Recent Trends in Southeastern Ecosystems (2020)

Measuring progress toward the Southeast Conservation Adaptation Strategy (SECAS) goal

October 13, 2020

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Executive summary

Through SECAS, diverse partners are working together to design and achieve a connected network of lands and waters that supports thriving fish and wildlife populations and improved quality of life for people across the Southeastern United States and the Caribbean. The long-term goal for SECAS is a 10% or greater improvement in the health, function, and connectivity of Southeastern ecosystems by 2060. To stay on track for achieving that goal, a 1% improvement will be needed every 4 years.

This report is the second annual assessment of progress toward the SECAS goal using information from existing monitoring programs. It uses the most recent 3-6 years of available data. The report is intended to facilitate discussion around conservation actions needed to meet the goal.

Most indicators improved overall during the period covered in this report. Given the rapid changes happening in the Southeast, this is an encouraging sign for achieving the SECAS goal. Prescribed fire in longleaf pine, longleaf pine area, upland forest birds, forested wetland birds, and marine fisheries indicators improved fast enough to stay on track to meet the SECAS goal. Longleaf pine, forest conservation, and marine fisheries have been major areas of shared conservation focus in the Southeast, and those efforts are clearly having a big impact.

Pine and prairie birds continue to have large declines and are far off track for meeting the SECAS goal. Declines in habitat, especially within the Piedmont, Appalachians, Central Hardwoods, and Peninsular Florida, are likely driving this pattern. This further reinforces the importance of accelerating open pine, pine/oak savanna, and other grassland restoration throughout the Southeast for grassland birds, pollinators, and other key species.

While areas without invasive plants are also declining, work to reduce the spread of specific invasive species is having an impact. Without the ongoing work to reduce invasives, landscape and climate change in the Southeast would likely lead to far worse trends. This highlights the importance of continued and increasing attention on invasive plants to get back on track to meet the SECAS goal.

Overview of recent trends in ecosystem indicators

Table 1. Overview of recent trends in ecosystem indicators.

	Recent trend	On track for goal	Trend confidence	Page
Pine and prairie				
Prescribed fire in longleaf pine	2.00% increase/year	Yes	Medium	5
Longleaf pine extent	4.50% increase/year	Yes	Medium	6
Pine and prairie birds	2.70% decline/year	No	Medium	7
Upland forest				
Upland forest area	0.14% increase/year	No	High	13
Upland forest birds	0.65% increase/year	Yes	Medium	15
Forested wetland				
Forested wetland area	0.15% increase/year	No	Medium	19
Forested wetland birds	3.06% increase/year	Yes	Medium	21
Landscapes				
Areas without invasive plants	0.33% decline/year	No	Medium	25
Freshwater aquatic				
Water quality	< 0.01% increase/year	No	Low	27
Aquatic connectivity	< 0.01% increase/year	No	Low	28
Beach and dune				
Beach birds	< 0.01% increase/year	No	Low	30
Estuarine and marine				
Coastal condition	0.19% increase/year	No	Low	32
Fisheries	0.56% increase/year	Yes	Medium	34

Introduction

Background

Through SECAS, diverse partners are working together to design and achieve a connected network of lands and waters that supports thriving fish and wildlife populations and improved quality of life for people across the Southeastern United States and the Caribbean. In the fall of 2018, SECAS leadership approved a long-term goal and supporting short-term metrics to evaluate progress toward that connected network.

The long-term goal is a 10% or greater improvement in the health, function, and connectivity of Southeastern ecosystems by 2060. One of the short-term metrics, selected to stay on track to meet the long-term goal, is a 1% improvement in the health, function, and connectivity of Southeastern ecosystems every 4 years. This report on recent trends seeks to measure progress toward that metric.

Purpose of this report

This report is an assessment of progress toward the SECAS goal using information from existing monitoring programs. It is intended to facilitate discussion around conservation actions needed to meet the goal.

Methods

Changes since the last report

For 2020, we made three major improvements: 1) A new indicator for areas without invasive plants, 2) An improved approach for water quality trends based on state data, and 3) Updated data for bird indicators and the prescribed fire indicator. We also added new maps and summaries showing bird indicator trends by Bird Conservation Region.

Selecting indicators

We selected indicators that are monitored by consistent multi-state efforts and are already used by other organizations to evaluate ecosystem conditions.

Defining “recent” trends

We used the most recent 3-6 years of available data for each indicator to calculate the recent trend. In many cases, the time periods for various indicators do not overlap. The available data from all of the monitoring made it difficult to select a single time period as the definition of recent. For example, 2010 is the most recent year with available data from the National Coastal Condition Assessment, while data on prescribed fire in longleaf pine was only available starting in 2013.

Estimating trends

For indicators where charts only show two points in time (e.g., longleaf pine area), we simply calculated the change between those points. For indicators showing data from more than two years (e.g., prescribed fire in longleaf pine), we estimated the trend based on the slope of a linear regression through all points. For coastal condition and bird indicators, where trends were only available for discrete subregions or states, we averaged trends equally instead of weighting by area.

Evaluating confidence in trend

The confidence estimate for each trend is a qualitative judgement based on the design of the monitoring, overall sample size, and major sources of variability in the indicator.

