> | Short-tailed Hawk |
| • <i>Falco columbarius</i> | Merlin |
| • <i>Falco peregrinus</i> | Peregrine Falcon |
| • <i>Patagioenas leucocephala</i> | White-crowned Pigeon |
| • <i>Coccyzus minor</i> | Mangrove Cuckoo |
| • <i>Megascops asio</i> | Eastern Screech-Owl |
| • <i>Chordeiles gundlachi</i> | Antillean Nighthawk |
| • <i>Vireo altiloquus</i> | Black-whiskered Vireo |
| • <i>Helmitheros vermivorum</i> | Worm-eating Warbler |
| • <i>Parkesia motacilla</i> | Louisiana Waterthrush |
| • <i>Vermivora chrysoptera</i> | Golden-winged Warbler |
| • <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| • <i>Protonotaria citrea</i> | Prothonotary Warbler |
| • <i>Limnothlypis swainsonii</i> | Swainson's Warbler |
| • <i>Setophaga ruticilla</i> | American Redstart |
| • <i>Setophaga cerulea</i> | Cerulean Warbler |
| • <i>Setophaga castanea</i> | Bay-breasted Warbler |
| • <i>Setophaga petechia gundlachi</i> | Cuban Yellow Warbler |
| • <i>Setophaga discolor discolor</i> | Prairie Warbler |
| • <i>Setophaga discolor paludicola</i> | Florida Prairie Warbler |
| • <i>Cardellina canadensis</i> | Canada Warbler |

Reptiles

- | | |
|--|---------------------------------------|
| • <i>Plestiodon egregius egregius</i> | Florida Keys Mole Skink |
| • <i>Sphaerodactylus notatus notatus</i> | Florida Reef Gecko |
| • <i>Crotalus adamanteus</i> | Eastern Diamond-backed Rattlesnake |
| • <i>Diadophis punctatus acricus</i> | Key Ring-necked Snake |
| • <i>Drymarchon couperi</i> | Eastern Indigo Snake |
| • <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake |
| • <i>Lampropeltis getula</i> | Eastern Kingsnake |
| • <i>Pantherophis guttatus</i> | Red Cornsnake (Lower Keys population) |

- *Storeria victa* Florida Brownsnake (Keys Population)
- *Tantilla oolitica* Rim Rock Crowned Snake
- *Thamnophis sauritus sackenii* Peninsula Ribbonsnake (Lower Keys Population)
- *Kinosternon baurii* Striped Mud Turtle (Lower Keys Population)
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Drymaeus multilineatus latizonatus* Wide-banded Forest Snail
- *Liguus fasciatus* Florida Tree Snail
- *Orthalicus floridensis* Banded Tree Snail
- *Orthalicus reses* (not incl. *nesodryas*) Stock Island Tree Snail
- *Orthalicus reses nesodryas* Florida Keys Tree Snail
- *Hojeda inaguensis* Keys Mudcloak
- *Cochlodinella poeyana* Truncate Urocoptid
- *Chondropoma dentatum* Crenulate Horn
- *Eustala eleuthera* Eleuthera Orb Weaver
- *Coenobita clypeatus* Land Hermit Crab
- *Cardisoma guanhumii* Great Land Crab (Blue Land Crab)
- *Belocephalus sleighti* Keys Short-winged Conehead Katydid
- *Cycloptilum irregularis* Keys Scaly Cricket
- *Eburia stroheckeri* Strohecker's Ivory-spotted Long-horned Beetle
- *Linsleyonides albomaculatus* Tropical White-spotted Long-horned Beetle
- *Stenodontes chevrolati* Chevrolat's Tropical Long-horned Beetle
- *Stizocera floridana* Florida Privet Long-horned Beetle
- *Phyllophaga clemens* Clemens' June Beetle
- *Phyllophaga youngi* Young's June Beetle
- *Rutela formosa* Handsome Flower Scarab Beetle
- *Epargyreus zestos* Zestos Skipper
- *Chlorostrymon maesites* Amethyst Hairstreak
- *Chlorostrymon simaethis* Silver-banded Hairstreak
- *Cyclargus thomasi bethunebakeri* Miami Blue
- *Eumaeus atala* Atala
- *Ministrymon azia* Gray Ministreak
- *Strymon martialis* Martial Scrub-hairstreak
- *Anthanassa frisia* Cuban Crescent
- *Eunica monima* Dingy Purplewing
- *Eunica tatila tatilista* Florida Purplewing
- *Neonympha helicta dadeensis* Helicta Satyr (Miami-Dade Subspecies)
- *Siproeta stelenes* Malachite
- *Heraclides aristodemus ponceanus* Schaus Swallowtail Butterfly
- *Papilio andraemon bonhotei* Bahamian Swallowtail
- *Papilio aristodemus ponceanus* Schaus' Swallowtail
- *Appias drusilla* Florida White
- *Eurema nise* Mimosa Yellow
- *Kricogonia lyside* Lyside Sulphur
- *Pyrisitia dina* Dina Yellow

