USDA Natural Resources
Conservation Service

Ecological site R156AY500FL
Subaqueous Haline Estuarine Habitats of MLRA 156A

Last updated: 2/07/2025
Accessed: 05/13/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 156A–Florida Everglades and Associated Areas

This area makes up about 7,749 square miles (20,071 square kilometers) and is entirely in Florida. It is located at the southern tip of the State and has shoreline on both the Atlantic Ocean and the Gulf of Mexico. Lake Okeechobee borders the MLRA to the north. Aside from sugar cane plantations in the north, the Everglades National Park, Big Cypress National Preserve, and the Big Cypress Seminole Indian Reservation comprise this area. Historical ditching, berming, and canals prevent natural water flow through this delicate ecosystem. To mitigate this, extensive restoration efforts have been implemented. Urban sprawl from Miami and cities to its north on the Atlantic Ridge has encroached along the eastern boundary of this area. Most of the MLRA has resisted urbanization because of a water table that is at or near the surface, a considerable acreage of unstable organic soils, and its identity as a national treasure.

About one-third of this area is in Native American reservations, national parks, game refuges, or other large holdings. Cypress forests are extensive in the area, but mangrove forests are widespread along the eastern and southern coasts. A large part of the area is open marsh. Much of the area is used for hunting, fishing, and other recreational activities. The cropland in the area is used mainly for winter vegetables, but citrus fruits, avocado, and papaya are grown on the better drained soils. Sugarcane is an important crop on the organic soils south of Lake Okeechobee. The acreage of improved pasture is increasing. Beef cattle are the principal kind of livestock, but dairying is an important enterprise locally. Urbanization is extensive along the eastern coast.

The major soil resource concerns are wind erosion, maintenance of the content of organic matter and productivity of the soils, and management of soil moisture and soil subsidence. Conservation practices on cropland generally include conservation crop rotations, cover crops, nutrient management, pest management, water-control structures, surface drainage systems (field ditches, mains, and laterals), pumping plants, and irrigation water management (including micro irrigation systems and surface and subsurface irrigation systems). Conservation practices on pasture and rangeland generally include prescribed grazing, brush management, pest management, prescribed burning, and watering facilities. Conservation practices on forestland generally include forest stand improvement, firebreaks, pest management, prescribed burning, and management of upland and wetland wildlife habitat.

LRU notes

There is not an official LRU for the MLRA 156A area. For the time being the technical team recommended to add the four physiographic provinces ecoregions to this section (Big Cypress, Everglades, Southern Coast and Islands, and Miami Ridge/ Atlantic Coastal Strip). This PES is a subaqueous ecological concept and not included in the physiographic ecoregions created by the EPA. For the time being we have created an unofficial ecoregion called the Coastal Marine and Estuarine Ecoregion.

The Coastal Marine and Estuarine Ecoregion is an unofficial ecoregion, which encompasses subaqueous habitats within this MLRA. It consists of subaqueous estuarine and marine habitats which are dominated by seagrass and algal beds, coral reefs, oyster beds, and unconsolidated substrates. These areas provide important habitat for marine life which is a major economic driver in the Florida Keys and along the Florida coast.

Classification relationships

All portions of the geographical range of this site falls under the following ecological / land classifications including:

-Environmental Protection Agency's Level 3 and 4 Ecoregions of Florida: 76 Southern Florida Coastal Plain (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013)

-Florida Natural Area Inventory, 2010 Edition: Marine and Estuarine (FNAI ,2010)

-Everglades National Park Ecosystems, National Park Service: Marine and Estuarine (National Park Service, 2021)

-Biscayne National Park Ecosystems, National Park Service: Biscayne Bay, Seagrass Meadows (National Park Service, 2021)

-Big Cypress National Preserve, National Park Service: Estuaries (National Park Service, 2021)

Ecological site concept

The Subaqueous Haline Estuarine Habitats are typically submerged sites found within subtidal zones. This site occurs in low energy areas (affected very little by wave energy, deposition of sandy material, or storm events). Water depths are variable but are characterized as semi-enclosed bodies of water but have open, partly obstructed, or sporadic access to the open ocean, in which water is at least occasionally diluted by freshwater runoff from the land. These sites are very fragile and susceptible to sea level rise and nutrient pollution. Native vegetation includes rooted and floating seagrass species, with cover ranging from 0 to 100%. This area is very important for recreational, commercial, and wildlife uses. Benthic fauna such as oysters, coral species, tubeworms, juvenile fish and crab species are often associated with this concept. Notable sites in this ecological site include Whitewater Bay and Florida Bay.

Associated sites

R156AY110FL	**Subtropical Tidal Saline Wetlands of Southern Coast and Islands** The Subtropical Tidal Saline Wetlands of Southern Coast and Islands may be found as the ecotone to terrestrial landscapes in low wave energy intertidal areas as mangrove swamps, tidal marshes, or other intertidal areas within the Southern Coast and Island ecoregion.
R156AY310FL	**Subtropical Tidal Saline Wetlands of Miami Ridge/ Atlantic Coastal Strip** The Subtropical Tidal Saline Wetlands of Miami Ridge / Atlantic Coastal Strip may be found as the ecotone to terrestrial landscapes in low wave energy intertidal areas as mangrove swamps, tidal marshes, or other intertidal areas within the Miami Ridge / Atlantic Coastal Strip ecoregion.
R156AY550FL	**Subaqueous Haline Marine Habitats of MLRA 156A** The Subaqueous Haline Marine Habitats of MLRA 156A may be found in deeper, unprotected high wave energy systems.

Similar sites

R156AY550FL	**Subaqueous Haline Marine Habitats of MLRA 156A** The Subaqueous Haline Marine Habitats of MLRA 156A is mainly distinguished by the physiographic location of a marine system rather than an estuarine system.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Halodule wrightii* (2) *Thalassia testudinum*

Physiographic features

These sites are very fragile and are found within estuarine communities. Estuarine systems are semi enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which water is at least occasionally diluted by freshwater runoff from the land. Salinity ranges from 0.5 to 30 ppt for a majority of the year and may be periodically increased above that of the open ocean by evaporation. Estuarine communities may temporarily exhibit freshwater conditions during periods of heavy rainfall or upland runoff or marine conditions when rainfall and upland runoff are low. These sites occur on gently sloping underwater areas sloping from shallow to deep zones and occurs from sea level to below low tide marks.

This system extends (1) upstream and landward to where ocean-derived salt measures less than 0.5 ppt during the period of average annual low flow; (2) to an imaginary line closing the mouth of a river, bay, or sound; and (3) to the seaward limit of wetland emergent, shrubs, or trees where they are not included to the previously state "imaginary lines". These are generally found in low wave energy areas, due to natural or artificial barriers that form the estuary or bay.