Assessments used in the report

We used 10 different assessments to evaluate indicator trends. Assessments ranged from remotely sensed data like the National Land Cover Database to long-term volunteer-driven monitoring programs like the Breeding Bird Survey. Additional assessments used included America's Longleaf Range-wide Accomplishment Reports, Forest Inventory and Analysis, Gopher Tortoise Candidate Conservation Agreement reports, International Shorebird Survey , EPA 303(d) state reports, Southeast Aquatic Resources Partnership Aquatic Barrier Database, National Coastal Condition Assessments, and NOAA Reports to Congress on the Status of Fisheries.

Assessments considered but not used in this report

There are many subregional assessments of ecosystem conditions (e.g., Chesapeake Bay, Everglades), but their coverage of only part of the Southeast made them difficult to formally integrate into this particular report. One national assessment, Surfrider Foundation's State of the Beach, had potential, but was not used because it focused on policies related to beach conditions rather than the actual condition of the beaches.

Ecosystem indicator trends

Pine and prairie

This ecosystem includes open pine, pine/oak savanna, and other grasslands.

Prescribed fire in longleaf pine

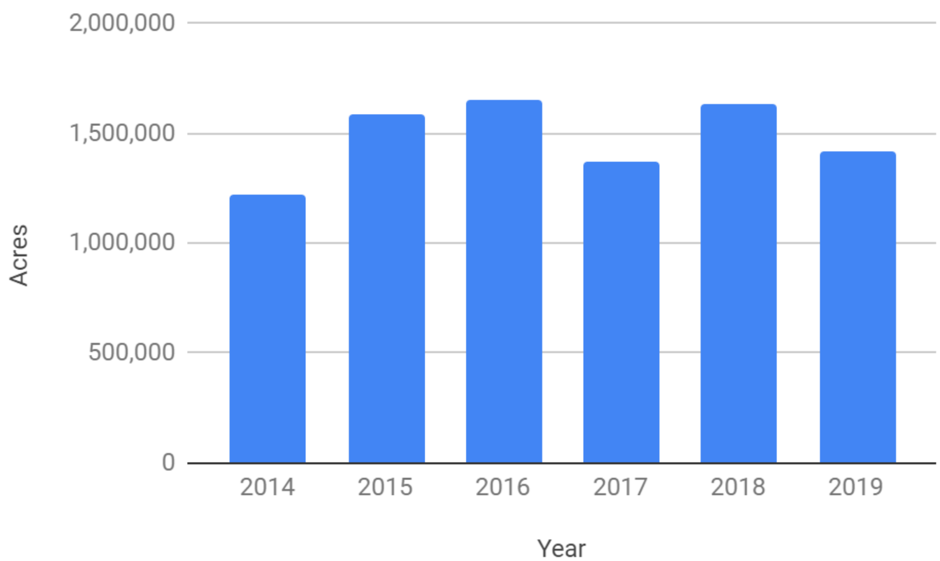


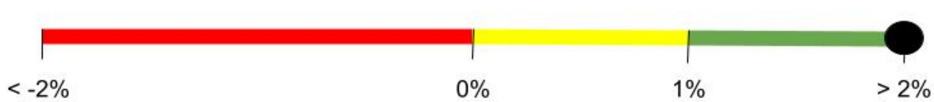
Figure 1. Acres of prescribed fire in longleaf pine from 2014-2019.

Yearly trend

Prescribed fire in longleaf pine increased by about 2% per year from 2014-2019.

On track to meet SECAS goal

Yes. The increase of about 8% every 4 years is greater than the SECAS goal of a 1% increase every 4 years.



Data source

[America's Longleaf Range-wide Accomplishment Reports]

Confidence in trend

Medium. While the range-wide tracking system for prescribed fire in longleaf is not perfect, its strong coverage of significant geographic areas means it likely documents a large percentage of prescribed fire in longleaf over this period.

Interpretation

This is an indicator of habitat management in one part of the pine and prairie ecosystem. Prescribed fire is also important outside of the longleaf range, but sufficient trend data wasn't yet available in those areas. Prescribed fire in longleaf has increased considerably despite major weather-related variations in what can be burned each year. Changes in prescribed fire in other grassland systems are not as well understood.

