

**Natural Resource Indicator recommendations**

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Overview

The 2-4 year mission of the South Atlantic LCC is to “design a shared blueprint for landscape conservation actions that sustain natural and cultural resources in the South Atlantic region”. Designing and evaluating the success of this blueprint will require some specific measures of what success would look like for natural resources. The ecosystems of the South Atlantic are complex and indicators help simplify the modeling and monitoring of those systems

These recommendations are based on detailed input from 235 experts in marine, freshwater, and terrestrial resources in the South Atlantic region and 9 experts representing all 5 adjacent LCCs. This input includes:

* 197 online reviews
* Feedback on opportunities for sharing indicators across LCC boundaries from all adjacent LCCs
* Input from regional partnerships (e.g., Atlantic Coast Joint Venture, Southeast Aquatic Resources Partnership, Atlantic Coast Fish Habitat Partnership, Southeast Partners in Amphibian and Reptile Conservation, Albemarle-Pamlico National Estuary Partnership)
* Phone interviews with 18 local experts
* Integration of all feedback and final recommendations by the 20 members of the selection team

Indicator recommendations are based on the ecological, practical, and social criteria identified in the South Atlantic LCC Natural Resource Indicator process. The ecological criteria focus on how well indicators capture key ecosystem elements and major landscape threats. The practical criteria focus on the ability to monitor and model the indicators based on current resources and efforts. The social criteria focus on how well the indicators resonate with a wide variety of audiences capable of changing the landscape.

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Quick recommendation summary

## Beaches and dunes

Productivity of loggerhead sea turtles

Index of beach birds

Miles of altered beach

## Estuarine

Index of coastal condition

Index of estuarine birds

Percent of impervious cover

## Forested wetlands

Acres of forested wetlands

Index of forested wetland birds

Acres of natural habitat near isolated wetlands

## Freshwater aquatic

Percent of natural habitat near rivers and streams

Percent of impervious cover

Index of biotic integrity

## Landscapes

Index of functional connectivity

Acres of interior natural communities

Index of structural connectivity

Acres of “biodiversity hotspots” in natural condition

## Marine

Abundance of gag grouper

Abundance of red drum

Index of nearshore forage fish

## Maritime forest

Abundance of painted bunting

Acres in protected status

## Pine woodlands, savannas, and prairies

Index of pine woodland, savanna, and prairie birds

Acres of open canopy habitat that is regularly burned

Occurrence of flatwoods salamanders

## Tidal and nontidal freshwater marshes

Index of tidal and nontidal freshwater marsh birds

Acres of tidal freshwater marsh

Acres of invasive species

## Upland hardwood forests

Acres of “biodiversity hotspots” in natural condition

Abundance of big trees

Index of upland hardwood birds

## Waterscapes

Index of fish passage

Number of dams mimicking natural flow

Detailed recommendations by ecosystem

# Beaches and dunes indicators

This ecosystem includes all of the beach and dune ecosystems of the South Atlantic

## Productivity of loggerhead sea turtles

### Reason for selection

Loggerhead sea turtles provide an indicator of human disturbance and nest predation pressure for beach nesting species, are well monitored, and resonate with a diversity of audiences

### Target

14,000 nests with the average nest success rates for the region (based on the species recovery plan)

## Index of beach birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: Piping Plover, American Oystercatcher, Wilson's Plover, Red Knot, Least Tern

### Target

Reach wintering and breeding population goals identified in the SE Waterbird and Shorebird plan

## Miles of altered beach

### Reason for selection

Altered beach (including jetties, groins, and other shoreline hardening) provides a measure of overall habitat alteration and is generally well monitored

### Target

Decrease miles by 50% and restore 25% to natural high quality beach habitat

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# Estuarine indicators

This ecosystem extends upstream to head of tide and seaward to the mouth of the estuary

## Index of coastal condition

### Reason for selection

This index measures the overall abiotic condition of the system, is well monitored, and is synthesized by the EPA every 5 years. It integrates measures of water quality, sediment quality, benthic habitat quality, coastal wetlands and fish tissue contaminants

### Target

All parameters rank at least “good”

## Index of estuarine birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: Seaside Sparrow, Nelson's Sharp-tailed Sparrow, Saltmarsh Sharp-tailed Sparrow, American Black Duck, Wood Stork, Redhead, and Canvasback

### Target

Reach breeding and wintering population goals identified in SE Waterbird and Shorebird plan, NAWMP, Atlantic Coast Joint Venture, and Partners in Flight plans

## Percent of impervious cover

### Reason for selection

Impervious cover is easy to monitor and model, widely used and understood by diverse partners, and is strongly linked to water quality and freshwater inflow

### Target

No catchments with more than 10% impervious cover

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# Forested wetlands

This ecosystem includes forested wetlands on organic soils (e.g., poccosins, carolina bays) and mineral soils (e.g., bottomland hardwood forests, floodplain forests)

