USDA Natural Resources Conservation Service

Ecological site R156BY100FL
Subaqueous Freshwater Riverine Habitats

Last updated: 2/07/2025
Accessed: 02/20/2025

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): 156B–Southern Florida Lowlands

This area is in the Floridian section of the Coastal Plain province of the Atlantic Plain. It is on nearly level lowlands. A few hummocks rise 3 to 6 feet (1 to 2 meters) above the general level of the landscape. Elevation ranges from near sea level to 26 feet (8 meters).This area is a dominantly wetland ecosystem that has been heavily influenced by human activity. It supports hummock and slough wetland vegetation. Remaining native savanna and scrub areas consist of native grasses, forbs, sedges, and a few scattered pines. Slash pine and cabbage palm are the dominant overstory species. Saw palmetto, cordgrasses, and bluestems make up the understory. Major wildlife species include white-tailed deer, feral hog, gray fox, raccoon, opossum, armadillo, rabbit, tree squirrel, wild turkey, bobwhite quail, mourning dove, Florida mallard, and woodpecker.

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: 75 Southern Coastal Plain; 75d Eastern Florida Flatwoods (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013)

-Florida Natural Area Inventory, 2010 Edition: Riverine (FNAI, 2010)

Ecological site concept

The Subaqueous Freshwater Riverine Habitat are typically permanently submerged sites found as natural, flowing waters from their source to the downstream limits of tidal influence, bounded by channel banks. Water depth is variable depending on the time of year and will support both subaqueous and water emergent vegetation. These sites are highly used for recreation and support a high diversity of wildlife. Notable sites in this MLRA include the upper St. Johns River as well as multiple large canals which connect lakes and restoration areas.

Associated sites

R156BY150FL	**Subaqueous Freshwater Lacustrine Habitats** This site feeds and is fed by the riverine habitats.
R156BY011FL	**Mineral Floodplain Marshes and Swamps** This site will occur within the floodplain of the river system and support permanent high water tables and frequent slow moving surface water for hydric mineral soil development.
R156BY010FL	**Histisol Floodplain Marshes and Swamps** This site will occur immediately adjacent in the floodplain of the river system and support permanently high water tables and frequent slow moving surface water for histisol soil development and perpetuance.

Similar sites

R156BY150FL	**Subaqueous Freshwater Lacustrine Habitats** The Subaqueous Freshwater Lacustrine Habitats may be confused with the Subaqueous Freshwater Riverine Habitats during periods of extremely slow moving water in the very flat landscape of MLRA 156B.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Vallisneria americana* (2) *Nuphar*

Physiographic features

These sites are found within riverine communities. Riverine systems are contained within a channel, described as an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. They are enclosed on the landward sides by the channel bank (including natural and man-made levees), or by wetlands dominated by trees, shrub, persistent emergents, emergent mosses, or lichens. Over long periods of time the channel of riverine systems may change, as erosion, deposition, and transport of sediment occurs, following the path of least resistance through the landscape. These sites move from areas of high elevation to areas of low elevation, causing a continuous flow of water. In this MLRA, slight gradients create very slow-moving rivers, allowing for large floodplains which support large freshwater non-forested wetlands to function as a water storage area.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Marine terrace (2) Marine terrace > River > Channel
Runoff class	Very high
Flooding duration	Very long (more than 30 days)
Flooding frequency	Very frequent
Elevation	0–80 ft
Slope	0–1%
Water table depth	0 in
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation in this area is 40 to 62 inches (1,015 to 1,575 millimeters). About 60 percent of the precipitation occurs from June through September. The center of the area is the driest part. Most of the rainfall occurs as 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 is 73 to 78 degrees F (23 to 25 degrees C). The freeze-free period averages 365 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	53-59 in
Frost-free period (actual range)	365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	52-61 in

Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	56 in

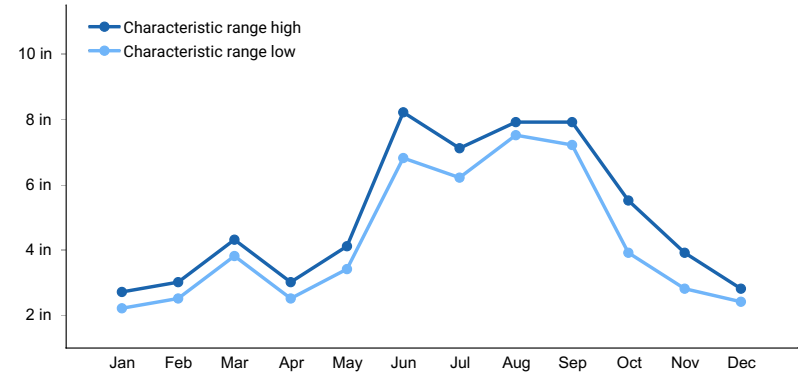


Figure 1. Monthly precipitation range

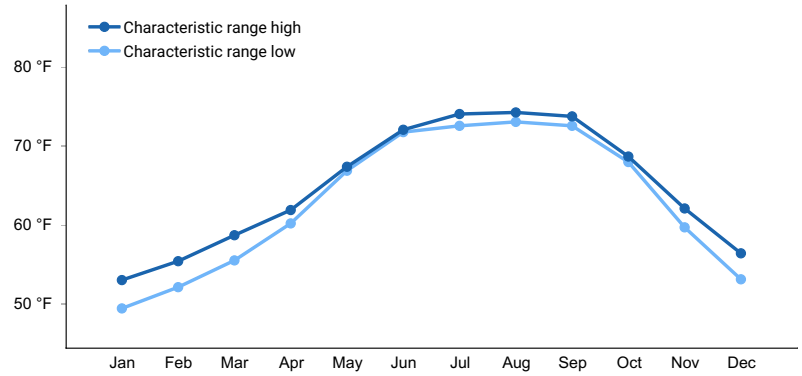


Figure 2. Monthly minimum temperature range

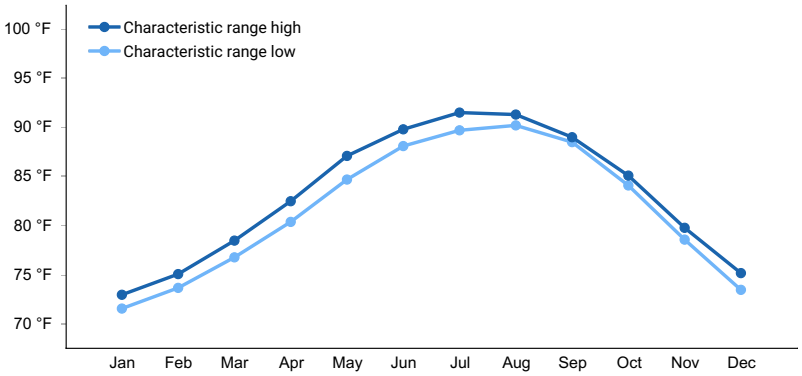


Figure 3. Monthly maximum temperature range

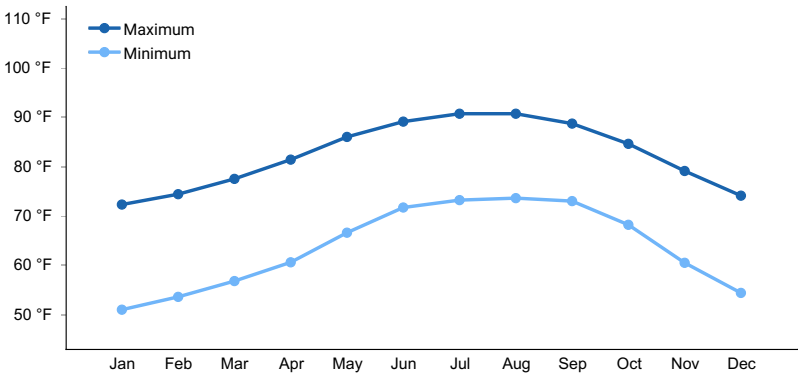


Figure 4. Monthly average minimum and maximum temperature

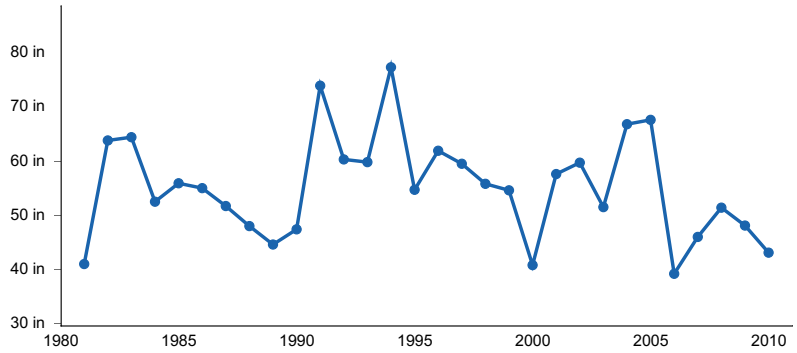


Figure 5. Annual precipitation pattern

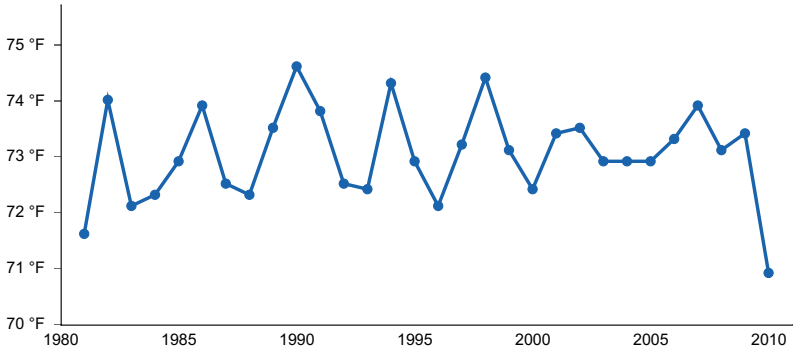


Figure 6. Annual average temperature pattern

Climate stations used

- (1) PALM BEACH GARDENS [USC00086764], Palm Beach Gardens, FL
- (2) CANAL POINT USDA [USC00081276], Belle Glade, FL
- (3) PORT SALERNO 5W [USC00087304], Stuart, FL
- (4) VERO BEACH 4SE [USC00089219], Vero Beach, FL
- (5) MELBOURNE INTL AP [USW00012838], Melbourne, FL
- (6) TITUSVILLE [USC00088942], Titusville, FL
- (7) FOREVER FLORIDA [USC00083026], Saint Cloud, FL

Influencing water features

Water is usually, but not always, flowing in the Riverine System. Upland islands or palustrine wetlands may occur in the channel, but they are not included in the Riverine System. The major river which runs through this MLRA is the St. Johns River, which extents from the headwaters of Ft. Drum Creek northward to its opening into the Atlantic Ocean (in MLRA 155). The headwaters of this river act as major overland sheet flow from Ft. Drum Creek into man made canals to the opening of Lake Hellen Blazes where it becomes a navigable slow moving natural river system. It