Geology of the surrounding terrestrial area consists of Holocene Sediments, Miami Oolite and Key Largo Limestone. Human Altered / Human Transported Materials may be used to create new anthropogenic soils from the effects of dredging channels and deposition into dredge piles.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain (2) Lagoon (3) Bay (4) Estuary
Runoff class	High
Flooding duration	Very long (more than 30 days)
Flooding frequency	Very frequent
Elevation	0 m
Slope	0–2%
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate of MLRA 156A is subtropical, with mild winters and hot wet summers. The average annual precipitation of this MLRA is 37 to 62 inches (950 to 1,565 millimeters). About 60 percent of the precipitation occurs from June through September. Most of the rainfall occurs during moderate intensity, tropical storms that produce large amounts of rain from late spring through early autumn. Late autumn and winter are relatively dry. The average annual temperature of the MLRA is 74 to 78 degrees F (23 to 26 degrees C). The freeze-free period of the MLRA averages 355 days and ranges from 345 to 365 days.

The following tables and graphs consist of specific climate stations found within the range of this ecological site within this MLRA.

Table 3. Representative climatic features

Frost-free period (characteristic range)	365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	1,118-1,346 mm
Frost-free period (actual range)	365 days
Freeze-free period (actual range)	365 days

Precipitation total (actual range)	1,041-1,422 mm
Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	1,219 mm

