Ecological site F154XA008FL
Moist Sandy Scrubby Flatwoods

Last updated: 2/21/2024
Accessed: 05/11/2025

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): 154X–South-Central Florida Ridge

MLRA 154 is entirely in Peninsular Florida, and contains 8,285 square miles. The landscape of MLRA 154 is characterized by a series of parallel, prominent sandy ridges of Pleistocene marine origin, including the Brooksville and Mount Dora Ridges. These North to South oriented parallel ridges are interspersed with more low lying physiographic provinces, including: upland hills, plains, valleys and gaps (Puri and Vernon 1964). The extreme western portion of the MLRA consists of thin belt of coastal lowlands and marshlands.

Many of the soils of MLRA 154 are Pleistocene or Holocene sands that are underlain with older, loamy Pliocene marine sediments (Cypresshead formation) or the clayey Miocene marine sediments (Hawthorne formation). A combination of marine depositional events and the dissolution of underlying limestone (karst geology) is responsible for surficial topography throughout Peninsular Florida.

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; 75c Central Florida Ridges and Uplands (Griffith, G. E., Omernik, J. M., & Pierson, S. M., 2013)

-Florida Natural Area Inventory, 2010 Edition: Scrub, Scrubby Flatwoods, Xeric Hammock (FNAI, 2010)

Ecological site concept

The central concept of the Moist Sandy Scrubby Flatwoods site is very deep, white, acidic, somewhat poorly to well drained sands that have a sandy or loamy subsoil. This site occurs on 0 to 5% slopes (occasionally up to 8%). Soil series include deep to very deep, sandy, or sandy over loamy, somewhat poorly drained (Cassia, Electra, Electra Variant, Hurricane, Mandarin, Narcoossee, Newnan, Ridgeland, Zolfo), the moderately well drained (Orsino, Pomello), and the well drained (Deland). This site is dominantly mapped in the Central Valley, St. Johns River Offset, Tsala Apopka Plain, and Western Valley physiographic units, and to a less extent in the Duval Uplands, Marion Uplands, and the Northern Highlands.

Associated sites

F154XA004FL	**Moist Sandy Pine-Hardwood Woodlands** This is a somewhat poorly to moderately well drained site that occurs in similar landscape positions
F154XA005FL	**Poorly Drained Upland Pine-Hardwood Forests** This is a poorly drained sandy site that occurs in upland flats landscape positions

F154XA006FL	**Dry White Sand Scrubs** This is a moderately well to well drained site that occurs in higher, drier, more xeric landscape positions
F154XA007FL	**Moist Sandy Wet-Mesic Flatwoods** This is a poorly drained sandy site that occurs in lowland flats landscape positions
F154XA010FL	**Moist Lithic Flatwoods And Hammocks** This is a somewhat poorly to moderately well drained site that occurs in similar landscape positions with lithic contact within 152 cm
F154XA012FL	**Wet Rich Forests And Woodlands** This is a poorly drained loamy and clayey site that occurs in lowland flats landscape positions

Similar sites

F154XA004FL	**Moist Sandy Pine-Hardwood Woodlands** These are poorly drained sites with a depth to seasonal high water table less than 30 cm, which will resulting in more wet plant communities
F154XA007FL	**Moist Sandy Wet-Mesic Flatwoods** These are somewhat poorly to moderately well drained sites that will have a loamy or clayey subsoil below 200 cm or is absent, resulting in more xeric plant communities

Table 1. Dominant plant species

Tree	(1) *Pinus palustris* (2) *Pinus clausa*
Shrub	(1) *Quercus chapmanii* (2) *Quercus myrtifolia*
Herbaceous	(1) *Aristida stricta* (2) *Rhynchospora megalocarpa*

Physiographic features

The physiography of the area is among the best defined in Peninsular Florida with rolling topography consisting of ridges, hills, and dunes interspersed with low-lying valleys, depressions, and drainageways. The entire area is located within the Floridian Section of the Coastal Plain Province of the Atlantic Plain. Elevation varies between sea level and 180 feet (0 to 55 meters).