is driven by freshwater inputs through rainfall, seasonal blackwater streams, and tributaries. Slight gradients and large floodplains function as a water storage area, serving as a natural regulator of high and low water stages. These waterways connect several shallow lakes with the MLRA basin, which act as public water supply and irrigation supply for surrounding areas.

Wetland description

Classification: Cowardin
System: Riverine
Subsystem: Lower Perennial
Class: Aquatic Bed / Non-persistent Wetland

Soil features

Many of the soils in riverine systems typically have sandy bottoms frequently underlain by limestone. Organic

materials may be present overlaying the sandy bottom in some areas of extreme low water flow or permanently flooded marsh systems. The surface materials are highly variable and are deposited over time from constant fluctuations in river flow. Unconsolidated substrates can originate from organic sources such as decaying plant tissues or from water erosion of stream banks. Consolidated materials may be eroded from limestone outcrops and moved downstream during periods of high flow. Geology of this MLRA is influenced by the Anastasia Formation and Recent and Pleistocene marine and estuarine deposits. There are currently no correlated soil map units for these systems yet and will be addressed during future Initial Mapping Projects with the Coastal Zone Soil Survey project group.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Marine deposits–limestone
Surface texture	(1) Hydrous, grassy, parachannery sand
Drainage class	Subaqueous