Longleaf pine area

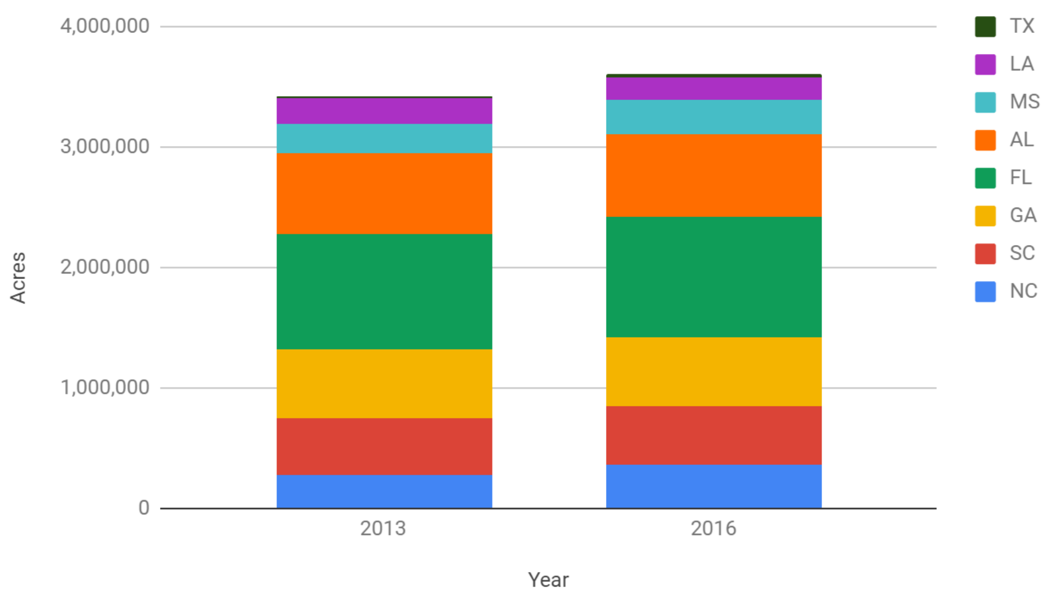


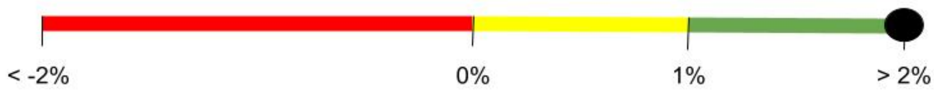
Figure 2. Acres of longleaf pine in 2013 and 2016.

Yearly trend

Longleaf pine acres increased by about 4.5% per year from 2013-2016. Acreage increased during this period in most states, except for Louisiana and Georgia, which had small overall declines. The latest data from Georgia in 2017 shows an overall increase from 2013-2017. More recent data was not available for Louisiana. Virginia also has longleaf pine, but it was not present in the samples used for this analysis.

On track to meet SECAS goal

Yes. The increase of about 18% every 4 years is greater than the SECAS goal of 1% increase every 4 years.



Data source

[Forest Inventory and Analysis (FIA) data from EVALIDator](#) (last revised April 10, 2019)

Confidence in trend

Medium. While the longleaf sample size is small in some states, the statistically randomized design of FIA, its long history of tracking trends, and the larger sample across all states with longleaf suggest these data provide a reasonable estimate of the trend across the full longleaf range.

Interpretation

This is an indicator of restoration for one part of the pine and prairie ecosystem. Longleaf pine acreage continues to increase. Reported longleaf establishment numbers from 2017 and 2018 also show this positive trend.

Pine and prairie birds

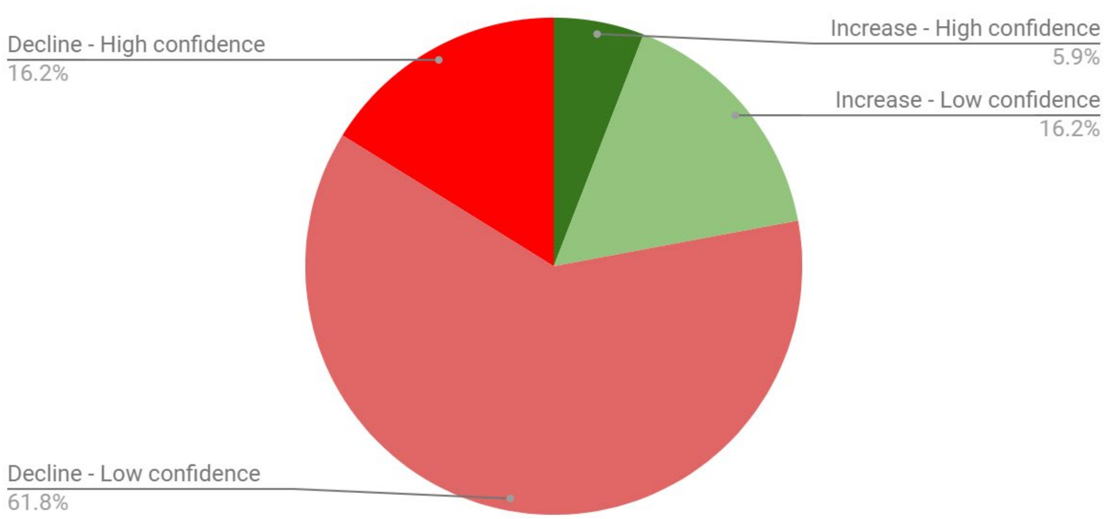


Figure 3. Percent of pine and prairie bird species that are increasing or declining by state from 2012-2017.

Table 2. Species trend data from 2012-2017 for each state used in Figure 3 above. Brighter colors indicate higher confidence.