This site occurs on very deep, sandy or sand over loamy, somewhat poorly to well drained soils on lowlands in west-central Florida. Slopes are nearly level to gently sloping, and range from 0 to 5 %, on ridges surrounded by wetter environments. The soils are dominantly sandy to > 80 inches or are sandy and have a loamy or clayey subsoil below 40 inches.

Table 2. Representative physiographic features

Hillslope profile	(1) Footslope (2) Backslope (3) Summit
Landforms	(1) Marine terrace > Ridge
Runoff class	Negligible to low
Flooding frequency	None
Ponding frequency	None
Elevation	0–180 ft
Slope	0–5%
Water table depth	18–48 in
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Not specified
Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	0–8%
Water table depth	Not specified

Climatic features

The climate varies considerably across the latitudinal gradient of MLRA 154. The north to south orientation of MLRA 154 spans three USDA plant hardiness zones in the Florida Peninsula (USDA-ARS).

The climate is characterized by humid subtropical with long hot summers and mild winters. In the winter months, Canadian air masses move across Peninsular Florida and produce cool, cloudy, rainy weather. Below freezing temperatures are occasional in the northern section of the MLRA, but very rare in the southern. Overall, there are typically fewer than 30 days of the year with below freezing temperatures in MLRA 154.

Similarly, average temperatures vary considerably from north to south over the range of the site. Average seasonal low temperature in the northern portions of the MLRA is 12.7°C in January, and prolonged freezing temperatures are common in the winter months. In contrast, the southern portions have more uniformity of seasonal temperatures and winter freezes are rare.

Precipitation in MLRA 154 is distributed fairly evenly throughout the year. Average annual precipitation ranges from 45 to 55 inches (114 to 140 cm). The highest monthly precipitation occurs from June through October, with June through August being the wettest period. However, the northern areas receive substantially more precipitation during the winter months compared to the southern. Winter rainfall is associated with seasonal cold fronts, which tend to disintegrate before reaching the southern reaches of MLRA 154.

Hurricanes and tropical storms affect much of MLRA 154. Catastrophic hurricanes make landfall along the Atlantic coast of Peninsular Florida on the order of two to four time per century. Strong winds and heavy rainfall affect the interior peninsula (MLRA 154); rainfall from hurricanes and tropical systems vary widely but can exceed 20 inches (51 cm) from one event. Hurricanes are most likely to occur between June and November and are most common in August and September.

Table 4. Representative climatic features

Frost-free period (characteristic range)	309-365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	51-53 in
Frost-free period (actual range)	239-365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	50-54 in
Frost-free period (average)	335 days
Freeze-free period (average)	365 days
Precipitation total (average)	52 in