Ecological dynamics

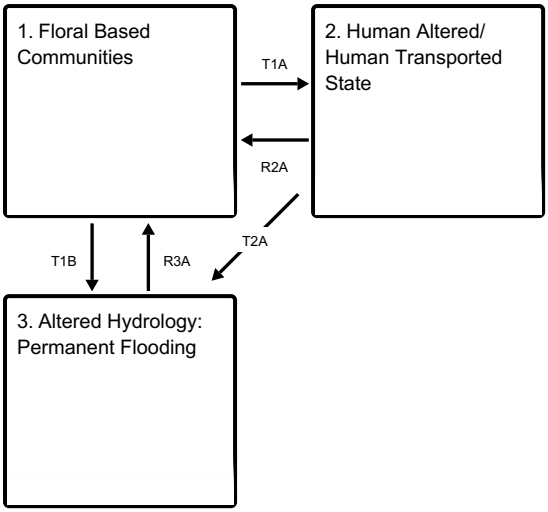
The information presented in this ecological site description (ESD) and state-and-transition model (STM) were developed using archaeological and historical information, published and unpublished scientific reports, professional experience, consultation with technical experts, and NRCS inventories and studies. The information presented represents 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.

This ecosite consists of floral based submerged communities as well as floating emergent vegetation. Native submerged vegetation includes rooted and floating seagrasses and algal species, with floating emergents such as lilies and floating hearts present towards the banks of the riverine system. Cover of vegetation species may range from very few along the fringe of the system to almost complete cover of the water surface. The more cover of the water surfaces the less light is available to support benthic vegetation. Benthic and emergent 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. Dense communities of vegetative habitats help 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 nutrient pollution) and will often be accompanied by a shift in vegetation when disturbed.

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 (aquatic animals in water bottom sediments) to be destroyed or to migrate out of the area. Deposition of spoil material may create spoil islands which can replace habitat for native species. Much of the vegetated communities are found along sandy bottoms, with rocky bottoms giving the system barren appearance. Water color may naturally range from clear water to tea-colored water, caused naturally by tannins, particulates and dissolved organic matter and iron derived from drainage through swamps and marshes. In areas where agriculture runoff is present, excess nitrogen and phosphorus causes eutrophication, creating phytoplankton blooms that block out light stressing or killing plants on the ground, as well as 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. Natural disturbances consist of flooding events which can move and deposit sediments along other communities as well as washing out sediments from flood zones, 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

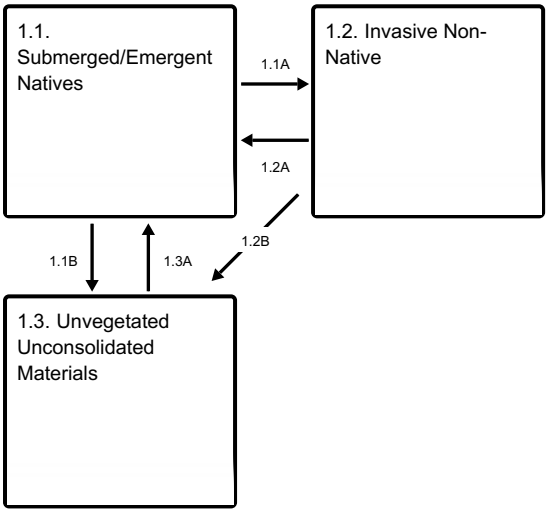
T1B - Damming

R2A - Fill/ Vegetation Replanting

T2A - Damming

R3A - Dam Removal

State 1 submodel, plant communities



1.1A - Decrease in Water Quality

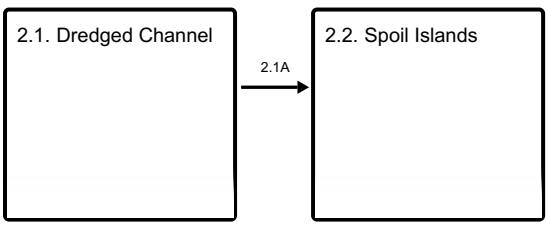
1.1B - Decrease in Water Quality

1.2A - Increase in Water Quality / Vegetation Replanting

1.2B - Decrease in Water Quality

1.3A - Increase in Water Quality / Vegetation Replanting

State 2 submodel, plant communities



2.1A - Deposition of Spoil Material

State 3 submodel, plant communities

3.1. Lacustrine Habitat

State 1
Floral Based Communities

These communities describe large populations of vascular and non-vascular submerged and emergent aquatic plants, found within the river channel. These communities provide habitat for smaller organisms as well as important food sources for marine organisms such as benthic organisms and fish. 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. The natural vegetation of this community includes seagrass and algal beds and floating water emergent species.