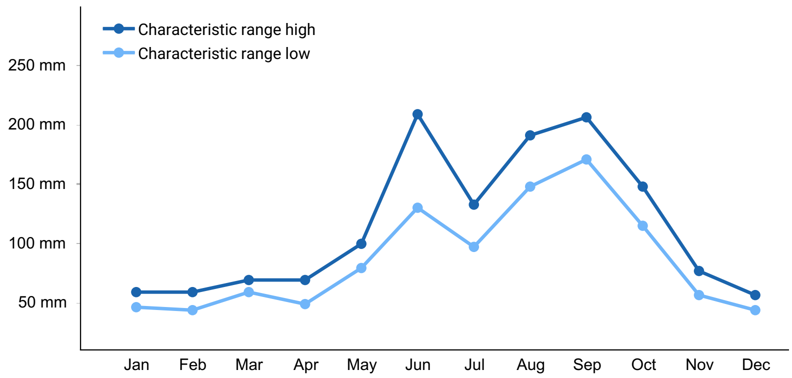


Figure 1. Monthly precipitation range

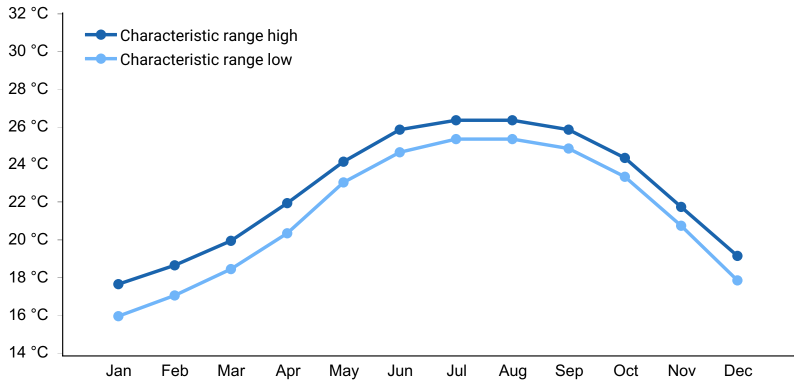


Figure 2. Monthly minimum temperature range

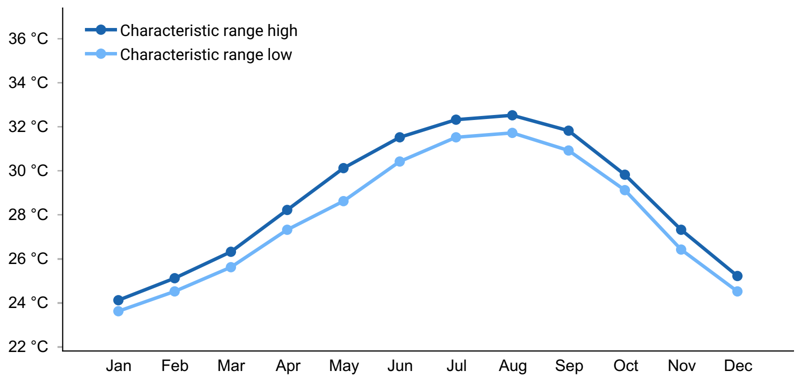


Figure 3. Monthly maximum temperature range

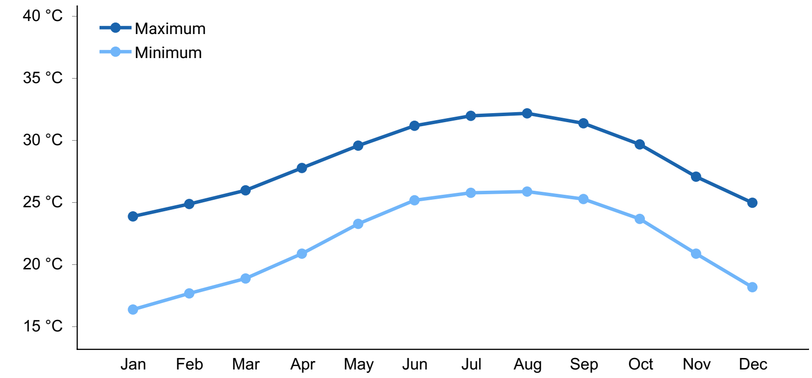


Figure 4. Monthly average minimum and maximum temperature

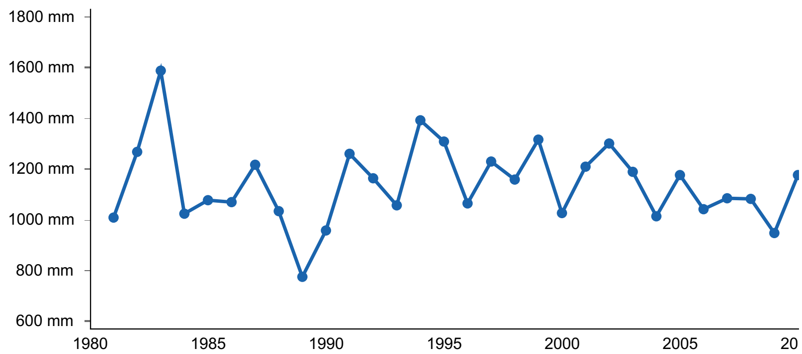


Figure 5. Annual precipitation pattern

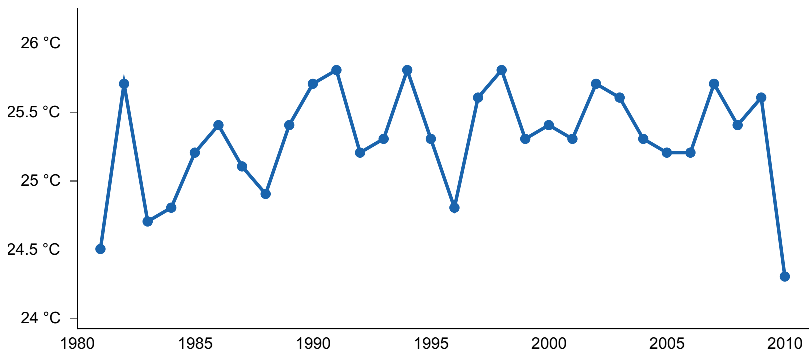


Figure 6. Annual average temperature pattern

Climate stations used

- (1) KEY WEST INTL AP [USW00012836], Key West, FL
- (2) KEY WEST NAS [USW00012850], Key West, FL
- (3) BAHIA HONDA SP [USC00080414], Big Pine Key, FL
- (4) MARATHON AP [USW00012896], Marathon, FL
- (5) CURRY HAMMOCK SP [USC00082046], Marathon, FL
- (6) DUCK KEY [USC00082441], Marathon, FL
- (7) CONCH KEY [USC00081795], Marathon, FL
- (8) ISLAMORADA [USC00084320], Islamorada, FL
- (9) TAVERNIER [USC00088841], Tavernier, FL
- (10) JOHN PENNEKAMP SP [USC00084412], Key Largo, FL
- (11) CAPE FLORIDA [USC00081306], Key Biscayne, FL
- (12) MIAMI BEACH [USW00092811], Miami Beach, FL
- (13) FLAMINGO RS [USC00083020], Homestead, FL
- (14) EVERGLADES [USC00082850], Naples, FL

Influencing water features

This site is influenced by a range of brackish and saltwater, with major changes in vegetation arising from changes in oceanic tides, precipitation, freshwater runoff from land areas, evaporation, and wind. Changes in water quality such as light, turbidity, changes in nutrient levels, or changes in salinity levels, can greatly affect the ecological dynamics of this site. Changes in light due to turbidity, water depth, or sediments in the water column can decrease the photosynthetic capabilities of floral based natural communities, shading the area and transitioning into an algal dominated system or an open area of unconsolidated material. Low wave action from oceanic tides and surface winds create suitable habitat for floral based species to grow. These are fragile communities in which once they change it is very difficult to restore it to the natural habitat.

Wetland description

Classification: Cowardin
System: Estuarine
Subsystem: Subtidal
Class: Aquatic Bed

Soil features

Soils in this ecosite are unsolidified hydric materials that include coralgal, marl, mud, mud/sand, sand or shell. These materials are deposited over time from runoff in upland communities as well as from currents and tides from deeper waters. Unconsolidated substrates can originate from organic sources such as decaying plant tissues (e.g. mud) or from calcium carbonate depositions of plants or animals (e.g. coralgal, marl and shell substrates). In reference areas the surface texture may range from thin organic deposits to mucky sand or bare sand. Root systems may trap fine sediments and decaying seagrass to form mucky / organic surface modifiers in these protected low-energy areas. Currently no official soil descriptions have been identified for Florida subaqueous soils. No laboratory data is available due to current ongoing mapping of subaqueous soils in Florida.

Table 4. Representative soil features

Parent material	(1) Fluviomarine deposits (2) Marine deposits–coral limestone
Surface texture	(1) Mucky sand
Drainage class	Subaqueous

Ecological dynamics

The information presented in this ecological site description (ESD) and state-and-transition model (STM) were developed using archaeological and historical information, published and unpublished scientific reports, professional experience, consultation with technical experts, and NRCS inventories and studies. The information presented is represented of a complex set of plant community dynamic and environmental variables. Not all scenarios or plants are represented and included. Key indicator plants, animals, and ecological processes are described to help guide land management decisions and actions. Due to lack of soils and vegetation mapping this site represents broad concepts of estuarine system, which can be split into more refined concepts based off landscape, soil type, and other abiotic factors later in the future.

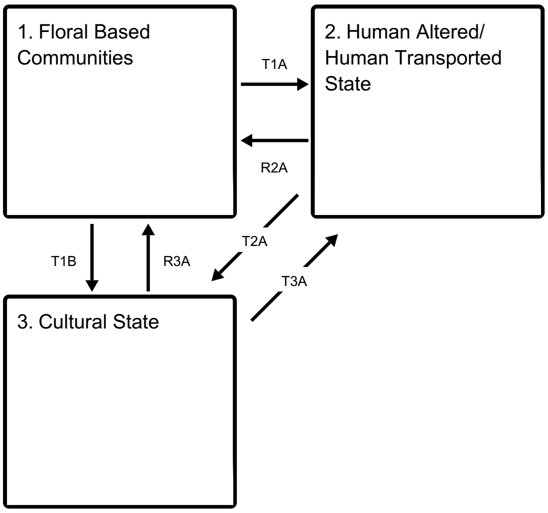
This ecosite consists of floral based submerged communities. Native vegetation includes rooted and floating seagrass and algal species, with cover ranges from 0 to 100%. Benthic vegetation helps stabilize unconsolidated substrates (sand, silty muck), entrap silt, recycle nutrients, provide shelter, habitat, and substrate for animals and other plant forms, provide important nursery grounds, and are important direct food sources. These communities are found in the subtidal zones in areas protected by barrier islands, beach ridges, sandbars, etc. Dense communities of vegetative habitats help reduce the wave-energy on the bottom and promotes settling of suspended particulates. The settled particles become stabilized by the dense roots and rhizomes that help soil accumulation. These communities are vulnerable to disturbances from both human and natural disturbances that are sensitive and can easily be destroyed or modified (e.g. dredging or extreme storm surges). The shifts in communities are often very subtle and can form matrixes within each community. Faunal communities (oyster beds, coral reefs, worm reefs) may be extensive and form interspersed matrixes within this ecosite, and provide important habitat and ecosystem functions that help protect the natural vegetated communities (See Other Information in the

Interpretations section for more information about these communities).

These are fragile communities, with disturbances causing community shifts or destruction of the community entirely. Human activities from dredging for boat channels or fill can cause infaunal organisms to be destroyed or to migrate out of the area from creating deeper zones in which sufficient light cannot reach the bottom to support vegetative growth. Removed materials can be deposited to create dredge spoils, which often can be formed as small islands, where vegetation can form anthropogenic communities with non-native species present. Where runoff waters contain excess nitrogen and phosphorus, phytoplankton blooms can decrease light penetration levels stressing or killing plants on the ground, as well as creating low dissolved oxygen levels that can cause fish kills. Accumulation of toxic levels of heavy metals, oil, and pesticides can also kill the infaunal organisms, eliminating food sources for fishes, birds, and other organisms. Typical disturbance events which cause shifts in the community are seen spreading from the point of entry into the estuary via riverine deposition or as over land sheet flow. Natural disturbances consist of storm events which can move and deposit sediments along other communities as well as washing out unstabilzied sediments, adding new material into the community. Generally, these areas are easily recolonized either by the same organism or a series of organisms which eventually results in the community returning to its original state once the disturbance has ceased.

