Landscape Condition

This indicator represents natural areas with limited human alteration while also considering the natural landcover of the surrounding landscape. Examples of human alteration include urban development and intense agricultural use. The degree of naturalness across the landscape is a key ecological condition for sustaining species and ecosystem services that are sensitive to habitat fragmentation at multiple scales. This indicator uses NLCD landcover, known grasslands from multiple sources, and ideas from the Florida Critical Lands and Waters Identification Project's approach for evaluating landscape integrity.

Reason for Selection

A high degree of naturalness across the landscape benefits species diversity as well as ecosystem services such as pollinator habitat, increased water infiltration, and reduced soil erosion. Though much of the Southeast has experienced human alteration at some point, natural landcover across the wider landscape provides many benefits. It allows species to disperse during different life stages, better adapt to a changing climate by accessing refugia, and freely move between different habitats. Natural landscapes can also complement existing protected areas and help increase resilience to extreme weather events such as flooding and hurricanes (Kremen and Merenlender 2018).

Input Data

- Southeast Blueprint 2024 extent
- 2021 National Land Cover Database (NLCD)
- U.S. Census Bureau 2018 state boundaries (500k version): download the data

Known grasslands used in grasslands and savannas indicator

- Prairies dataset for the Middle Southeast subregion, provided by Toby Gray with Mississippi State University (available on request by emailing toby@gri.msstate.edu); this is an improved version of the Known Prairie Patches in the Gulf Coastal Plains and Ozarks (GCPO) layer
- Piedmont prairie locations in the South Atlantic subregion: We identified known prairie locations by requesting spatial data on known prairies from the 74 members of the Piedmont Prairie Partnership mailing list and other prairie managers (Wake County Open Space program and Prairie Ridge Ecostation in NC). We combined that information with known locations in Virginia aggregated by the Virginia Natural Heritage Program (available on request by emailing rua_mordecai@fws.gov).
- Southeastern Grasslands Institute polygons from selected iNaturalist projects: We used only projects with polygons digitized at a fine resolution and did not include projects with more coarse polygons covering a large area. Specific projects used were:
    - allegheny-mountains-riverscour-barrens, big-south-fork-riverscour-barrens-1, big-south-fork-riverscour-barrens-2, big-south-fork-riverscour-barrens-4-us, big-south-fork-riverscour-barrens-6, biodiversity-of-piedmont-granite-glades-outcrops, bluff-mountain-fen, caney-fork-sandstone-riverscour-barrens-and-glades, clear-creek-sandstone-riverscour-barrens, clear-fork-river-riverscour-barrens, craggy-mountains-

mafic-outcrops-and-barrens, cumberland-plateau-escarpment-limestone-barrens, cumberland-river-limestone-riverscour-glades, daddy-s-creek-riverscour-barrens, dunbar-cave-prairie-restoration, eastern-highland-rim-limestone-riverscour-glade, emory-river-sandstone-riverscour-barrens, falls-of-the-ohio-river-limestone-riverscour-glade, flat-rock-cedar-glades-and-barrens-state-natural-area, grasshopper-hollow-fen, gunstocker-glade, hiwassee-river-phyllite-riverscour-glade, ketona-dolomite-barrens, laurel-river-riverscour-barrens-and-glades, lime-hills-limestone-barrens, limestone-barrens-of-the-western-valley-of-the-tennessee-river, little-mountains-limestone-barrens, little-river-canyon-riverscour-barrens-and-glades, moulton-valley-limestone-glades, mulberry-fork-of-black-warrior-river-riverscour-barrens-and-glades, muldraugh-s-hill-limestone-barrens, nashville- basin-limestone-glades, new-river-riverscour-barrens, obed-river-sandstone-riverscour-barrens, outer-bluegrass-dolomite-barrens, ridge-and-valley-sandstone-outcrops, rock-creek-sandstone-riverscour-barrens, rockcastle-river-sandstone-riverscour-barrens, shawnee-hills-sandstone-glades-and-outcrops, southern-blue-ridge-mountains-grass-balds, southern-blue-ridge-mountains-serpentine-barrens, southern-blue-ridge-phyllite-outcrops, southern-ridge-and-valley-limestone-glades, southern-ridge-and-valley-shale-barrens, southern-ridge-and-valley-siltstone-barrens, tennessee-ridge-and-valley-dolomite-barrens-and-woodlands-tn-us, the-farm-prairie-and-oak-savanna, tin-top-road-savanna, western-allegheny-escarpment-limestone-barrens, western-highland-rim-limestone-glade-and-barrens, western-valley-limestone-barrens-decatur-co-north-us, western-valley-limestone-barrens-hardin-wayne-cos, western-valley-limestone-barrens-perry-co, western-valley-silurian-limestone-barrens, white-s-creek-sandstone-riverscour-barrens-and-glades, folder-six-glades.

- Grassland polygons from the Catawba Indian Nation, provided by Aaron Baumgardner, Natural Resources Director, on 7-2023 (available on request by emailing rua_mordecai@fws.gov)
- Grassland polygons from two iNaturalist projects in Texas: erwin-park-prairie-restoration-area, stella-rowan-prairie

Mapping Steps

- Combine all known grassland polygons and convert to raster.
- Reclassify the NLCD into 3 alteration classes where 3 is natural, 2 is altered, and 1 is heavily altered. Assign a value of 1 to all pixels with a land cover class of “Developed, High Intensity” or “Developed, Medium Intensity”. Assign a value of 2 to all pixels with a land cover class of “Developed, Open Space”, “Developed, Low Intensity”, “Hay/Pasture”, or “Cultivated Crops”. Assign a value of 3 to everything else.
- From Census state boundary file, export SECAS states and dissolve into a single layer. This is used to identify the continental and non-ocean part of the Blueprint.
- Convert that dissolved layer into a raster and use it to remove any area that’s either ocean or not continental from the reclassified landcover layer.

- Many species and ecological processes operate at multiple scales. To account for this, estimate the average amount of alteration using a circular moving window (or neighborhood) analysis at 4 different scales: approximately 0.22 acres (single pixel), approximately 10 acres, approximately 100 acres, and approximately 1,000 acres. Then average the values across all scales. This results in continuous values from 1 to 3.
- Bin the continuous values into the following categories seen in the final indicator values below: 1 (heavily altered): 1 to <1.5; 2 (altered): 1.5 to <2; 3 (partly natural): 2 to <2.5; 4 (mostly natural): 2.5 to <2.9; 5 (natural): 2.9 to <2.99; 6 (very natural): 2.99 to 3.
- As a final step, clip to the spatial extent of Southeast Blueprint 2024.

Final indicator values

Indicator values are assigned as follows:

6 = Very natural landscape
5 = Natural landscape
4 = Mostly natural landscape
3 = Partly natural landscape
2 = Altered landscape
1 = Heavily altered landscape

Known Issues

- This indicator underestimates landscape condition in many areas composed of native grasses and forbs. NLCD landcover often classifies these areas as "Hay/Pasture". Most of the areas classified as "Hay/Pasture" are partly altered areas, but some are functioning as natural grasslands either with or without grazing. The indicator does use known grassland polygons to correct for this issue, but the known grassland data is missing many grassland areas in the Southeast.
- This indicator does not account for variation in habitat condition due to invasive species.

Literature Cited

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