Community 1.1
Submerged/Emergent Natives

This community is typically characterized with stands of vascular submerged and emergent plants. These plants play important roles in water quality and sediment stability, and often where rooted aquatic vegetation occur there is generally areas of soil accumulation. These species act as indicator species for water quality and overall health of a riverine system. Decreases in water quality may shift this community to an invasive floating and emergent habitat. Typical emergent species may include goldenclub (*Orontium aquaticum*), smartweed (Polygonum spp.), pondlily (Nuphar spp.). and pondweed (Potamogeton spp.). Generally green filamentous algal species may be found along areas with unconsolidated substrates in submerged zones. The most dominant plant which grows in streambeds is tapegrass (*Vallisneria americana*).

Dominant plant species

- American eelgrass (*Vallisneria americana*), other herbaceous
- goldenclub (*Orontium aquaticum*), other herbaceous
- knotweed (*Polygonum*), other herbaceous
- pond-lily (*Nuphar*), other herbaceous
- pondweed (*Potamogeton*), other herbaceous

Community 1.2
Invasive Non-Native

This community describes the shift from the natural community to one dominated by invasive or non native introduced species when water quality begins to move out of desired growth conditions for native species. These species may shade out habitat and outcompete native species for essential nutrients and habitat. Common species may include the aquatic soda apple (*Solanum tampicense*), crested floating heart (*Nymphoides cristata*), Hydrilla (*Hydrilla verticillata*), Giant salvinia (*Salvinia molesta*), water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), and water spinach (*Ipomoea aquatica*). More information on these species and others may be found at: https://www.fdacs.gov/content/download/63140/file/Florida%E2%80%99s_Pest_Plants.pdf

Dominant plant species

- scrambling nightshade (*Solanum tampicense*), other herbaceous
- crested floatingheart (*Nymphoides cristata*), other herbaceous
- waterthyme (*Hydrilla verticillata*), other herbaceous
- kariba-weed (*Salvinia molesta*), other herbaceous
- common water hyacinth (*Eichhornia crassipes*), other herbaceous
- water lettuce (*Pistia stratiotes*), other herbaceous

- swamp morning-glory (*Ipomoea aquatica*), other herbaceous

Community 1.3
Unvegetated Unconsolidated Materials

This is characterized as expansive, relatively open areas of the river channel 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 organisms. Unconsolidated substrates are 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 replanting to transition back to the vegetated community.

Pathway 1.1A
Community 1.1 to 1.2

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

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

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

Pathway 1.2B
Community 1.2 to 1.3

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

This transition is driven from an increase in water quality. This increase in water quality may provide the opportunity for vegetation regrowth. Transplanting of native 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 while maintaining the natural river boundaries.

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.

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 surface water they may be colonized by invasive non-native species.

Pathway 2.1A
Community 2.1 to 2.2

This transition is driven by the deposition of spoil materials into one area. It is typically seen on nautical charts as underwater protruding dome or rectangle shaped areas.

State 3
Altered Hydrology: Permanent Flooding

This state describes alterations of the riverine system to create an artificial lake or pond by damming the natural flow of water.

Community 3.1
Lacustrine Habitat

This community describes the shift from a riverine community to a lacustrine habitat (See R156BY150FL) from natural or anthropogenic blocking of natural water flow.

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 is the natural or anthropogenic process of damming a natural flowing river. Natural damming processes including activities from beavers. Anthropogenic damming processes create artificial dams to block the natural flow of water. This floods the area behind the dam leaving behind a larger stagnant permanent body of water.

Restoration pathway R2A
State 2 to 1

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

Transition T2A
State 2 to 3

This is the natural or anthropogenic process of damming a natural flowing river. Natural damming processes including activities from beavers. Anthropogenic damming processes create artificial dams to block the natural flow of water. This floods the area behind the dam leaving behind a larger stagnant permanent body of water.