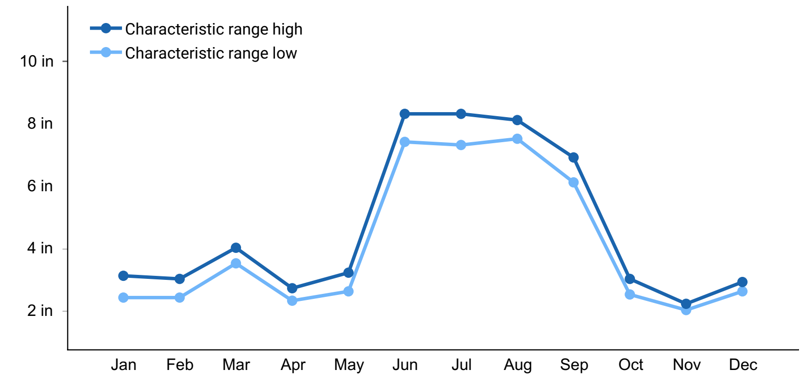

Figure 1. Monthly precipitation range

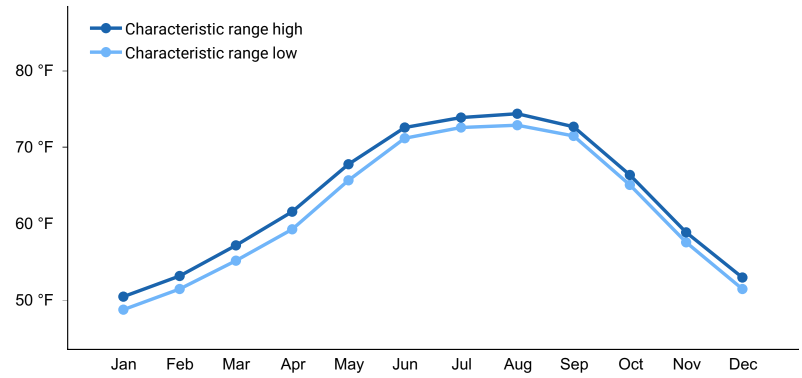

Figure 2. Monthly minimum temperature range

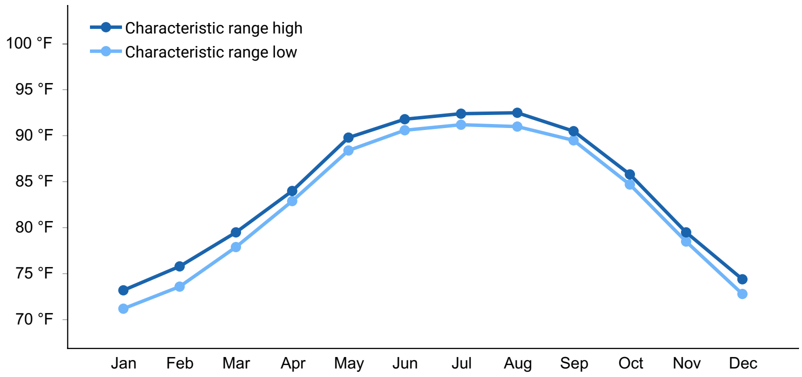

Figure 3. Monthly maximum temperature range

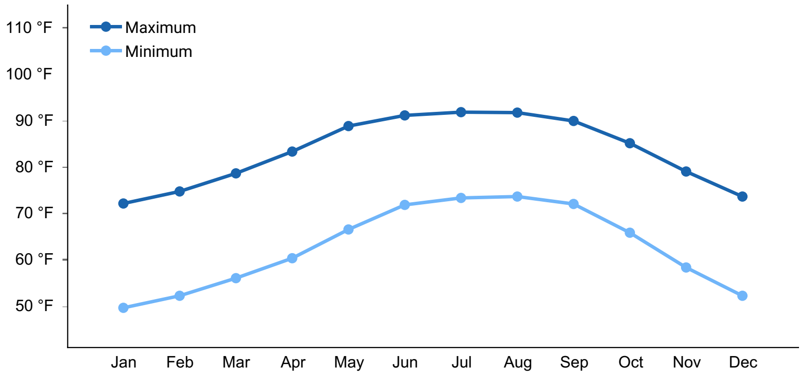

Figure 4. Monthly average minimum and maximum temperature

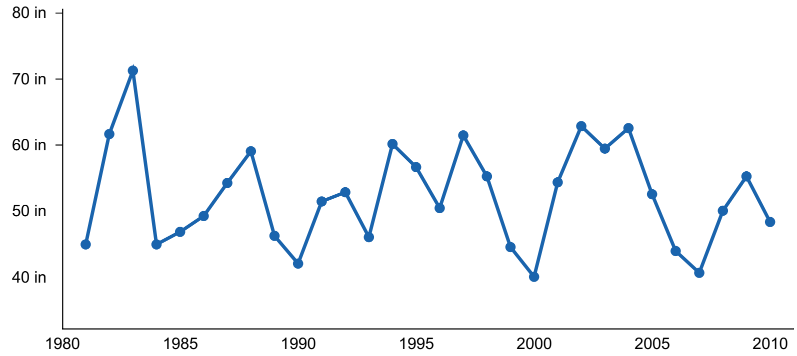

Figure 5. Annual precipitation pattern

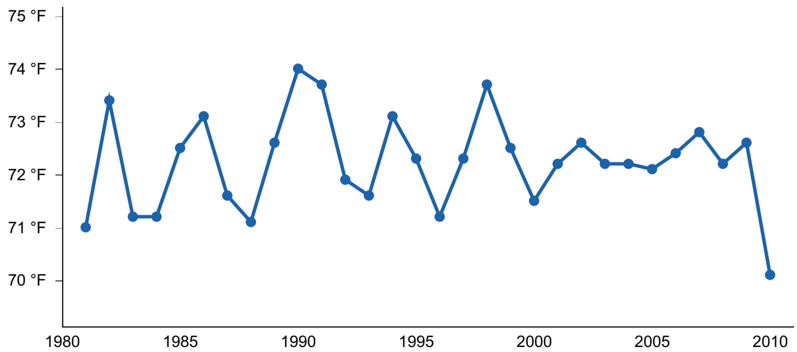

Figure 6. Annual average temperature pattern

Climate stations used

- (1) BROOKSVILLE CHIN HILL [USC00081046], Brooksville, FL
- (2) PLANT CITY [USC00087205], Plant City, FL
- (3) TARPON SPGS SEWAGE PL [USC00088824], Tarpon Springs, FL
- (4) SAINT LEO [USC00087851], San Antonio, FL
- (5) BARTOW [USC00080478], Bartow, FL
- (6) WINTER HAVEN [USC00089707], Winter Haven, FL
- (7) CLERMONT 9 S [USC00081641], Clermont, FL
- (8) MTN LAKE [USC00085973], Lake Wales, FL

Influencing water features

Most of this site occurs as isolated, fragmented scrublands on slight rises, knolls, and ridges surrounded by wetter habitats. On a moisture gradient, this site is intermediate between the Dry White Sand Scrubs (F154XA006FL) and the Moist Sandy Wet-Mesic Flatwoods (F154XA007FL) ecological site concepts.

The site is situated on soils that have a moderately deep or deep water table (18 to 48 inches below the surface). Subsurface water flow is dependent on the presence or absence of an aquitard (loamy or clayey layer). The presence, depth, and orientation of this water restrictive layer may affect subsurface water movement.

Hydrogeomorphically, water inputs come from precipitation, and discharging water through the soil to adjacent wetter sites or the Florida Aquifer, or through local runoff to low-lying areas. Slope gradient and rapid infiltration results in negligible surface runoff.

Soil features