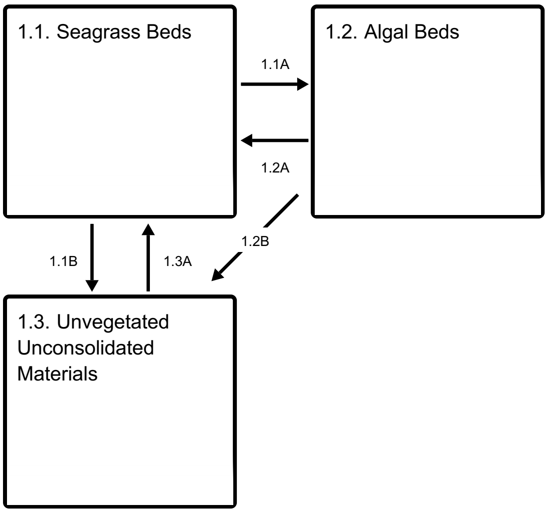
State and transition model

Ecosystem states



T1A - Dredging
T1B - Aquaculture Preparation
R2A - Fill and Replace Soil Material/ Seagrass Planting
T2A - Aquaculture Preparation
R3A - Fill and Replace Soil Material/ Seagrass Planting
T3A - Dredging

State 1 submodel, plant communities



1.1A - Decrease in Water Quality

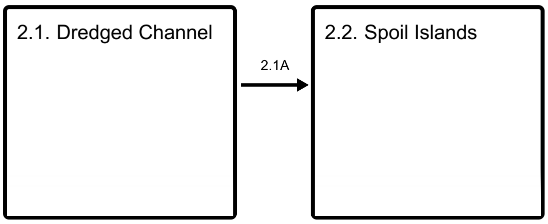
1.1B - Decrease in Water Quality

1.2A - Increase in Water Quality / Seagrass Replanting

1.2B - Decrease in Water Quality

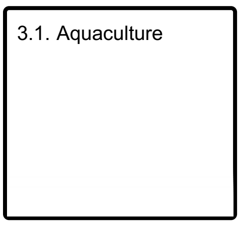
1.3A - Increase in Water Quality / Seagrass Replanting

State 2 submodel, plant communities



2.1A - Deposition of Spoil Material

State 3 submodel, plant communities



State 1
Floral Based Communities

These communities describe large populations of vascular and non-vascular aquatic plants, found in the subtidal zones. These communities provide habitat for smaller organisms as well as important food sources for marine organisms such as sea turtles and manatees. They are commonly found on unconsolidated substrates but can be found on consolidated substrates and act as stabilizers and reduces the wave-energy on the bottom and promotes settling of suspended particles. When found on unconsolidated substrates these communities are typically seen as extensive stands with one or more species present and open bare bottom areas. When found on or near consolidated substrates these communities are typically seen interspersed in faunal based communities occupying the space between organisms. The natural vegetation of this community includes seagrass and algal beds.

Community 1.1
Seagrass Beds

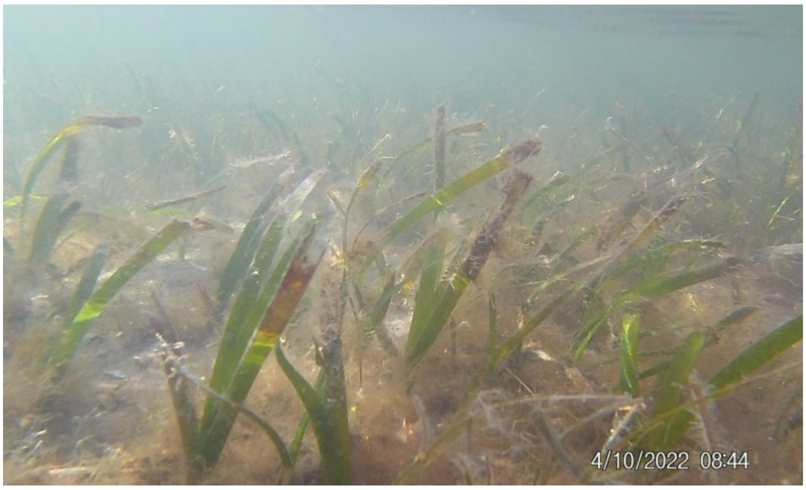


Figure 7. Dense bed of Turtle grass (Thalassia testudinum)

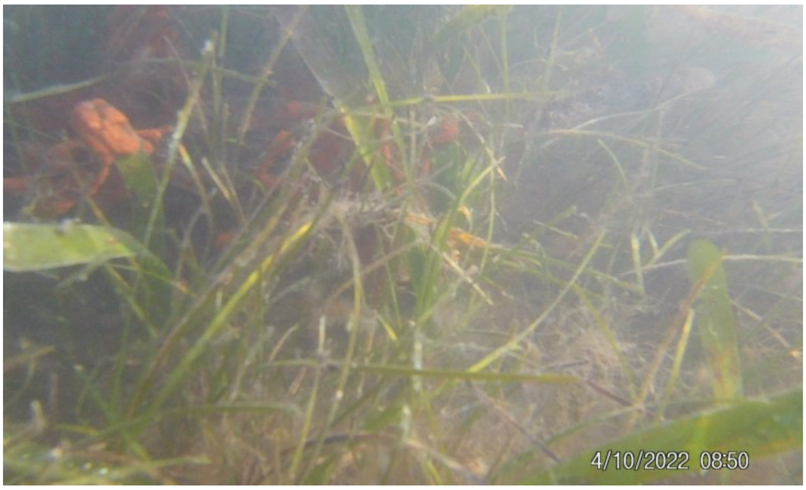


Figure 8. Dense Bed of Turtle grass (Thalassia testudinum) and Shoal grass (Halodule wrightii)

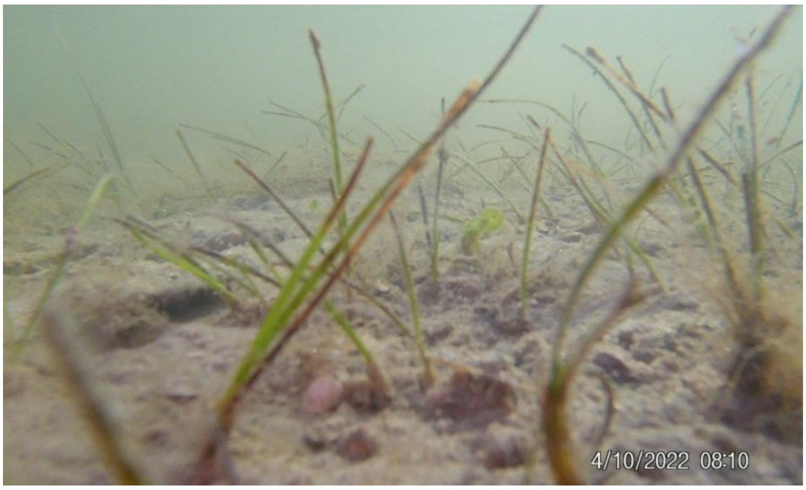


Figure 9. Patchy bed of Shoal grass (Halodule wrightii)