Restoration pathway R3A
State 3 to 1

This restoration includes the removal of the natural or anthropogenic dam to restore the natural flow of the riverine habitat before damming occurred.

Additional community tables

Animal community

Much of the upper St. Johns River Basin contains wildlife species which live in the system or are critically dependent on the system for survival. In the middle and lower river basin many of the species are present as well as marine mammals such as manatees and dolphins. Common species found in the upper basin include:

Reptiles: Brown water snake (Nerodia taxispolota), common snapping turtle (Chelydra serpentina), Florida softshell turtle (Apalone ferox), Striped mud turtle (Kinosternon baurii), and American Alligator (Alligator mississippiensis) are year-round residents, using the water as habitat and a food source.

Amphibians: Greater sirens (Siren lacertina), Green tree frog (Hyla cinerea), Pip frog (Lithobates grylio), and Southern leopard frog (L. sphenocephalus).

Fish: Black crappie (Pomoxis nigromaculatus), Bluegill (Lepomis macrochirus), Brown bullhead (Ameiurus nebulosus), Chain pickerel (Esox niger), Florida gar (Lepisosteus platyrhincus), Largemouth bass (Micropterus salmoides), Spotted sunfish (Lepomis punctatus), and White catfish (Ameiurus catus). These are the major game species found typically with Florida riverine systems, many more species may be present .

Birds: White ibis (Eudocimus albus), Tricolored heron (Egretta tricolor), Snowy egret (E. thula), Reddish egret (E. rufescents), Little blue heron (E. caerulea), Florida sandhill crane (Grus canadensis pratensis), Wood stork (Mycteria americana), Bald Eagle (Haliaeetus leucocephalus), Green-winged teal (Anas crecca), Hooded merganser (Lophodytes cucullatus), Mallard (Anas platyrhynchos) and Osprey (Pandion haliaetus). Many of these birds prey on fish and vegetation in this system and make nests along the border of water. Many migratory birds may also be seen during the winter breeding season.

Mammals: River otter (Lontra canadensis), Round-tailed muskrat (Neofiber alleni), and Raccoons (Procyon lotor) use this system for habitat and food sources. Other mammals will often use this system for a source of water.

Hydrological functions

The ecological integrity of this riverine ecosystem is dictated primarily by hydrologic influences (i.e. water level fluctuation and flow), which result from seasonal rainfall patterns. Seasonal rains raise the water levels, causing flooding into the adjacent floodplains. Seasonal flooding plays an important role in this system as it deposits sediment and nutrients required for plant growth in adjacent systems. Water quality plays a big role in the vegetation type, with poor quality leading to more algal blooms and invasive species. Both through the Federal Clean Water Act and the Florida Watershed Restoration Act, water quality is monitored and maintained which establish the maximum amount of pollutants a body of water can assimilate without exceeding water quality standards. Issues affecting the rivers water quality include point source pollutants from municipal separate storm sewer systems, domestic and industrial wastewater facilities, and non-point source pollutants.

The Upper basin of the St. Johns River is the major central water body for this MLRA. It is north flowing from its source in the marshes in Fort Drum Marshes to its mouth in Mayport (MLRA 155). Much of the St. Johns River floodplain has been diked, drained, and converted to agricultural production. Historically, rainfall entered the system as sheet flow from surrounding marshes, feeding the river system. These activities significantly impact the hydroperiod of the basin by reducing water retention times and accelerating flows. This alteration decreases the rivers natural ability to provide flood control and maintain water quality, which inadvertently affects wildlife and fish populations. Changes to the riverine system can negatively impact discharge areas into marine and estuarine systems which may connect.

Recreational uses

This community is highly recreated and used year-round. Common recreation activities include boating, swimming, fossil hunting, fishing, tourism, wildlife viewing and hunting (Waterfowl, Alligators).

Other information

Restoration efforts conducted by St. Johns Water Management District, University of Florida, Jacksonville University and other public and private institutes are ongoing projects to restore native habitat and water quality in the St. Johns River and its surrounding bodies of water.

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.

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Approval

Charles Stemmans, 2/07/2025

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St. Johns River Water Management District
Florida State Parks
Florida Department of Environmental Protection

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	02/20/2025
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:**