	Northern bobwhite	**Grasshopper sparrow**	**Prairie warbler**	**Loggerhead shrike**	**Bachman's sparrow**
West Virginia	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	
Kentucky	Decline – High confidence	Decline - High confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence
Virginia	Decline - High confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	
Missouri	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	
Oklahoma	Increase - High confidence	Increase - Low confidence	Decline - Low confidence	Increase - Low confidence	
North Carolina	Decline - High confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence
Tennessee	Decline - High confidence	Increase - Low confidence	Increase - Low confidence	Decline - Low confidence	
Texas	Increase - High confidence	Increase - High confidence	Decline - Low confidence	Increase - High confidence	Decline - Low confidence
Alabama	Decline - High confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence
Mississippi	Decline - High confidence	Decline - Low confidence	Increase - Low confidence	Decline - Low confidence	Decline - Low confidence
Georgia	Decline - low confidence	Decline - Low confidence	Decline - Low confidence	Increase - Low confidence	Increase - Low confidence
South Carolina	Decline - High confidence	Decline - Low confidence	Decline - Low confidence	Decline - Low confidence	Increase - Low confidence
Arkansas	Decline - High confidence	Increase - Low confidence	increase - Low confidence	Decline - Low confidence	Decline - Low confidence
Louisiana	Decline - High confidence		Increase - Low confidence	Decline - Low confidence	Decline - Low confidence
Florida	Decline - High confidence		Decline - Low confidence	Decline - Low confidence	Decline - Low confidence

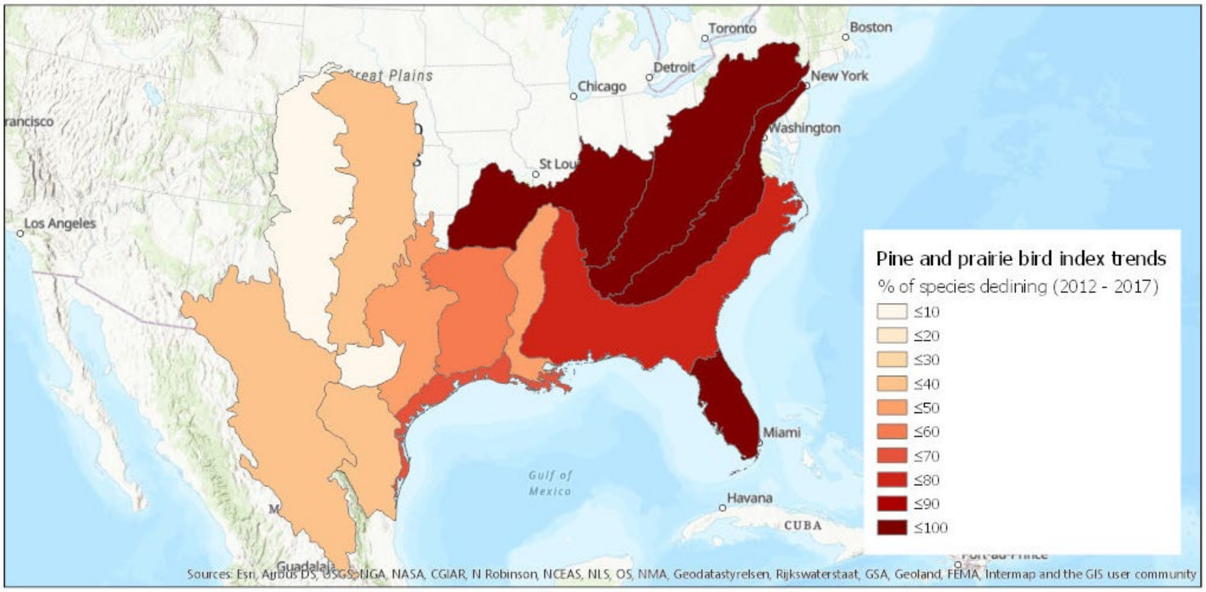


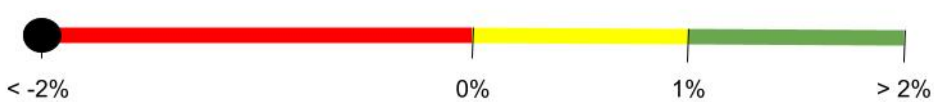
Figure 4. Percent of pine and prairie bird species declining from 2012-2017 by Bird Conservation Region (BCR).

Yearly trend

Most states showed declining trends for pine and prairie bird species from 2012-2017. Species selected are Regional Species of Greatest Conservation Need for states in the Southeast, primarily occur in this ecosystem, and have sufficient data for trend analysis in the Breeding Bird Survey. High confidence trends were statistically significant while low confidence trends were not. Averaging species trends across species and states results in an overall decline of 2.7% per year.

On track to meet SECAS goal

No. The decline of about 8% every 4 years is not on track to meet the SECAS goal of a 1% increase every 4 years.



Data source

[Breeding Bird Survey (BBS)]

Confidence in trend

Medium. Despite issues with roadside sampling and detectability for some species, the BBS is a standardized and randomized sample regularly used to estimate bird population trends. While the declines are only statistically significant (“high confidence”) for some of the states and species, the number of declining trend predictions is very suggestive of overall declines in these species.

Interpretation

This is an indicator of both local and landscape conditions across the pine and prairie ecosystem. There are many possible reasons for the decline in pine and prairie birds, despite large increases in prescribed fire and overall acreage of longleaf.