Conservation Threats

Threats to Tropical Hardwood Hammock habitat that were also identified for multiple other habitats are addressed in Chapter 7: Multiple Habitat Threats and Conservation Actions. These threats include:

- Chemicals and toxins
- Conversion to housing and urban development
- Groundwater withdrawal
- Incompatible fire
- Invasive animals
- Invasive plants
- Roads
- Surface water withdrawal

Threats specific to Tropical Hardwood Hammock were limited to incompatible residential activities that include movement of fertilizer, herbicide, and invasive species from landscape maintenance, activities of people, their pets, and nuisance species, and disposal of yard and household waste. Feral or pet cats and roof rats were specifically identified as threatening SGCN in this habitat.

The following stresses and sources of stress threaten this habitat:

Stresses		Habitat Stress Rank
A	Altered landscape mosaic or context (S and E of canal L-31)	High
B	Excessive depredation and/or parasitism	High
C	Altered species composition/dominance	High
D	Altered hydrologic regime	High
E	Altered community structure	High
F	Fragmentation of habitats, communities, ecosystems (in urban)	Medium
G	Habitat destruction or conversion (on private lands)	Medium
H	Altered fire regime	Medium
I	Altered soil structure and chemistry (on Rock Ridge)	Medium
J	Insufficient size/extent of characteristic communities or ecosystems	Medium
K	Habitat degradation/disturbance	Medium
L	Missing key communities, functional guilds, or seral stages	Low

The sources of stress, or threats, were used to generate conservation actions.

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
1	Invasive animals	High	A, B, C
2	Invasive plants	High	A, C, E
3	Incompatible fire	Medium	C, E
4	Groundwater withdrawal	Medium	D, C
5	Conversion to housing and urban development	Medium	A, D

Sources of Stress		Habitat Source Rank	Related Stresses (see above)
6	Surface water withdrawal	Medium	C, D
7	Incompatible vegetation harvest	Low	B, C
8	Nuisance animals	Low	A, B, C
9	Chemicals and toxins	Low	A, C
10	Incompatible wild animal harvest	Low	B, C
11	Roads	Low	A, D
12	Incompatible residential activities	Low	A
13	Incompatible agricultural practices	Low	A
Statewide Threat Rank of Habitat		High	

Conservation Actions

Actions to abate the threats to Tropical Hardwood Hammock that were also identified as statewide threats (see list above in Conservation Threats section) are in Chapter 7: Multiple Habitat Threats and Conservation Actions.

Actions to abate specific threats that were identified for Tropical Hardwood Hammock are below, though none were ranked of high priority for implementation. These actions were designed to reduce the impacts from activities of residents adjacent to this habitat and the animals that accompany residential development.

Nuisance Animals

Overall Rank	Land/Water/Species Management	Feasibility	Benefits	Cost
M	Work with the USDA Animal and Plant Health Inspection Service to establish and implement a trapping program for controlling feral cats in specific tropical hardwood hammocks to protect native species from excessive depredation.	M	M	M
Overall Rank	Planning and Standards	Feasibility	Benefits	Cost
L	Develop management techniques for waste management in areas where SGCN or habitats are subject to high depredation or disturbance rates by exotic and nuisance animals with populations elevated by garbage (providing a supplemental food source).	M	L	L
Overall Rank	Policy	Feasibility	Benefits	Cost
M	Assist counties, municipalities, and homeowners associations to develop and implement curbside pick-up of yard and household waste.	H	M	M
L	Promote increased awareness and understanding of potential impacts of outdoor pet feeding on wildlife, and encourage homeowners to feed pets indoors.	L	M	M
L	Support local governments to ensure that home and business owners have wildlife-proof garbage containers.	H	L	H