This community is typically characterized as expansive stands of vascular plants. This community occurs in subtidal (rarely intertidal) zones, in clear, coastal waters where wave energy is moderate. Seagrasses are not true grasses (Poaceae). These grasses play an important role in water quality and sediment stability, and where seagrass is present there is generally areas of soil accumulation. These are slow growing species and are indicator species for water quality and overall health of an estuarine ecosystem. Decreases in water quality may shift this community to an algal dominated community. There is a general pattern of seagrass distribution based on different environmental factors such as salinity, light, and air exposure. In shallow waters shoal grass (*Halodule wrightii*) is the most dominant species because it is able to tolerate exposure and high salinities better than other seagrasses. Turtle grass (*Thalassia testudinum*) can live at similar to slightly deeper depths of shoal grass. In deeper areas, turtle grass is replaced by manatee grass (Syringodium filforme), which forms large beds. In areas where light is able to penetrate deeper into water to support photosynthesis, seagrasses such as star grass (Halophila engelmanni) and paddle grass (Halophilia decipiens) can grow. Seagrass Beds are extremely vulnerable to human impacts. Many have been destroyed through dredging and filling activities or have been damaged by sewage outfalls and industrial wastes. In these instances, the Seagrass Beds are either physically destroyed, or succumb as a result of decreased solar radiation resulting from increased water turbidity. Seagrass Beds are also highly vulnerable to oil spills. Low concentrations of oil are known to greatly reduce the ability of seagrasses to photosynthesize. Extreme high temperatures also have adverse impacts on Seagrass Beds. The area surrounding power plant outfalls, where water temperatures may exceed 35°C (95°F), has been found to be lethal to seagrasses. Marine and Estuarine Seagrass Beds are susceptible to long term scarring cuts from boat propellers, anchors and trawls. Such gouges may require many years to become revegetated. When protected from disturbances, seagrasses have the ability to regenerate and recolonize areas. Additionally, some successful replanting of Seagrass Beds has been conducted. Seagrass beds often transition to algal beds when there has been a drop in the quality of water, either from increased siltation, turbidity, or excess of nutrients into the system via upland processes.

Resilience management. Because seagrass beds help trap sediments in the water column, they are often seen on areas with soil accumulation. Other factors affecting the establishment and growth of Seagrass Beds include water temperature, salinity, wave-energy, tidal activity, and available light. Generally, seagrasses are found in waters with temperatures ranging from between 20° and 30°C (68°-86°F). Seagrasses occur most frequently in areas with moderate current velocities, as opposed to either low or high velocities. Although Marine and Estuarine Seagrass Beds are most commonly submerged in shallow subtidal zones, they may be exposed for brief periods of time during extreme low tides. One of the more important factors influencing seagrass communities is the amount of solar radiation reaching the leaf blades. In general, the water must be fairly clear because turbidity blocks essential light necessary for photosynthesis. The rapid growth rate of seagrass under optimum conditions rivals that of most intensive agricultural practices, without energy input from man.

Dominant plant species

- shoalweed (*Halodule wrightii*), other herbaceous
- turtlegrass (*Thalassia testudinum*), other herbaceous
- (*Syringodium*), other herbaceous
- widgeongrass (*Ruppia maritima*), other herbaceous
- Caribbean seagrass (*Halophila decipiens*), other herbaceous
- Engelmann's seagrass (*Halophila engelmannii*), other herbaceous
- Johnson's seagrass (*Halophila johnsonii*), other herbaceous

Dominant resource concerns

- Nutrients transported to surface water
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Aquatic habitat for fish and other organisms

Community 1.2
Algal Beds

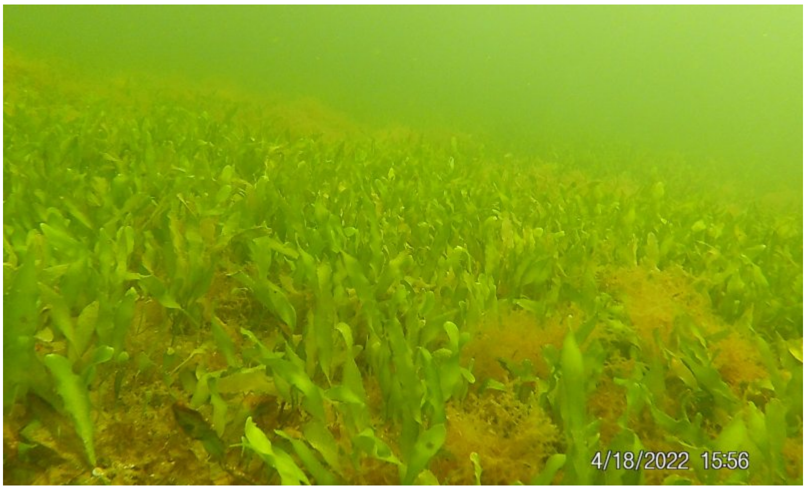


Figure 10. Continuous algal bed consisting of Caulerpa prolifera and drift algae.

Figure 11. Aerial view of patchy algal beds

This community is characterized as large populations of nondrift macro or micro algae. They occur primarily when there has been a drop in the water quality, either from increased siltation, turbidity, or excess of nutrients into the system via upland processes. This community may be found in the sub-, inter-, or supratidal zones on consolidated and unconsolidated substrates. This community acts as indicators of decreasing water quality and appear alongside with seagrass beds when water quality begins to decrease. The dominant plant species include Anadyomene, Argardhiella, Avrainvella, Batophora, Bryopsis, Calothrix, Caulerpa, Chrondia, Cladophora, Dictyota, Digenia, Gracilaria, Halimeda, Laurencia, Oscillatoria, Penicillus, Rhipocephalus, and Sargassum species.

Dominant plant species

- caulerpa (*Caulerpa*), other herbaceous

Dominant resource concerns

- Nutrients transported to surface water
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Aquatic habitat for fish and other organisms

Community 1.3
Unvegetated Unconsolidated Materials

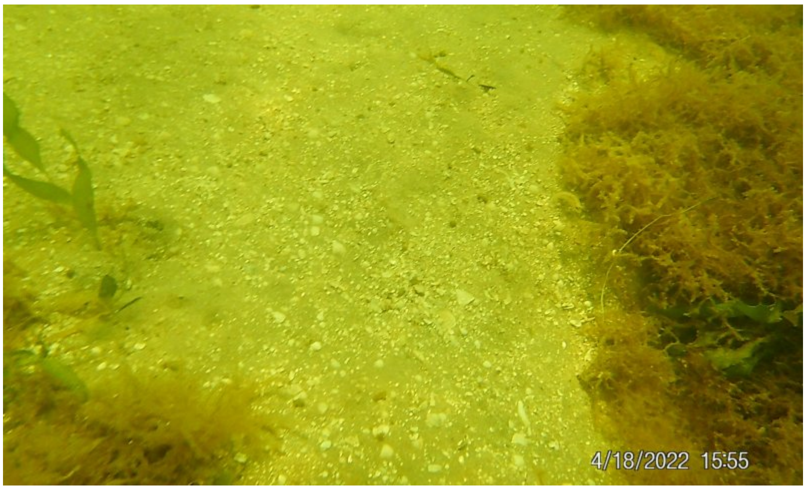


Figure 12. Unvegetated unconsolidated substrates (sand/ shells) with patches of drift algae and Caulerpa prolifera