Looking at trends within BCRs provides additional context for the state-level results (see Figure 4). The largest declines in pine and prairie birds are in the Piedmont, Appalachian, Central Hardwoods, and Peninsular Florida BCRs. These are all areas with little to no longleaf pine. While there is ongoing work to restore and manage habitat in these regions, it doesn't look like it was enough to slow declines caused by historically more open habitat transitioning to dense mixed forests that aren't suitable for pine and prairie birds.

Pine and prairie birds are also still declining in the Southeast Coastal Plain where most longleaf occurs. One potential reason is that longleaf restoration doesn't always result in enough native herbaceous ground cover to support these birds. Another contributing factor could be that the breeding bird trend analysis stops at 2017, only a few years into the major push for longleaf restoration. Much of that early restoration is still fairly young and may not yet provide good habitat for these species.

Trends are better in the BCRs in the western part of the Southeast. Trends in these arid regions, however, can also be driven by yearly weather patterns. For example, low summer rainfall sometimes combined with high spring rainfall during multiple years from 2012-2017 could explain bobwhite quail increases Texas and Oklahoma.

Gopher tortoise (Eastern population)

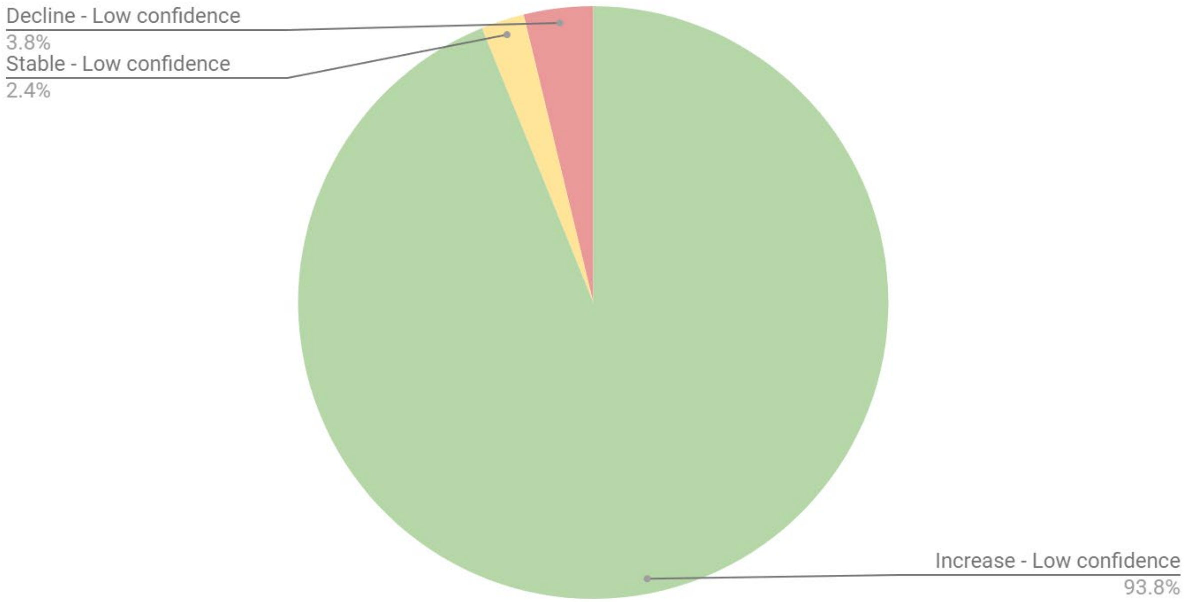


Figure 5. Percent of gopher tortoise sites with increasing, declining, or stable trends during resurveys in 2017.

Yearly trend

Most of the sites that were resurveyed in 2017 showed an increase in gopher tortoises within the Eastern population segment (Florida, Georgia, South Carolina, and eastern Alabama). The Eastern population is a candidate for listing under the Endangered Species Act. The chart above shows reported population trends and is weighted by acres surveyed. Due to inconsistencies in methods and reporting, it was not possible to estimate a numerical trend.

On track to meet SECAS goal

Unknown

Data source

[10th Annual Gopher Tortoise Candidate Conservation Agreement report]

Confidence in trend

Low. Due to inconsistencies in methods and reporting, it was not possible to estimate a numerical trend. The organizations in the Candidate Conservation Agreement report collectively own and/or manage more than 1.3 million acres of gopher tortoise habitat. Only approximately 35,000 acres of that habitat was resurveyed in 2017. The areas resurveyed were also not a random sample of potential habitat.

Interpretation

This is an indicator of both local and landscape conditions in part of the pine and prairie ecosystem. Despite the low confidence in the trend, it does appear that gopher tortoise populations are increasing overall. Significant effort has gone into restoration and habitat protection for this species and, where trend data are available, it appears the species is responding positively to these actions.

Upland forest

This ecosystem includes wooded communities ranging from dry upland forests to moist forests next to floodplains.