Overall Rank	Research	Feasibility	Benefits	Cost
M	Fund research on the impacts of roof rats on native tropical hardwood hammock SGCN populations to identify whether control programs are necessary and/or feasible.	VH	L	L

Incompatible Residential Activities

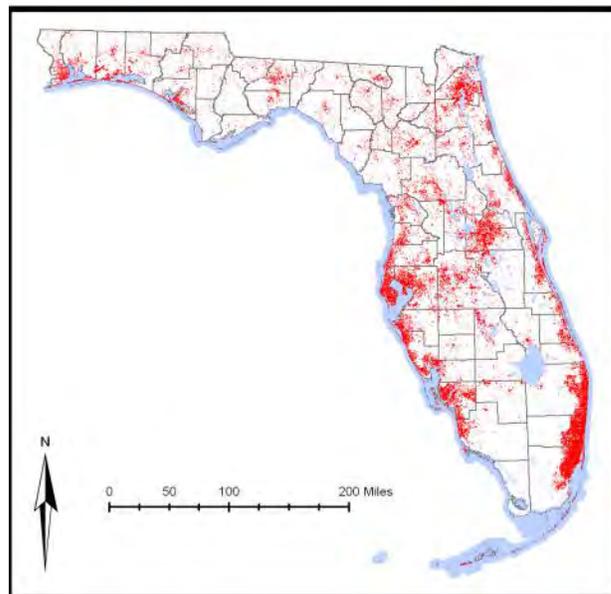
Overall Rank	Economic And Other Incentives	Feasibility	Benefits	Cost
M	Expand the scale of the Florida Yards and Neighborhoods program from certifying individual landowners to whole neighborhoods; certification should be renewed biennially and any time property ownership changes.	M	M	L
L	Support incentives for residential property owners to resolve issues of incompatible use of and including pesticide use, pet control, feeding of wildlife, household or yard waste disposal, landscape plants, irrigation use, prescribed fire tolerance, and light-use in coastal areas.	M	L	L
L	Identify and promote effective reward models for homeowners, maintenance companies, and municipalities for reducing impacts on neighboring conservation areas.	M	L	L
L	Develop a voluntary program directed at developers to provide on-site site specific educational materials and recommendations to home-owner associations about incompatible residential activities.	M	L	L
Overall Rank	Education and Awareness	Feasibility	Benefits	Cost
M	Encourage and support continuing education opportunities for landscape maintenance industry that includes appropriate use of chemicals, irrigation, plants, and disposal of yard waste.	H	M	M

Urban/Developed



Status

Current condition: Not applicable.
According to the best available GIS information at this time (see Appendix C: GIS Data Tables), approximately 4,222,166 acres (1,708,650 ha) of Urban/Developed areas are present in Florida.



Some habitat distributions or locations may be misrepresented on this map due to size, resolution and insufficient data sources.

Habitat Description

FNAI type: None

This habitat includes a mixture of built structure (e.g., roads, residential and commercial buildings, and parking lots) and vegetation including lawns, golf courses, road shoulders, airports, park facilities, and natural remnants surrounded by or located near residential/commercial development. Many secondary roads are included in this category.

Associated Species of Greatest Conservation Need

Mammals

- *Eptesicus fuscus*
 - *Eumops floridanus*
 - *Lasiurus borealis borealis*
 - *Lasiurus intermedius floridanus*
 - *Lasiurus seminolus*
 - *Tadarida brasiliensis cynocephala*
 - *Geomys pinetis pinetis*
 - *Sciurus niger avicennia*
 - *Tamias striatus*
- Big Brown Bat
 - Florida Bonneted Bat
 - Red Bat
 - Northern Yellow Bat
 - Seminole Bat
 - Brazilian Free-tailed Bat
 - Southeastern Pocket Gopher
 - Big Cypress Fox Squirrel
 - Eastern Chipmunk