Soils include deep, sandy, somewhat poorly drained or moderately well drained Oxyaquic Alorthods (Cassia, Electra, Electra Variant, Hurricane, Mandarin, Narcoossee, Newnan, Pomello, Ridgeland, Zolfo), moderately well drained Spodic Quartzipsamments (Orsino), and well drained Entic Grossarenic Alorthods (Deland). These soils formed in sandy or sandy over loamy marine sediments. The dominant representative slope for the correlated soil components is 0 to 5 % (but ranges up to 8%). Soil mineralogy is siliceous, with 1 to 10% clay content.

These very deep, porous sands and underlying finer textured material will not restrict rooting depth. These soils have a dynamic water table with extreme fluctuations between winter and summer. Without sufficient, periodic precipitation, shallower rooted species may develop moisture stress during the hot summers.

Figure 7. Soil profiles for this PES

Table 5. Representative soil features

Parent material	(1) Marine deposits
Surface texture	(1) Fine sand (2) Sand
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately rapid to very rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1.6–3.1 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–1 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	3.7–5.4
Subsurface fragment volume <=3" (0-40in)	0%
Subsurface fragment volume >3" (0-40in)	0%

Table 6. Representative soil features (actual values)

Drainage class	Not specified
Permeability class	Not specified
Soil depth	Not specified

Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-40in)	1.5–7 in
Calcium carbonate equivalent (0-40in)	Not specified
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	3.5–6
Subsurface fragment volume <=3" (0-40in)	Not specified
Subsurface fragment volume >3" (0-40in)	Not specified

Ecological dynamics

This concept encompasses (all or in part) two xeric natural community types: Scrub and Scrubby Flatwoods (FNAI, 2010). These two community types are floristically similar but differ in dominant canopy pine species and natural disturbance regimes. Small variations in depth to water table are thought to influence vegetation (and the distribution of these two community types). This, in turn, influences the frequency and intensity of fire regimes.