## Acres of forested wetlands

### Reason for selection

Overall acreage provides an indicator of whether forested wetlands being inundated by sea level rise are being replaced or restored somewhere else, is well monitored, and resonates with a diversity of audiences

### Target

No net loss of protected forested wetlands

## Index of forested wetland birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: Prothonotary Warbler, Swainson's Warbler, Yellow-throated Warbler, Wood Duck, Swallow-tailed Kite, Cerulean Warbler, Black-throated Green Warbler, Brown-headed Nuthatch, Northern Parula, Chuck-will's-widow, Red-headed Woodpecker, and Red-cockaded Woodpecker

### Target

Meet Partners In Flight population objectives for all species

## Acres of natural habitat near isolated wetlands

### Reason for selection

Natural habitat near isolated wetlands provides a measure of the overall condition of isolated wetlands which is not well captured by the bird index or overall forested wetland acreage indicator, is generally well monitored, and resonates with a diversity of audiences

### Target

Increase natural habitat within 200m of isolated wetlands by 25%

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# Freshwater aquatic

This ecosystem includes lakes, rivers, and streams

## Percent of natural habitat near rivers and streams

### Reason for selection

Habitat near rivers and streams is strongly linked to water quality and instream flow, is easy to monitor and model, and is widely used and understood by diverse partners. These buffers provide a “frontline defense” for aquatic systems

### Target

Ensure 85% natural habitat within 100ft of rivers and streams

## Percent of impervious cover

### Reason for selection

Impervious cover provides an indicator of water quality and freshwater instream flow that captures land cover patterns throughout the catchment, is easy to monitor and model, and is widely used and understood by diverse partners

### Target

Maintain percent of catchments that have 10% or less impervious cover

## Index of biotic integrity

### Reason for selection

The Index of Biotic Integrity (IBI) provides an indicator of additional elements of water quality not well covered by the other indicators above, is well monitored, and is widely used by diverse partners. This indicator uses the IBI data and classes used by states as biocriteria in determining the 303(d) list of impaired watersheds.

### Target

Double the number of sites with a high IBI score for the region of each state that overlaps the South Atlantic LCC (Target is stratified by state due to variations in IBI scoring between states)

# Landscapes

This ecosystem focuses on the connections across all terrestrial ecosystems

## Index of functional connectivity

### Reason for selection

This index provides an indicator of connectivity from the perspective of multiple species with different home range sizes and connectivity requirements, is being modeled through a SALCC funded project, and resonates with a diversity of audiences. Species in the index include: Black Bear, Timber “Canebrake” Rattlesnake, Eastern “Diamondback” Rattlesnake, and Box Turtle

### Target

Maintain viable populations of all species

## Acres of interior natural communities

### Reason for selection

Acres of interior natural communities (including early successional habitats) provide an indicator of large patches of natural communities, are easy to monitor and model, and are widely used and understood by diverse partners

### Target

Increase acres of natural communities >200m from an anthropogenic edge by 50% using patches of at least 10,000 acres

## Index of structural connectivity

### Reason for selection

This index provides an indicator of how well natural habitat is connected in general without using species specific thresholds, is already modeled nationally, and resonates with a diversity of audiences

### Target

Increase acreage of highest value connections in protected status by 50%

## Acres of “biodiversity hotspots” in natural condition

### Reason for selection

This indicator provides an indicator of landscape condition for rare and range restricted organisms, is easy to monitor and model, and resonates with a diversity of audiences. Areas with rare soil types are being used to represent “Biodiversity hotspots” in the South Atlantic

### Target

Increase acres of unique soil types (proxy for “hotspots”) in protected status by 50%

## Additional comments

The group expected indicators #1 and #3 to be highly correlated and so is recommending 4 total indicators. The group expects that #1 and #3 would either be merged or only one would be retained in the future

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# Marine

This ecosystem goes from either the mouth of the estuary or the splash zone affected by breaking waves to the 200 mile EEZ in the central ocean

## Abundance of gag grouper

### Reason for selection

Gag grouper provide an indicator of hard bottom habitat condition in state and federal waters, are relatively well monitored, and resonate with a diversity of audiences. The intention is for this indicator to evolve to an index that covers the overall snapper/grouper complex.

### Target

Increase Catch Per Unit Effort (CPUE) in fishery independent sampling by 20%

## Abundance of red drum

### Reason for selection

Red drum provide an indicator of nearshore ocean bottoms, are well monitored, and resonate with a diversity of audiences

### Target

Increase spawning stock by 10%

## Index of nearshore forage fish

### Reason for selection

This index provides an indicator of the prey base for larger fish, seabirds, and marine mammals, is well monitored, and resonates with a diversity of audiences. Species include: Atlantic Croaker, Spot, Star Drum, Brief Squid, and Whiting (Menticirrhus americanus)

### Target

Catch Per Unit Effort (CPUE) for all species remains within 1 standard deviation of historic mean

# Additional comments

The group plans to explore a number of other potential indicators in the testing / revision process

# Maritime forest

This ecosystem includes all types of maritime forests

## Abundance of painted bunting

### Reason for selection

Painted bunting provides an indicator of habitat structure and configuration, are well monitored, and resonate with a diversity of audiences

### Target

Increase population by 100% (based on Partners in Flight population objective)

## Acres in protected status

### Reason for selection

Acres in protected status provide an indicator of the overall status of the ecosystem, is easy to monitor and model, and is widely used and understood by diverse partners

### Target

Double the acres in protected status

**Additional comments**

The group is only recommending two indicators as a starting point for this habitat type. This ecosystem originally included other forms of scrub-shrub habitat but the group felt that those habitats were better addressed through the other terrestrial ecosystem types.