- *Procyon lotor auspicatus* Key Vaca Raccoon
- *Procyon lotor incautus* Key West Raccoon
- *Procyon lotor inesperatus* Matecumbe Key Raccoon
- *Puma concolor coryi* Florida Panther
- *Ursus americanus floridanus* Florida Black Bear
- *Odocoileus virginianus clavium* Key Deer

Birds

- *Anas fulvigula* Mottled Duck
- *Mycteria americana* Wood Stork
- *Ardea herodias occidentalis* Great White Heron
- *Egretta thula* Snowy Egret
- *Egretta caerulea* Little Blue Heron
- *Egretta tricolor* Tricolored Heron
- *Egretta rufescens* Reddish Egret
- *Nycticorax nycticorax* Black-crowned Night-Heron
- *Nyctanassa violacea* Yellow-crowned Night-Heron
- *Pandion haliaetus* Osprey
- *Haliaeetus leucocephalus* Bald Eagle
- *Falco sparverius paulus* Southeastern American Kestrel
- *Falco peregrinus* Peregrine Falcon
- *Grus canadensis pratensis* Florida Sandhill Crane
- *Haematopus palliatus* American Oystercatcher
- *Tringa solitaria* Solitary Sandpiper
- *Sternula antillarum* Least Tern
- *Sterna dougallii* Roseate Tern
- *Rynchops niger* Black Skimmer
- *Columbina passerina* Common Ground-Dove
- *Crotophaga ani* Smooth-billed Ani
- *Megascops asio* Eastern Screech-Owl
- *Athene cunicularia* Burrowing Owl
- *Chordeiles minor* Common Nighthawk
- *Caprimulgus carolinensis* Chuck-will's-widow
- *Chaetura pelagica* Chimney Swift
- *Colaptes auratus* Northern Flicker
- *Tyrannus dominicensis* Gray Kingbird
- *Lanius ludovicianus* Loggerhead Shrike
- *Aphelocoma coerulescens* Florida Scrub-Jay
- *Progne subis* Purple Martin
- *Hirundo rustica* Barn Swallow
- *Vermivora chrysoptera* Golden-winged Warbler
- *Vermivora cyanoptera* Blue-winged Warbler
- *Setophaga ruticilla* American Redstart
- *Setophaga kirtlandii* Kirtland's Warbler
- *Setophaga castanea* Bay-breasted Warbler
- *Setophaga dominica stoddardi* Stoddard's Yellow-throated Warbler
- *Setophaga discolor discolor* Prairie Warbler
- *Cardellina canadensis* Canada Warbler
- *Euphagus cyanocephalus* Brewer's Blackbird

Reptiles

- *Anolis carolinensis seminolus* Southern Green Anole

- *Plestiodon reynoldsi* Florida Sand Skink
- *Sceloporus woodi* Florida Scrub Lizard
- *Diadophis punctatus acricus* Key Ring-necked Snake
- *Drymarchon couperi* Eastern Indigo Snake
- *Heterodon platirhinos* Eastern Hog-nosed Snake
- *Heterodon simus* Southern Hog-nosed Snake
- *Lampropeltis extenuata* Short-tailed Snake
- *Pantherophis guttatus* Red Cornsnake (Lower Keys population)
- *Storeria victa* Florida Brownsnake (Keys Population)
- *Tantilla oolitica* Rim Rock Crowned Snake
- *Tantilla relicta* Florida Crowned Snake
- *Virginia valeriae valeriae* Eastern Smooth Earthsnake (Highlands Co.)
- *Gopherus polyphemus* Gopher Tortoise
- *Terrapene carolina* Eastern Box Turtle

Invertebrates

- *Nastra neamathla* Neamathla Skipper
- *Polites baracoa* Baracoa Skipper
- *Eumaeus atala* Atala
- *Satyrrium titus* Coral Hairstreak
- *Strymon martialis* Martial Scrub-hairstreak
- *Neonympha helicta dadeensis* Helicta Satyr (Miami-Dade Subspecies)
- *Siproeta stelenes* Malachite
- *Aphrissa statira* Statira

Conservation Threats

While threats to its conservation as well as remedial actions were identified during earlier workshops, the Urban/Developed habitat category was not addressed in the Threat and Action Workshops (FWC 2005) that generated tables of ranked threats and actions, as seen in most other habitat categories. The decision to not rank threats and actions for this habitat was made to maximize discussion time for higher-priority habitats and because of some disagreement over recognition of this habitat type as important to wildlife conservation. Therefore, threats and actions are presented as bulleted lists with no prioritization.