Upland forest area

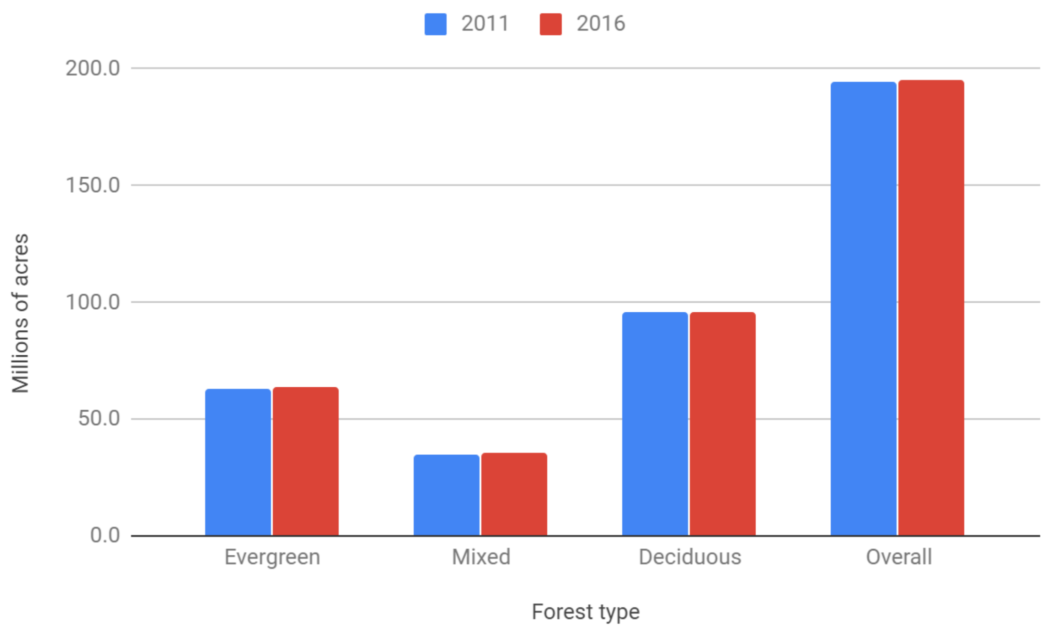


Figure 6. Millions of acres of various forest types in 2011 and 2016.

Table 3. Table showing state-specific percent change from 2011-2016.

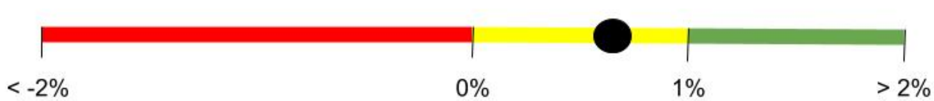
	Evergreen	Mixed	Deciduous	Overall
West Virginia	1.55	0.84	-0.47	-0.27
Kentucky	1.75	1.74	0.56	0.79
Virginia	-2.21	1.05	-1.30	-0.60
Missouri	-0.73	1.28	0.27	0.33
Oklahoma	0.81	3.29	1.67	1.62
North Carolina	2.61	1.40	-0.49	0.74
Tennessee	3.45	2.11	1.26	1.50
Texas	2.18	1.12	-0.43	1.30
Alabama	3.36	1.95	0.52	2.01
Mississippi	2.54	0.83	-1.26	0.98
Georgia	-1.75	0.62	-0.45	-0.48
South Carolina	-1.43	1.99	-0.01	-0.58
Arkansas	1.12	0.62	0.18	0.49
Louisiana	5.69	-0.71	0.82	2.59
Florida	0.67	-1.42	2.26	1.07

Yearly trend

Overall upland forest area increased by approximately 0.14% per year from 2011-2016. While that translates to a gain of approximately 280,000 acres per year, it is still a relatively small percent change given the large forest area across the Southeast. Evergreen, mixed, and deciduous forest area all increased during this time period. Forest area overall also increased for most states.

On track to meet SECAS goal

No. The increase of about 0.56% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

[National Land Cover Database (NLCD)]

Confidence in trend

High. The remotely sensed data used in this indicator provides full coverage of the region and forests typically have high classification accuracy.

Interpretation

This is a coarse indicator of the overall extent of potential habitat in the upland forest ecosystem. Conversion back to forest, particularly from areas classified as hay/pasture, is outpacing conversion of forests to urban and row crops. This estimate of forest area change may even be an underestimate of forest area increase as the new NLCD classifies many small linear forest fragments surrounded by development as developed open space. While more forest can be good for many upland species, additional forest often comes at the expense of grassland and early successional habitat. For more information on these possible impacts, see the pine and prairie bird indicator.

