# Ecological site R156AY120FL
# Subtropical Keys Tidal Rock Barrens of Southern Coast and Islands

Last updated: 4/14/2025
Accessed: 09/24/2026

## 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 America. 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 terrestrial physiographic provinces ecoregions (Big Cypress, Everglades, Southern Coast and Islands, and Miami Ridge / Atlantic Coastal Strip) and one subaqueous ecoregion (Coastal Marine and Estuarine) on this section. This PES occurs within the Southern Coast and Island ecoregion. The Southern Coast and Islands Ecoregion, 5 m and below (17 ft and below) in elevation and includes the Ten Thousand Islands and Cape Sable, the islands of Florida Bay, and the Florida Keys. It is an area of mangrove swamps and coastal marshes, coral reefs, various coastal strand type vegetation on beach ridge deposits and limestone rock islands. Although freshwater habitats are limited or non-existent in this region, any freshwater that does occur for periods of time may have great ecological significance. Coastal rockland lakes are small and number, occurring primarily in the Florida Keys. These waters are alkaline, with high mineral content and highly variable salinity levels. The rockland lakes provide important habitat for several kinds of fish, mammals, and birds of the Keys. Reductions in the fresh groundwater lens that floats on the denser saline groundwater can severely affect these lakes.

## 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; 76D Southern Coast and Islands (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013) -Florida Natural Area Inventory, 2010 Edition: Marine and Estuarine Vegetative Wetlands; Keys Tidal Rock Barren (FNAI ,2010)

## Ecological site concept

The Subtropical Keys Tidal Rock Barren of Southern Coast and Islands ecological community occurs in flat, wet, supratidal coastal zones along relatively low energy coastlines. These are rocky scrub soils without continuous cover with much exposed and eroded white limestone at the surface. The main sources of water are from the ocean, where saltwater reduces competition of freshwater species, and from rainfall and runoff from adjacent uplands, which flushes salt from the site and delivers nutrients. The Keys Tidal Rock Barren only exists within the Florida Keys found upon Key Largo Limestone in the Upper Keys and Miami Limestone in the Lower Keys. These communities help protect other inland communities by absorbing the brunt of tropical storms and hurricanes and by mitigating coastal erosion. The major threat to this ecological site is sea level rise, which is replacing these saltwater tolerant communities with coastal wetlands such as salt marshes and mangrove swamps, sites that are more adapted to frequent flooding. This ecological site is very fragile and maintains high ecological diversity.

## Associated sites

| | |
|---|---|
| **F156AY130FL** | **Subtropical Forested Rocklands of Southern Coast and Islands**<br><br>The Subtropical Forested Rocklands of Southern Coast and Islands occurs in slightly higher landscape positions, and may grade into this community as marl and sand become more abundant. This site will support the growth of more upland terrestrial species on thin soils that are not influenced by tidal regimes. |
| **R156AY110FL** | **Subtropical Tidal Saline Wetlands of Southern Coast and Islands**<br><br>The Subtropical Tidal Saline Wetlands of Southern Coast and Islands occurs in slightly lower terrestrial landscape positions, and may grade into this community due to pneumatophores ability to trap herbaceous material and create its own highly organic sediment for new seedlings to propagate on. In depressions within the Tidal Rock Barrens where organic matter has accumulated this site may be present as small inclusions. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | (1) *Rhizophora mangle*<br>(2) *Avicennia germinans* |
| Shrub | (1) *Conocarpus erectus*<br>(2) *Lycium carolinianum* |
| Herbaceous | (1) *Leucanthemum vulgare*<br>(2) *Monanthochloe* |

## Physiographic features

These sites are highly protected and very fragile and subject to extended hydroperiods and varying salinity levels, reducing competition from freshwater species. The vegetative communities help stabilize land in coastal environments and act as a buffer zone during extreme weather events protecting upland communities. This site is found in supratidal zones that can become inundated during storm events and high spring tides, limiting species growth to extreme halophytes. This site occurs on gently sloping landforms ranging from 0 to 1% and occurs from sea level to 3 feet. This site occurs in limited geographic extent to areas formed on Miami Limestone and Key Largo Limestone within the Florida Keys.