The following stresses threaten this habitat:

- Absent or insufficient biological legacies
- Altered community structure
- Altered fire regime - timing, frequency, intensity, extent
- Altered hydrologic regime - timing, duration, frequency, extent
- Altered landscape pattern or mosaic
- Altered soil structure and chemistry
- Altered species composition/dominance
- Altered successional dynamics
- Altered water and/or soil temperature
- Altered water quality of surface water or aquifer: contaminants
- Altered water quality of surface water or aquifer: nutrients
- Erosion/sedimentation
- Excessive depredation and/or parasitism
- Fragmentation of habitats, communities, ecosystems
- Habitat degradation/disturbance

- Insufficient size/extent of characteristic communities/ecosystems
- Keystone species missing or lacking in abundance
- Missing key communities, functional guilds, or seral stages

The sources of stress, or threats, were used to generate conservation actions.

- Chemicals and toxins
- Conversion to commercial and industrial development
- Conversion to housing and urban development
- Incompatible fire
- Incompatible recreational activities
- Incompatible wildlife and fisheries management strategies
- Invasive animals
- Invasive plants
- Light pollution
- Management of nature–impoundments
- Nuisance animals
- Nutrient loads–urban
- Parasites/pathogens
- Roads
- Solid waste
- Sonic pollution

Conservation Actions

Actions to abate threats to Urban/Developed were designed to reduce the impacts of urban activities and increase the habitat's suitability to wildlife. Many threats were statewide (chemicals and toxins, conversion to commercial and industrial development, conversion to housing and urban development, incompatible fire, incompatible recreational activities, invasive animals, invasive plants, nutrient loads–urban, roads, and incompatible wildlife and fisheries management strategies).

The actions to abate threats that were identified for Urban/Developed habitat are below, though none were prioritized for implementation.

Land/Water Protection

- Develop low intensity recreation parks with native vegetation.
- Acquire open space with an emphasis on greenways and wildlife corridors

Land/Water/Species Management

- Restore hydrology by removing ditches, levees, and dams

Law and Policy

- Develop effective comprehensive land management for wildlife habitat enhancement
- Protect coast preserves with lighting ordinances
- Minimize connectivity impacts to wildlife through land use planning (e.g., avoid constructing new roads near wildlife crossings or water sources)
- Support incentives for residential property owners to resolve issues of incompatible use to enhance wildlife habitat or reduce development effects on wildlife and wildlife habitat
- Include green infrastructure (Glossary of Terms) costs in cost-benefit analyses of development

- Support policies that increase ease of recycling and reduce waste (e.g., curb-side pick-up of recyclable material)

Research, Education and Awareness

- Target education for homeowners, developers, construction contractors, and policy makers to benefit wildlife in their day-to-day activities
- Encourage wildlife-friendly landscaping (e.g., retaining dead leaves on palms for nesting and roosting animals, dead trees for cavity-nesting birds, etc.)
- Educate nuisance wildlife trappers and pest control operators on the proper methods for animal exclusion devices, especially ensuring breeding seasons are considered
- Educate architects about benefits of native plants for landscaping
- Educate homeowners about energy and water conservation
- Educate citizens about the dangers of feeding wildlife
- Support research on effective urban design to benefit wildlife
- Train policy makers on true smart growth and make wildlife issues a consideration
- Involve community volunteers in wildlife conservation efforts and increase their opportunities for involvement
- Educate homeowners about proper pesticide and fertilizer use and disposal

Economic and Other Incentives

- Provide incentives to improve land for wildlife
- Provide incentives to enhance the creation of developments that conserve wildlife habitat (e.g., permits are expedited)
- Support economic incentives for “green development” practices that enhance and benefit wildlife
- Provide awards to organizations and individuals that implement wildlife-friendly design and management practices
- Provide funds and materials for landowners to remove invasive exotics
- Support spay or neuter programs for cats and dogs and reduce number of free-ranging pets

Capacity Building

- Develop wildlife-friendly storm water runoff ponds
- Develop mass transit, pedestrian-friendly communities, and bike paths to reduce transport footprint