Upland forest birds

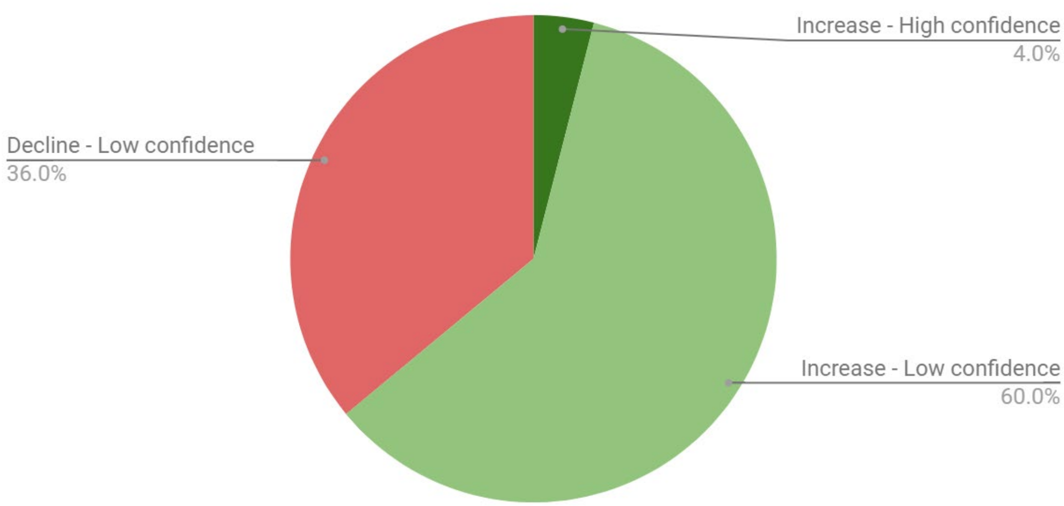


Figure 7. Percent of upland forest bird species that are increasing or declining by state from 2012-2017.

Table 4. Species trend data from 2012-2017 for each state used in Figure 7 above. Brighter colors indicate higher confidence.

	Cerulean warbler	**Wood thrush**	**Louisiana waterthrush**	**Worm-eating warbler**
West Virginia	Decline - Low confidence	Increase - Low confidence	Decline - Low confidence	Decline - Low confidence
Kentucky	Decline - Low confidence	Increase - Low confidence	Increase - Low confidence	Increase - Low confidence
Virginia	Decline - Low confidence	Decline - low confidence	Increase - Low confidence	Increase - Low confidence
Missouri	Decline - Low confidence	Increase - Low confidence	Increase - Low confidence	Increase - Low confidence
Oklahoma		Decline - Low confidence	Increase - Low confidence	
North Carolina	Increase - Low confidence	Increase - Low confidence	Increase - Low confidence	Decline - Low confidence
Tennessee	Decline - Low confidence	Decline - Low confidence	Increase - Low confidence	Decline - Low confidence
Texas		Decline - Low confidence	Increase - Low confidence	Decline - Low confidence
Alabama		Decline - Low confidence	Decline - Low confidence	Increase - Low confidence
Mississippi	Decline - Low confidence	Increase - High confidence	Increase - Low confidence	Increase - Low confidence
Georgia		Increase - Low confidence	Increase - Low confidence	Increase - Low confidence
South Carolina		Decline - Low confidence	Increase - Low confidence	Increase – Low confidence
Arkansas	Increase - Low confidence	Decline - Low confidence	Increase - Low confidence	Decline - Low confidence
Louisiana		Increase - High confidence	Increase - Low confidence	Increase - Low confidence
Florida		Decline - Low confidence	Increase - Low confidence	

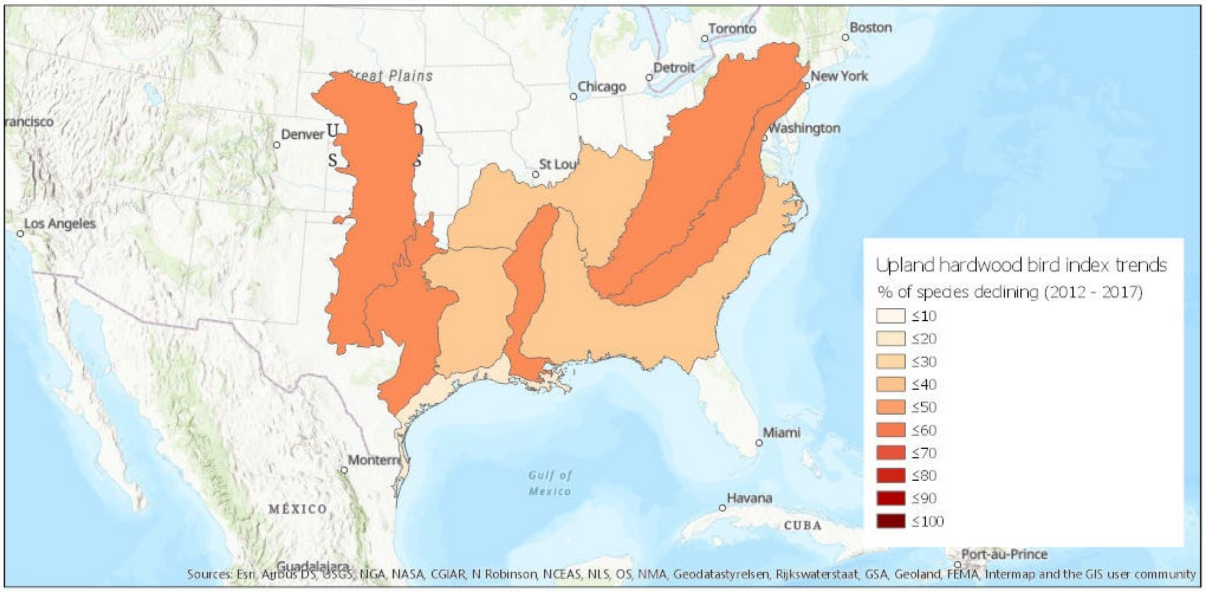


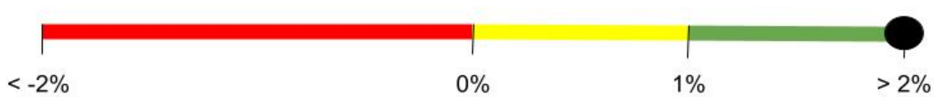
Figure 8. Percent of upland forest bird species declining from 2012-2017 by Bird Conservation Region (BCR).