The Southern Coast and Islands ecoregion falls under three major geographic units, the Pliocene series Tamiami Formation, a poorly defined lithostratigraphic unit containing a wide range of mixed carbonate-siliciclastic lithologies and associated faunas occurring at or near the surface. The Pleistocene series Miami Limestone, oolitic facies consisting of white to orangish gray, poorly to moderately indurated, sandy, oolitic limestone (grainstone) with scattered concentrations of fossils and bryozoan facies consisting of white to orangish gray, poorly to well indurated, sandy, fossiliferous limestone (grainstone and packstone). And the Pleistocene series Key Largo Limestone, a white to light gray, moderately to well indurated, fossiliferous, coralline limestone composed of coral heads encased in a calcarenitic matrix. Fossils found in all three geologic formations occur as casts, molds, and original materials. The fossils include corals, mollusks, bryozoans, barnacles, corals, echinoids, foraminifers and calcareous nanoplankton. These formations are highly porous and permeable and are part of the Biscayne Aquifer of the surficial aquifer system (Scott, 2001).

Geologic substrate plays little to no role in the development of this ecological site, which is driven by the highly adapted saltwater tolerant species which are able to physically and chemical alter the substrate they grow on.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Geomorphic position, flats | (1) Talf |
| Geomorphic position, terraces | (1) Tread |
| Slope shape up-down | (1) Linear |
| Slope shape across | (1) Linear |
| Landforms | (1) Coastal plain<br>(2) Island<br>(3) Marine terrace > Barrier island |
| Runoff class | High to very high |
| Flooding duration | Very brief (4 to 48 hours) |
| Flooding frequency | Very frequent |
| Ponding frequency | None |
| Elevation | 0 m |
| Slope | 0 % |
| Ponding depth | 0 cm |
| 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) | 370 days |
| Freeze-free period (characteristic range) | 370 days |
| Precipitation total (characteristic range) | 1,070-1,250 mm |
| Frost-free period (actual range) | 370 days |
| Freeze-free period (actual range) | 370 days |
| Precipitation total (actual range) | 1,040-1,400 mm |
| Frost-free period (average) | 370 days |
| Freeze-free period (average) | 370 days |
| Precipitation total (average) | 1,190 mm |

- (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) CURRY HAMMOCK SP [USC00082046], Marathon, FL
- (5) DUCK KEY [USC00082441], Marathon, FL
- (6) CONCH KEY [USC00081795], Marathon, FL
- (7) ISLAMORADA [USC00084320], Islamorada, FL
- (8) TAVERNIER [USC00088841], Tavernier, FL
- (9) JOHN PENNEKAMP SP [USC00084412], Key Largo, FL
- (10) FLAMINGO RS [USC00083020], Homestead, FL
- (11) EVERGLADES [USC00082850], Naples, FL

### Influencing water features

The gulf and Straits of Florida are the two influencing saline water features to this ecosite. High spring tides and storm events flush the supratidal zone, limiting growth to only saltwater tolerant species within the supratidal zones. Occasional low-energy waves in the supratidal zone promotes plant growth as well as seedling and propagule establishment. Whereas constant high-energy waves can prevent the deposition of fine sediments and cause erosion of the sediment bank along the shore during times of extreme weather events such as hurricanes and tropical storms. In the Florida Keys, tidal wetlands are often found along the sheltered side of islands with low energy wave action, with the exposed side supporting high energy coastal communities such as beaches and dune systems.

Different zones of vegetation mark different salinity levels in which species to grow. Spring tides and storm events are some of the only times when this site is inundated. Spray from coastal winds, and shallow water table and soils limits the growth of plants. In depressions filled with peat, mangrove and salt marsh communities may be present and constantly wet. As the transition moves upland to a buttonbush community, more freshwater species are able to compete due to flushing from upland sources via sheet flow from rainfall. Increased salinity levels due to sea level rise push mangrove and salt marsh communities further inland at the expense of these communities.