Fire is the dominant disturbance factor driving ecological dynamics of the concept. Depending on the availability of fine fuels and patchiness of vegetation, native fire regimes for this site vary considerably by most estimates. Pre-European settlement scrubs burned less frequently (but more intensely), on the order of once per 10 to 20 years. Scrubby flatwoods, which have more herbaceous ground cover and more fine fuels, have shorter fire return intervals; estimates are one per 5 to 15 years (Menges, 2008; FNAI, 2010).

Scrubby flatwoods, which frequently occurs in landscapes of more pyrogenic vegetation, burn patchily. Clonal scrub oaks and palmettos vigorously re-sprout, rapidly re-colonizing the post-fire environment (Abrahamson, 1984; Freeman and Kobziar, 2011). Dominant clonal oaks persist and resprout rapidly from underground parts in the post-fire environment (Abrahamson, 1984).

In the absence of fire the reference state will transition to xeric hammock (FNAI, 2010). Xeric hammocks are closed canopy forests of sand live oaks, moist ground cover litter, and almost complete absence of herbaceous vegetation precludes fire spread in all but extremely droughty conditions (Givens et al., 1984; Myers and White, 1987).

State and transition model

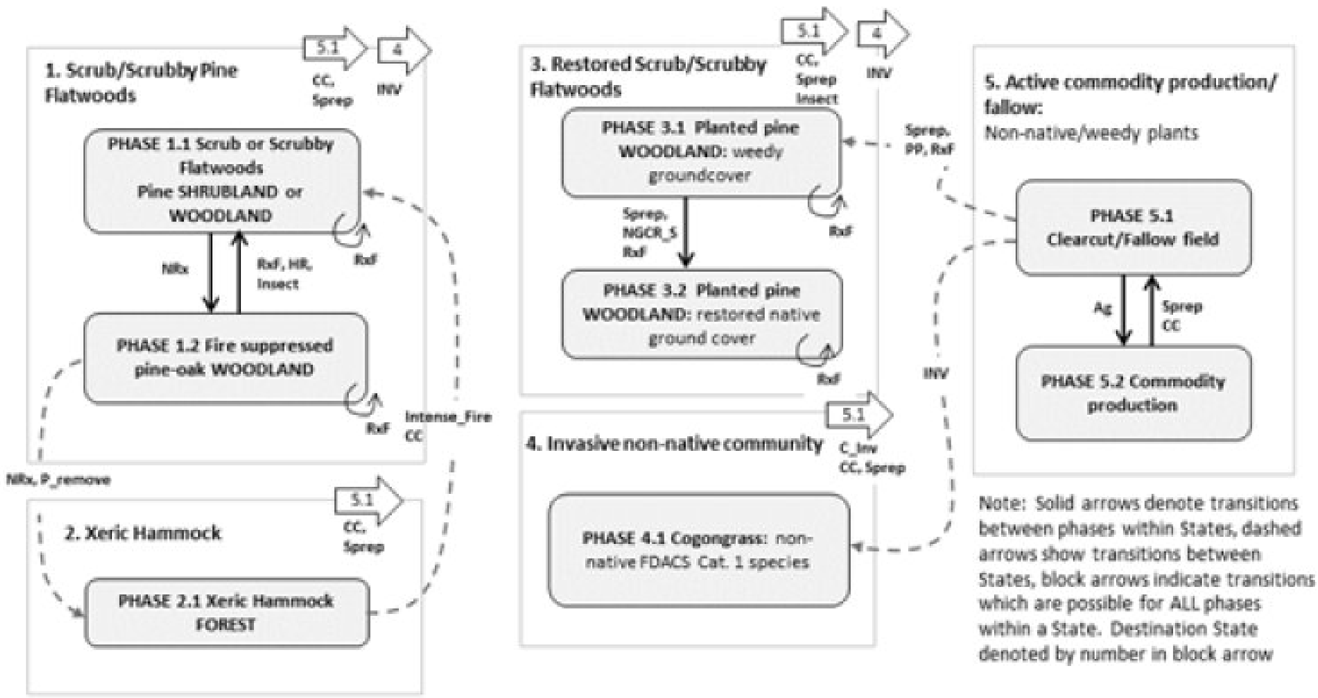

Figure 8. Moist Sandy Scrubby Flatwoods Custom STM

RxF	Frequent interval prescribed fire
Intense_Fire	Infrequent (intense) fire, often stand replacing catastrophic fire
NRx	Fire suppression, or very infrequent non-catastrophic fire
HR	Hardwood reduction (mechanical and chemical, no ground disturbance)
PP	Planted Pine
P_remove	Selective logging of pines
CC	Clearcut
Sprep	Site prep (mechanical and chemical)
INV	Invasion of noxious non-native plant species
C_Inv	Mechanical/chemical control of invasive plant species
NGCR_S	Native ground cover restoration: active seeding
Ag	Various agricultural practices for crop cultivation