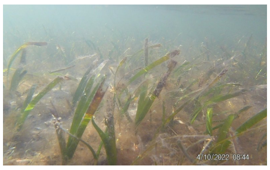
Figure 13. Landscape showing patches of unvegetated unconsolidated substrates interspersed with SAV cover

This is characterized as expansive, relatively open areas of subtidal, intertidal, and supratidal zones which lack dense populations of sessile plant and animal species. Unconsolidated substrates are unsolidified materials and include coralgal, marl, mud, mud/sand, sand, or shells. This community may support a large population of infaunal organisms as well as a variety of transient planktonic and pelagic organisms. This is the primary medium in which the floral based communities will grow on and help stabilize. This is typically seen when poor water quality kills off existing floral species, leaving behind the medium for their growth. Areas which have become unvegetated may remain in this state for long periods of time, and may require seagrass planting to transition back to the vegetated community. In general, unconsolidated substrate communities are the most widespread in the world, and vary throughout the coast of Florida, based on surrounding parent material. In south Florida, marl and coralgal substrates are the most widespread, with the remaining kinds of unconsolidated substrates present but slightly less common. While these communities may seem relatively barren, the densities of infaunal organisms in subtidal zones can reach the tens of thousands per meter square, making these areas important feeding grounds for many bottom feedings fish. The intertidal and supratidal zones are extremely important feeding grounds for many shorebirds and invertebrates. Unconsolidated substrates are important in that they form the foundation for the development of other marine and estuarine and coastal communities when conditions become appropriate. Along sandy bottoms, low energy wave action makes sand appear along ripples, allowing seagrass or algae to grow and stabilize the area.

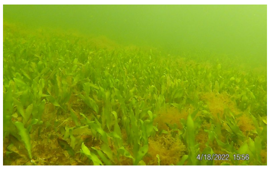
Dominant resource concerns

- Nutrients transported to surface water
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Aquatic habitat for fish and other organisms

Pathway 1.1A
Community 1.1 to 1.2



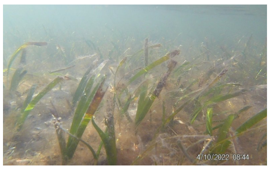
Seagrass Beds



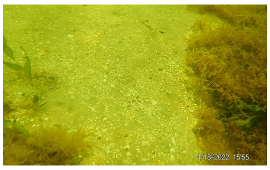
Algal Beds

This transition is driven primarily by decreases in water quality. Common decreases in water quality include increased siltation, turbidity, excess of nutrients into the system, reduction of light, or a combination of the above.

Pathway 1.1B
Community 1.1 to 1.3



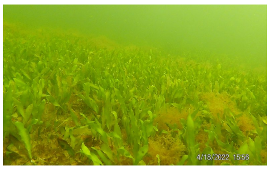
Seagrass Beds



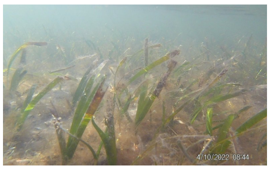
Unvegetated Unconsolidated Materials

This transition is driven primarily by decreases in water quality. Common decreases in water quality include increased siltation, turbidity, excess of nutrients into the system, reduction of light, or a combination of the above.

Pathway 1.2A
Community 1.2 to 1.1



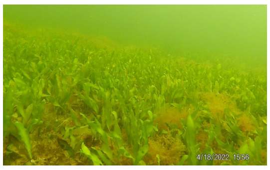
Algal Beds



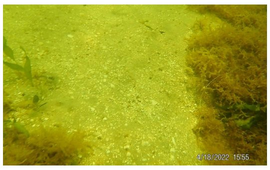
Seagrass Beds

This transition is driven from an increase in water quality. This increase in water quality may provide the opportunity for seagrass regrowth. Transplanting of seagrass species might be necessary for the community to become established again.

Pathway 1.2B
Community 1.2 to 1.3



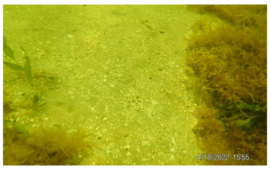
Algal Beds

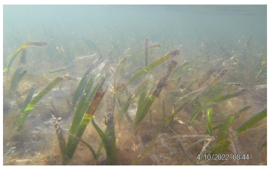


Unvegetated Unconsolidated Materials

This transition is driven primarily by decreases in water quality. Common decreases in water quality include increased siltation, turbidity, excess of nutrients into the system, reduction of light, or a combination of the above.

Pathway 1.3A
Community 1.3 to 1.1





Unvegetated Unconsolidated Materials

Seagrass Beds

This transition is driven from an increase in water quality. This increase in water quality may provide the opportunity for seagrass regrowth. Transplanting of seagrass species might be necessary for the community to become established again.

State 2
Human Altered/ Human Transported State

This state describes the impact from anthropogenic sources which can change the vegetative structure of a community that often cannot transition back to the natural community.

Community 2.1
Dredged Channel

This community is created from the anthropogenic effect of dredging the bottom of an area to create a wider opening for the passage of large boats and other marine vessels. The removal of material is often deposited in large quantities in the form of spoil islands.

Dominant resource concerns

- Nutrients transported to surface water
- Elevated water temperature
- Aquatic habitat for fish and other organisms

Community 2.2
Spoil Islands

Spoil islands are the result of deposited dredged materials when creating a deep channel. They are typically characterized by large mounds which are usually unvegetated that protrude from the landscape. If the spoil islands rise above the daily tidal limit they may be colonized by invasive non-native species. Mangroves are often found growing along the border of spoil islands.

Dominant resource concerns

- Nutrients transported to surface water
- Sediment transported to surface water
- Elevated water temperature
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

Pathway 2.1A
Community 2.1 to 2.2

This transition is driven by the deposition of spoil materials into one area.

State 3
Cultural State

This state describes the use of the natural environment for cultural purposes.

Community 3.1
Aquaculture

This community describes the culturally managed resources found within estuarine systems for aquaculture production. The main product of aquaculture in Southwest Florida is shellfish, which was originally established as means of taking pressure off declining wild populations. Expansions of aquaculture products to fish and seaweed are also possibilities for aquaculture managers. Common shellfish cultivated in this state are oysters, mussels and clams. These communities assist in increasing water quality for surrounding areas due to the large amounts of water shellfish are able to filter per day.

Resilience management. Successful aquaculture production requires good, clean water free from contamination. The biggest challenge for shellfish aquaculture comes from decreasing water quality and red tide blooms which cause massive die offs.