### Wetland description

Wetland Description: Cowardian
System: Estuarine
Subsystem: Intertidal
Class: Forested

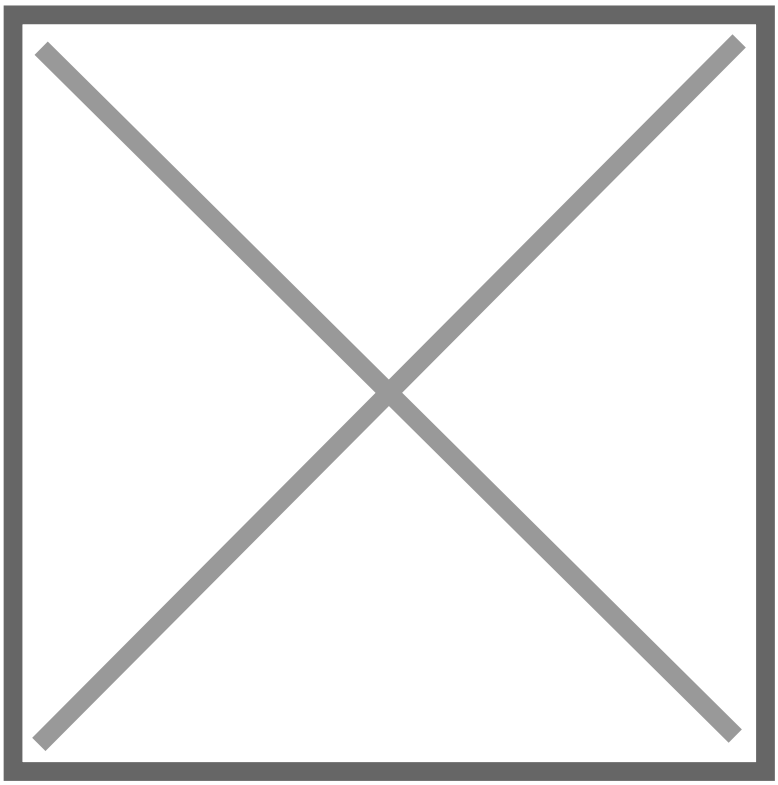

**Figure 7. Wave Energy (Average Breaker Height) in Florida modified from Fretwell et al. 1996. The SCI ecoregion falls under low wave energy, allowing for the dominant formation of tidal wetlands instead of coastal beaches similar to the MRR.**

## Soil features

Soils associate with this ecological site occur in the isohyperthermic soil temperature regime of MLRA 156A. The isohyperthermic soil temperature regime has mean annual soil temperatures of 22 °C (72?F) or more and a difference between mean summer and mean winter soil temperatures of less than 5 °C (41?F) at 50 cm (20 inches) below the surface.

Soils consist of discontinuous patches of thin marl soils over otherwise bare rock substrate. These are shallow, very poorly drained, highly carbonic and basic soils found over limestone bedrock or in slight depressions of exposed bedrock. Limestone is white in color, in contrast to the grey or black color of limestone exposed in lower tidal zones. Deeper depressions may accumulate peat and mud which can support mangrove swamps and salt marsh communities within the tidal rock barren. Representative soils for this community include Cudjoe and areas of Rock Outcrops (misc map units).

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Coastal marl – limestone<br>(2) Residuum – limestone |
| Surface texture | (1) Marly silt loam |
| Drainage class | Very poorly drained to poorly drained |
| Permeability class | Moderate |

| | |
|---|---|
| Depth to restrictive layer | 0 – 80 cm |
| Soil depth | 40 – 80 cm |
| Surface fragment cover <=3" | Not specified |
| Surface fragment cover >3" | Not specified |
| Available water capacity (0-81.3cm) | 6.86 – 13.72 cm |
| Calcium carbonate equivalent (0-81.3cm) | 70 – 90 % |
| Electrical conductivity (0-81.3cm) | 20 mmhos/cm |
| Sodium adsorption ratio (0-81.3cm) | 50 |
| Soil reaction (1:1 water) (0-81.3cm) | 10 – 8.2 |
| Subsurface fragment volume <=3" (0-81.3cm) | Not specified |
| Subsurface fragment volume >3" (0-81.3cm) | Not specified |