Figure 9. Moist Sandy Scrubby Flatwoods Custom STM Legend

State 1
Scrub/ Scrubby Pine Flatwoods

Moist Sandy Scrubby Flatwoods vegetation (State 1) is variable in its structure, ranging from scrub shrublands to open pine woodlands with a well-developed understory. The former condition resembles that of the Dry White Sand Scrubs concept. The latter has widely spaced canopy of longleaf or slash pines (*Pinus palustris*, *P. elliottii*), and an understory of scrub oak patches interspersed with herbaceous ground cover and other low shrubs. Wiregrass (*Aristida stricta*) and saw palmetto are present and distinguish scrubby flatwoods vegetation from scrub.

State 2
Xeric Hammock

State 2 describes late successional vegetation resulting from long term fire suppression. Xeric hammocks are compositionally similar to State 1 white sands scrub in that the same clonal oak species are dominant. However, xeric hammock is a forest with a closed canopy of sand live oak overtopping lower growths of clonal scrub oaks and hardwood seedlings. Sand pine is either absent, having failed to regenerate under densely forested conditions, or is present as a few old emergent trees. The forest floor is covered with oak leaf litter which holds considerable moisture, creating mesic conditions at ground level and further depressing native herbaceous growth as well as pine germination (FNAI, 2010).

State 3
Restored Scrub/Scrubby Flatwoods

This state describes a restored woodland or shrubland with similar structure and ecological function to that of State 1. Notably, this state describes conditions where native propagules have been extirpated following long term fire suppression and/or extensive soil disturbance associated with commodity land uses, followed by artificial establishment of native clonal oaks and other scrub shrub species. Many native species are absent, and weedy or residual non-native species may persist in this restored scrub community. Herbaceous species are absent, weedy or non-native, depending on pre-restoration conditions and geography. Restoration of native oaks provides fuels for infrequent fires necessary for ecological functioning and dynamics. Once established, clonal oaks may provide habitat suitable for establishment of other native plant populations, either from artificial seeding or natural recruitment. The full complement of native species remains incomplete in State 3. Perennial grasses and forbs with seed dispersal mechanisms not conducive to colonization of distant and disturbed sites are notably absent (i.e. big seeded species which rely on animal and gravity dispersal, and long lived clonal species). However, over time, native plants may recolonize, particularly wind-dispersed native herbaceous species.

State 4
Invasive non-native community

State 4 describes a condition where one or more noxious non-native plant species has invaded and dominated the site. By far the most common invasive plant species is cogongrass (*Imperata cylindrica*; (MacDonald, 2004)). This highly clonal grass spreads rapidly by underground rhizomes and windblown seeds, forming dense circular patches which can become very large (on the order of 100's of acres). Cogongrass grows vigorously in full sunlight and thrives on acidic, nutrient-poor soils and droughty conditions (MacDonald, 2004). Furthermore, cogongrass is a prolific seed producer, and readily invades following soil disturbances. (Yager, Miller, and Jones, 2010). Once clones are established, rapid cogongrass growth will extirpate native ground cover plant populations. In addition, cogongrass may be allelopathic in some situations (Brook, 1989; Bryson and Carter, 1993). In general, cogongrass may colonize conditions with plenty of sun exposure and open ground. Soil disturbance is conducive to cogongrass colonization.

State 5
Commodity land uses

This state describes commodity land uses of this site. Due to their infertility and doughtiness, agriculture and timber production is limited on these soils.

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Contributors

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Approval

Charles Stemmans, 2/21/2024

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	05/11/2025
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:**