Dominant resource concerns

- Nutrients transported to surface water
- Sediment transported to surface water
- Elevated water temperature
- Plant productivity and health
- Plant structure and composition
- Aquatic habitat for fish and other organisms

Transition T1A
State 1 to 2

This is an anthropogenic process of dredging. This is the removal of material from the bottom of the submerged system for the creation of channels for large boats and other marine vessels to pass through.

Transition T1B
State 1 to 3

This transition describes the process of establishing and managing an area for aquaculture practices such as shellfishing, fish farms, or seaweed farms.

Restoration pathway R2A
State 2 to 1

This restoration includes the removal of altered habitat and filled and replanted with native seagrass species to that area.

Transition T2A
State 2 to 3

This transition describes the process of establishing and managing an area for aquaculture practices such as shellfishing, fish farms, or seaweed farms.

Context dependence. Aquaculture Preparation

Restoration pathway R3A
State 3 to 1

This restoration includes the removal of altered habitat and filled and replanted with native seagrass species to that area.

Transition T3A
State 3 to 2

This is an anthropogenic process of dredging. This is the removal of material from the bottom of the submerged system for the creation of channels for large boats and other marine vessels to pass through.

Additional community tables

Animal community

These communities are important feeding grounds and nursery habitats for many sessile organisms. These may include:

Mammals: West Indian Manatees (Trichechus manatus) and bottlenose dolphins (Tursiops spp.) use these habitats as a food source. Mollusk reefs that are exposed during low tides are frequented by raccoons (Procyon lotor) from nearby terrestrial habitats.

Fish: These serve as nursery and feeding grounds for many fish. Common species include red drum (Sciaenops ocellatus), southern flounder (Paralichthys lethostigma), stingrays (Myliobatoidei spp), seahorses (Hippocampus spp.), spot (Leiostomus xanthurus), cownose ray (Rhinopter bonasus), gulf menhaden (Brevoortia patronus), gafftopsail catfish (Bagre marinus), pinfish (Lagodon rhomboides), spotted seatrout (Cynoscion nebulosus), tarpon (Megalops atlanticus), bonefish (Albula vulpes), Florida pompano (Trachinotus carolinus), sheepshead (Archosargus probatocephalus), permit (Trachinotus falcatus), striped mullet (Mugil cephalus), great barracuda (Sphyraena barracuda), and long-horned cowfish (Lactoria cornuta).

Invertebrates: These species are very numerous in this ecosite and include marine snails, clams, scallops, polychaete worms, blue crab (Callinectes sapidus), starfish (Asteroidea), sea urchins (Echinoidea), juvenile spiny lobsters (Panulirus argus) burrowing shrimp (Thalassinidea), mud crab (Xanthidae), stone crab (Menippe mercenaria), pea crab (Pinnotheridae), amphipods, corals and sponges.

Birds: Many bird species depend on estuaries for a source of food, whether from feeding on benthic invertebrates or preying on fish. As top predators within this community their presence reflects the overall health of this system. Some common species may include blue heron (Ardea herodias), brown pelican (Pelecanus occidentalis), white pelican (P. erythrorhynchos), Double-crested cormorant (Nannopterum auritum), snowy egret (Egretta thula), wood stork (Mycteria americana), sandhill crane (Grus canadensis), roseate spoonbill (Platalea ajaja), osprey (Pandion haliaetus), white ibis (Eudocimus albus), Bald Eagle (Haliaeetus leucocephalus), turkey vulture (Cathartes aura), common moorhen (Gallinula chloropus), and many more. This is a very diverse community and dependent on many birds for forage, nursing grounds, migratory and permanent residency.

Hydrological functions

These habitats historically received large quantities of freshwater via the Everglades and Big Cypress ecoregions. However, substantial alteration to accommodate the rapid growing south Florida population has greatly reduced the freshwater inflow into the Southern Coast and Islands ecoregion over the past century. Most of this reduction results from extensive series of drainage channels constructed to regulate flow for agriculture and flood control (Central and South Florida Project, South Dade Conveyance System, Flagar Railroad, etc.). Water which once might have flowed into this system has been diverted east towards the Atlantic Ocean. Many of these areas receive their freshwater input as sheet flow through the Taylor River and Shark River Slough but are lower than historic volumes because of current water management practices.

Altered freshwater flow can increase the salinity within this ecosite, causing slime mold infections of Thalassia spp. With greater salinity and decreases of Ruppia & Halodule spp. Salinity levels are usually at their highest during late spring, right before the wet season, and has been observed as high as 70 ppt in the Florida Bay. Areas which may be cut off from tidal actions due to mud banks or outwash islands as seen in the Florida Bay also may have high salinity levels due to lack of circulation. The unconsolidated substrate barriers (Sand outwash islands, tidal flats, etc.) which prevent circulation can be destroyed via high intensity storms which reestablishes circulation, however accumulation of sediment on these barriers can be comparable to sea level rise and continue restriction of water circulation, allowing for the growth of vegetative communities on the islands.

Light is mandatory for growth and survival of seagrasses, and light availability is strongly affected by water depth. Water depths in semi-enclosed estuarine systems are influenced by seasonal changes, by tides when near an inlet, during storm events, or from natural changes over periods of time. Rises in sea levels will decrease light penetration to floral based communities which will lead to a slow die-off of these species, many of which are relied on as habitat and food by marine organisms. If accumulation of sediments that restrict water circulation does not keep up with sea level rise, estuarine systems will shift to a more marine system, increasing water circulation and decreasing these fragile communities. Sea level rise will minimize the impact of attempted watershed restoration to preserve these communities from other disturbances as saltwater intrusion moves further inland, as well as causing low wave energy dependent terrestrial vegetation such as mangrove swamps and salt marshes to move further inland.

The habitats are mainly influenced by tidal fluxes but can be impacted by storm events such as physical damage and scouring from underwater transport of sediments. Faunal communities such as coral reefs, oyster beds, worm reefs, etc. (see Other Information below for more about these communities) may function to filter water and help protect the low energy floral based communities from high wave action during storm events. Storm events can help slow the process of coral bleaching however, with passage of storm events decreasing sea surface temperatures as well as allowing for mixture of surface waters due to intense winds. Storm events typically occur from the beginning of June to the end of November, with peak conditions during the months of August and September.