**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 ecological site is primarily dominated by salt tolerant species along low-energy coastlines. This site is found in high intertidal and supratidal zones and characterized by herbaceous and woody halophytic vascular plants. Fires are rare to non-existent in these communities. The main drivers behind the variations in this ecosite depend on salinity, tidal fluctuation, substrate, and wave energy. Keys tidal rock barren is a flat rockland with much exposed and eroded limestone and a sparse cover of stunted halophytic trees, shrubs, and

herbaceous species. The limestone has a white color, in contrast to the grey or black color of the limestone exposed in lower tidal zones, and it is inundated by salt water only during the equinoctial high tides or during storm events.

This community is confined within Florida to the Florida Keys on limestone bedrock, found along both shores facing the Florida Bay as well as the Straits of Florida. Keys tidal rock barren occurs above the daily tidal range but is subject to flooding by seawater during extreme tides and storm events. Salt spray from coastal winds, as well as shallow soils, may limit height growth of woody plants. Depressions with deeper peat and mud soils support mangrove swamp and salt marsh communities, dominated respectively by mangroves or Gulf cordgrass (Spartina spartinae). This community supports a gradient between the upper and lower Florida Keys, with species in the upper Florida Keys tend to be dominant with succulent halophytes while species in the lower Florida Keys tend to be dominant of salt tolerant grasses. This gradient is due to a difference in salinity, with less permeable Miami Limestone keeping the Lower Keys rock barrens less saline than rock barrens on the more permeable Key Largo limestone of the Upper Keys, however, management is the same regardless of the geology. At its seaward edge, Keys tidal rock barren borders regularly inundated mangrove swamps. Areas with greater than 50 percent cover of red and black mangroves, either normal height or dwarfed, are considered mangrove swamp; areas with less than 50 percent cover of mangroves are Keys Tidal Rock Barrens. Keys tidal rock barrens may also border salt marsh dominated by Gulf cordgrass, usually found growing on mud in depressions in the upper tidal zone. At its upper inland limit, Keys tidal rock barren often borders the thorn scrub variant of rockland hammock, which, though it may have button mangrove. In other situations, Keys tidal rock barren may grade directly into forested communities. This area is usually highly modified, ditches cut into the limestone rock for mosquito control have smoothed out the salinity variations in this supratidal zone by draining off salt water after storms and allowing salt water to penetrate further inland on normal tides.

Human alterations of this community include complete destruction of this site via constructed shorelines or urban development (anthropogenic fill over bedrock). Mosquito ditches cut into limestone bedrock may have helped smooth out the salinity variations in this supratidal community by draining off saltwater after storms and allowing water to penetrate further inland on normal and high tide events. Sea level rise may result in the destruction of this habitat as well, pushing mangrove swamps and salt marshes further inland encroaching on this rare habitat.

## State and transition model

## Additional community tables

**Table 5. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 6. Community 1.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 7. Community 2.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 8. Community 2.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 9. Community 2.3 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 10. Community 3.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

**Table 11. Community 3.2 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production () | Foliar Cover (%) |
|---|---|---|---|---|---|

## Animal community

This site is not the most suitable environment for large animals but is occupied by smaller insects and maritime species. Common species may include ants, earwigs, scorpions and spiders, typically found under moveable boulders or rocks. Maritime animals may include: the purple clawed hermit (Coenobita clypeatus), isopods (Ligia baudiniana), wharf crab (Sesarma cinereum), rapid crab (Cyclograpsus integer), gastropods (Tectarius muricatus, Truncatella bilabiata and Detracia bulloides).