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# Pine woodlands, savannas, and prairies

This ecosystem includes longleaf, loblolly, and slash dominated systems and the small number of prairies present in the South Atlantic

## Index of pine woodland, savanna, and prairie birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: Brown-headed Nuthatch, Bachman’s Sparrow, Red-cockaded Woodpecker, Northern Bobwhite, American Kestrel, Red-headed Woodpecker, Prairie Warbler, Henslow’s Sparrow, and Loggerhead Shrike

### Target

Meet Partners In Flight population objectives for all species

## Acres of open canopy habitat that is regularly burned

### Reason for selection

This indicator represents the overall structure and condition of the habitat, is easy to monitor and model, and is widely used and understood by diverse partners

### Target

Double the acres with < 60% canopy cover that’s burned at a 2 year interval

## Occurrence of flatwoods salamanders

### Reason for selection

Flatwoods salamanders provide an indicator of the condition and arrangement of embedded isolated wetlands and is generally well monitored. The group intends for this to eventually evolve into a more diverse index of herpetofauna

### Target

Group had insufficient herpetology expertise to set an initial target. Look to Southeast Partners in Amphibian and Reptile Conservation (SEPARC) to set target.

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# Tidal and nontidal freshwater marshes

This ecosystem includes all types of tidal and nontidal freshwater marshes

## Index of tidal and nontidal freshwater marsh birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: King Rail, American Black Duck, Northern Pintail, Least Bittern, Whimbrel, and Wood Stork

### Target

Meet Waterbird and Shorebird initiative population objectives for all species

## Acres of tidal freshwater marsh

### Reason for selection

Overall acreage provides an indicator of whether tidal freshwater marsh being inundated by sea level rise are being replaced or restored somewhere else, is well monitored, and resonates with a diversity of audiences

### Target

Maintain current acres

## Acres of invasive species

### Reason for selection

Acres of invasive species provides an indicator of habitat structure and quality and is generally well monitored

### Target

Decrease acres by 50%

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# Upland hardwood forests

This ecosystem includes a variety of upland forest types ranging from dry upland forests to wetter hydric hammocks

## Acres of “biodiversity hotspots” in natural condition

### Reason for selection

This acreage provides an indicator of condition for rare and range restricted organisms, is easy to monitor and model, and resonates with a diversity of audiences. Areas with rare soil types are being used to represent “Biodiversity hotspots” in the South Atlantic

### Target

Increase acres of unique soil types (proxy for “hotspots”) in protected status by 50%

## Abundance of big trees

### Reason for selection

Abundance of big trees provides an indicator of mature habitat condition, is relatively easy to monitor, and resonates with a diversity of audiences. Big trees (“thumpers”) are defined using a threshold based on the site index and a 6x DBH multiplier

### Target

2 per 3000 acres (i.e., 2 per FIA point)

## Index of upland hardwood birds

### Reason for selection

This index represents a variety of ecosystem features and is already being modeled and monitored for the entire region by the Atlantic Coast Joint Venture. Species in the index include: Acadian Flycatcher, Louisiana Waterthrush, Kentucky Warbler, Swainson's Warbler, Cerulean Warbler, Hooded Warbler, and Wood thrush

### Target

Meet Partners In Flight population objectives for all species

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# Waterscapes

This ecosystem focuses on the connections between freshwater and saltwater ecosystems

## Index of fish passage

### Reason for selection

The index of fish passage provides an indicator of connectivity, is easy to monitor and model, and resonates with diverse partners. The Index ranges from no passage for any species to complete removal of barrier. Includes level of passage for American Eel, River Herring, American Shad, Atlantic Menhaden, Striped Bass, and Sturgeon

### Target

Increase mean index by 20%

## Number of dams mimicking natural flow

### Reason for selection

Number of dams mimicking natural flow provides an indicator of departures from the natural flow regime where flow is already being altered and is generally easy to monitor. A dam “mimicking natural flow” will be defined as a dam with at least one measure in it’s operation plan that is intended to imitate natural flow patterns.

### Target

100% of new FERC licensed and CORP projects include mimicking natural flow as part of the operational plan.

**Additional comments**

The group felt that a third indicator to capture instream flow would be important but unsure of the best one to use. This will be investigated in the indicator testing and revision process.