Excessive runoff from both urban and agricultural areas can lead to excessive nutrients, primarily nitrogen (N) and phosphorus (P), entering these systems and causing eutrophication. Nutrient uptake in macro drift algae (MDA) present in these systems may remove some excess nutrients from the water column, but increase in these species may shade out seagrass communities. When these MDA are removed from the system or die, these nutrients are released back into the system, becoming available for plankton uptake. This leads to phytoplankton blooms which decreases water quality, with high populations causing the water to appear blue-green, green, brown or red, depending on the pigments found in the blooming species group. Short term blooms disappear once the source of nutrients are gone or when growing conditions are no longer favorable, however, when the nutrient source is continuous and conditions remain favorable, blooms may become long term events that can impact the surrounding ecosystem. Sustained blooms can block out or reduce sunlight reaching seagrasses, which can stress or kill the plants, with many animals dependent on seagrass for habitat and foraging grounds. The loss of seagrass can also reduce water clarity since seagrasses help trap and stabilize sediments on the seafloor, which can cloud the water column, further reducing light levels able to reach the seafloor. It is believed increased sedimentation from seagrass die off may cause detrimental positive feedback loops which hampers the recruitment of new shoots when the bloom subsides, creating a difficult environment for seagrass recovery. Blooms can also shift the producers at the base of the food web, with the blooming species most abundant it outcompetes other species that organisms higher up the food chain depend on as a food source. Long term blooms can also cause low dissolved oxygen levels, taking place during the night when the bloom species use more oxygen than they produce in photosynthesis. And as species die off, they undergo decomposition which also removes dissolved oxygen from the water column, all of which can lead to massive fish kills due to lack of oxygen. Few species of phytoplankton also produce toxins or poisons, which can have health impacts in humans and animals, coined as Harmful Algal Blooms (HABs). The “red tide” as seen sometimes in Florida waters is an example of HABs and can cause respiratory irritation in humans and animals and make filter feeders such as clams and oysters unfit for human consumption. Restoration of these systems to prevent blooms would consist of reducing anthropogenic inputs into the system, often fixed by creating better water management plans for the surrounding upland community.

Recreational uses

These areas are highly recreated areas in which millions of people from around the world come visit. Eco-tourism, including snorkeling, scuba diving, swimming, boating, birdwatching, dolphin and manatee sightseeing tours, etc., are highly seen activities throughout this ecosite. Fishing is also very popular due to the warm weather year-round and diverse species of fish.

Wood products

This ecosite is not suited for commercial wood production.

Other products

This ecosite provides habitat for economically important species such as pink shrimp (Farfantepenaeus duorarum), stone crab (Menippe mercenaria), spiny lobster, and commercial fish, which provides economic stability for many people who rely on this industry. Economic value of seafood production within the state varies from year to year and updated information can be found using the Fisheries Economics of the United States Tool provided by NOAA (https://www.fisheries.noaa.gov/data-tools/fisheries-economics-united-states-interactive-tool). There are no prospects for oil and gas drilling within this ecosite due to its protected nature.

Other information

Faunal Based Communities:

These communities mentioned below may exist interspersed with the native vegetation and provide a variety of ecological functions. These communities have not been fully included within this ecological site description because they are faunal based communities and are not the main focus of this product. While briefly mentioned in the Animal Communities Interpretation Section above, their functions and benefits are described more in depth below.

Coral Reefs:
Coral Reefs provide shelter and food for a myriad of reef fishes and marine invertebrates. Depending on light availability and other environmental factors, seagrass and other vegetation can be found growing adjacent to coral reef communities. These are slow growing communities, and are very fragile to changes in water temperature, salinity and nutrient availability. Coral reefs act as a buffer, protected inland communities from storms, high wave energy, and floods. This function helps create low wave energy areas in which seagrass beds may form. When these reefs are destroyed or damaged, the absence of this natural barrier can increase the damage to inland communities from normal wave action or during extreme storm events.

Artificial reefs are an important restored habitat for this ecosite, helping to assure the long-term social, economic, and quality of life values that not only benefit the local and regional economies of Florida, but create habitat for these protected subaqueous seagrass communities. Scientists can use artificial reefs to research how they function ecologically and physically along changing water conditions as well as helping boost the local economies through aquatic tours such as scuba diving, charter fishing, etc. these reefs can be constructed from concrete (bridge spans, rubble, etc.), metal (I-beams, scraps, etc.), modules (reef balls, A-frames, etc), rocks (Limestone boulders), vessels (barges, decommissioned naval ships, sailboats), and other materials such as tires.

Mollusk Reefs:
Also known as oyster beds, this community is dominated by sessile mollusks that occur in the subtidal and intertidal zones. They can be found growing on consolidated substrates and may be found along the border of mangrove swamps growing on the prop roots in the water. In addition to providing a food source for estuarine species, this community also helps buffer coastlines and inland communities from high wave action and extreme storm events, providing habitat for seagrass communities. These organisms are filter feeders, while filter and clean water while removing excess nutrients from the system to grow, increasing water quality. Increasing water depth and water temperatures are major threats to this community, damaging and destruction of these communities can increase the damage to inland communities from normal wave action or during extreme storm events.

Oyster reef restoration in Florida assists in restoration of estuarine systems that provide habitat for other faunal and floral based communities. Restoration efforts include recycling oyster shells from restaurants and creation of artificial reefs which act as hard substrate for oyster reef development.

Octocoral Beds
This community is characterized as large populations of sessile invertebrates of the Class Anthozoa, Subclass Octocorallia, Orders Gorgonacea and Pennatulacea. The dominant animal species are soft corals such as gorgonians, sea fans (Gorgonacea), sea feathers and sea plumes (Pseudopterogorgia spp.), sea fingers (Briareum asbetinum), sea pansies (Renilla spp.), sea rods (Plexaura spp.), and sea whips (Leptogorgia spp.). While these may look like they are vegetation, they are in fact planktonic filtering invertebrates. These communities provide habitat for benthic species that utilize seagrass beds for juvenile development and mating. Similar to mollusk reefs these communities are also planktonic feeders which filter and clean water, as well as acting as buffers for inland communities.

Sponge Beds
Sponge beds are characterized as dense populations of sessile invertebrates of the phylum Porifera, Class Demospongiae. The dominant animal species are sponges such as branching candle sponge (Verongia longissima), Florida loggerhead sponge (Spheciospongia vesparium) and sheepswool sponge (Hippiospongia lachne). Similar to the octocoral beds these communities provide habitat for benthic species that utilize seagrass beds at some point in their life, as well as acting as buffer zones for inland communities.

Worm Reefs
These reefs are characterized by large colonial conglomerates of rigid Sabellariid worm tubes of the species Phragmatopoma lapidosa. These communities act as buffers for inland communities as well as providing suitable hard substrate habitat for other faunal organisms such as mollusks to use as a growth medium.

Inventory data references

Information presented was derived from NRCS clipping data, current and historical literature, field observations, and personals contacts with local, state and federal partners. This is a provisional level ESD and is subject to change as more information becomes available, for any questions please contact your local NRCS office.

This is an ongoing project with the NRCS Coastal Zone Soil Survey (CZSS)and is subject to change as more information becomes available. CZSS is a SSURGO (Order 2 soil survey map and data) product that focuses the soil survey maps and data in the coastal zone which includes the dunes, marshes, beaches, anthropogenic coastal areas and the shallow-subtidal subaqueous soils (submerged lands) where submerged aquatic vegetation (SAV) is either growing or has the potential to grow. Once completed a coastal zone soil survey provides detailed (1:12,000 scale) spatial soil maps (points, lines, and polygons), a rich database of soil chemical and physical properties, site data, and interpretations for coastal applications (beach replenishment, aquaculture, coastal blue carbon, restoration, etc.).

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Approval

Charles Stemmans, 2/07/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/13/2025
Approved by	Charles Stemmans
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**