## Hydrological functions

Surface waters associated with this ecological site are characterized by a wide range of salinities from mesohaline to above 35 parts per thousand (ppt), low macro-nutrients concentrations (primarily phosphorous), relatively low oxygen concentrations, and frequently increased water color and turbidity. This ecosite is influenced by spring tides and from surficial fresh water sources such as rain. The vegetation depends on tides to wash sediment to estuaries or river deltas to support zonation and establishment as well as importing nutrients and oxygen and decreasing salt accumulation. Freshwater, through runoff from adjacent uplands or from rivers, flushes salt from the community and delivers needed nutrients. This community is very fragile to the effects of sea level rise. While the rise of sea level is increasing roughly 1/8th of an inch per year according to NOAA, mangroves seaward and landward margins begin to retreat landward if unobstructed, encroaching on this rare habitat. If obstructed, this community will become smaller until it can no longer be supported and disappears. During periods of storm events such as hurricanes and tropical storms, these sites help absorb much of the impact of the waves and wind, protecting inland communities. During these events, waves lose energy as they pass through the rocky environment and tangled above-ground roots, grasses, and shrubs, losing their ability to remove sediments from the system. In extreme events saltwater tolerant species may become inundated and die from high salinity content, leaving behind open bare limestone.

## Recreational uses

This ecological community is a highly protected community but is still open to many forms of recreation. Recreation uses in these areas include wildlife viewing and photography, boating, canoeing, kayaking, and eco tours.

## 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.

## References


. 2021 (Date accessed). **USDA PLANTS Database**. http://plants.usda.gov.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep water habitats of the United States.. U.S. Dept. of Interior, Fish & Wildlife Service, Office of Biological Services, Washington DC. FWS/OBS-79/31 1–142.


## Other references


Chadwick, J. 2011 Integrated LiDAR and IKONOS multispectral imagery for mapping mangrove distribution and physical properties, International Journal of Remote Sensing, 32:21, 6765-6781, DOI: 10.1080/01431161.2010.512944

Florida Chapter Soil and Water Conservation Society. 1989. 26 Ecological Communities of Florida

Florida Natural Areas Inventory (FNAI). 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL

Fretwell, J. D., Williams, J. S., & Redman, P. J. 1996. National water summary on wetland resources (Vol. 2425). US Government Printing Office.

Harshberger, John W. 1914. The Vegetation of South Florida South of 27 30 North, Exclusive of the Florida Keys. Philadelphia, Wagner Free Institute of Science, 1914.

Kambly, S., Moreland, T.R., 2009, Land cover trends in the Southern Florida Coastal Plain: U.S. Geological Survey Scientific Investigations Report 2009–5054, 16 p.

McNab, W.H.; Cleland, D.T.; Freeouf, J.A.; Keys, Jr., J.E.; Nowacki, G.J.; Carpenter, C.A., comps. 2007. Description of ecological subregions: sections of the conterminous United States [CD-ROM]. Gen. Tech. Report WO-76B. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p

McPherson, B. F., Hendrix, G. Y., Klein, H., & Tyus, H. M. 1976. The environment of south Florida: a summary report (Vol. 1011). US Government Printing Office.

Meadows, D. G., Caballero, J. P., Kruse, S. E., & Vacher, H. L. 2004. Variation of salinity in brackish-water lenses of two Florida Keys. Journal of coastal research, 20(2), 386-400.

Radabaugh, K., Powell, C., Moyer, R. 2017. Coastal Habitat Integrated Mapping and Monitoring Program Report for the State of Florida.

Ross, M. S., O'Brien, J. J., & Flynn, L. J. 1992. Ecological site classification of Florida Keys terrestrial habitats. Biotropica, 488-502.

Scott, Thomas M. 2001. Text to accompany the geologic map of Florida. Florida Geologic Survey, Tallahassee, Florida.

Stephenson, T. A., & Stephenson, A. 1950. Life between tide-marks in North America: The Florida Keys. The Journal of Ecology, 354-402.

### Contributors

Jack Ferrara
Martin Figueroa
Craig Prink
Jamie Bean

### Approval

Matthew Duvall, 4/14/2025

### Acknowledgments

Big Cypress National Preserve Staff Everglades National Park Staff Ten Thousand Islands National Wildlife Refuge Staff Dry Tortugas National Park Staff Southwest Florida Water Management District Florida Natural Areas Inventory

### 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 | 04/14/2025 |
| Approved by | |
| 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:**

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

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

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

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

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

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

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

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

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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:**

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

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

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

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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:**

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17. **Perennial plant reproductive capability:**

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