Yearly trend

A slight majority of states showed increasing trends for upland forest bird species from 2012-2017. Some species mostly increased across states (Louisiana waterthrush, worm-eating warbler) while others were mixed (cerulean warbler and wood thrush). Species selected are Regional Species of Greatest Conservation Need for states in the Southeast, primarily occur in this ecosystem, and have sufficient data for trend analysis in the Breeding Bird Survey. High confidence trends were statistically significant while low confidence trends were not. Averaging species trends across species and states results in an overall 0.65% increase per year.

On track to meet SECAS goal

Yes. The increase of about 2.6% every 4 years is greater than the SECAS goal of a 1% increase every 4 years.



Data source

[Breeding Bird Survey (BBS)]

Confidence in trend

Medium. Despite issues with roadside sampling and detectability for some species, the BBS is a standardized and randomized sample regularly used to estimate bird population trends. The mixed patterns across species and the low number of statistically significant (“high confidence”) trends suggests that overall, upland forest birds may be stable, slightly increasing, or slightly decreasing, with major variations in trends within species.

Interpretation

This is an indicator of both local and landscape conditions across the upland forest ecosystem. The mixed trends across species highlight competing changes in this ecosystem: increasing forest area and increasing forest fragmentation. Each species likely responds differently depending on where those changes are occurring.

The two species with the most divergent trends—wood thrush (a slight majority declining) and Louisiana waterthrush (mostly increasing)—may provide good examples of those differences. In the Piedmont and Coastal Plain, Louisiana waterthrush likely benefits from the focus on conserving intact forests near water. Wood thrush, which typically uses habitat farther from water, is impacted by increased fragmentation in areas farther from water that are getting less protection.

Other species, like worm-eating warblers, are likely benefiting from maturing forests throughout the Southeast.

These species are all neotropical migrants, however, and threats to survival during migration (e.g., communication towers) and on their wintering grounds (e.g., habitat loss) are likely also impacting population trends.

Forested wetland

This ecosystem includes frequently flooded forests on both organic and mineral soils.

Forested wetland area

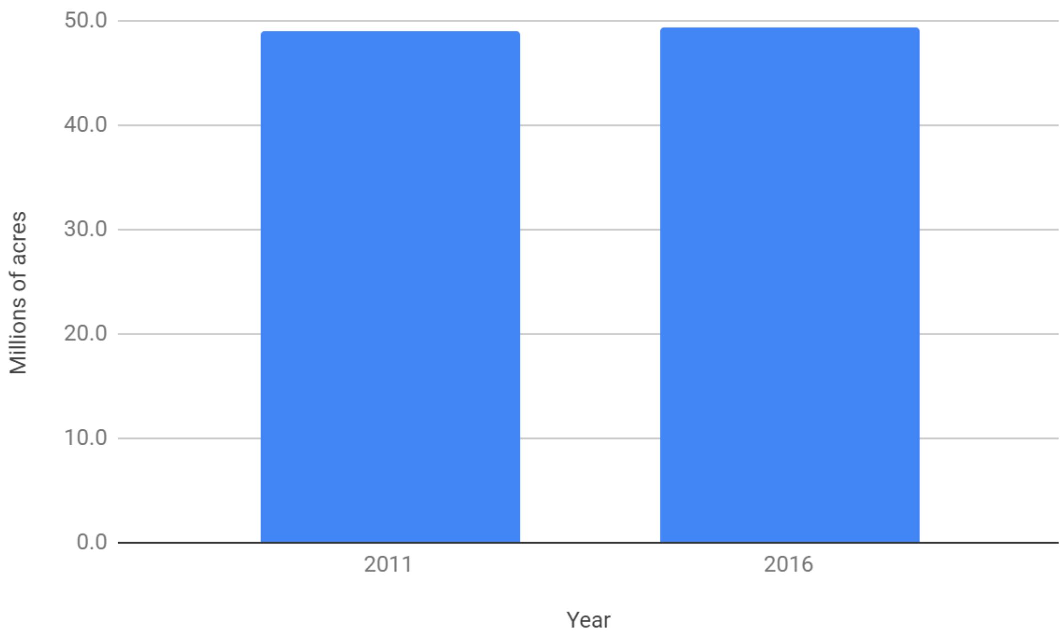


Figure 9. Millions of acres of forested wetland in 2011 and 2016.

Table 5. State-specific percent change in forested wetland area from 2011-2016.

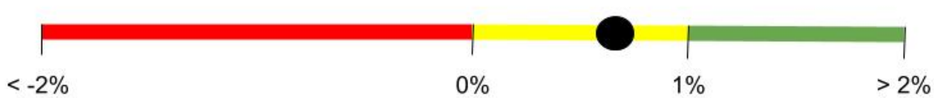
	2011 acres	2016 acres	% change/year
West Virginia	19,314	20,512	1.24
Kentucky	288,882	290,485	0.11
Virginia	1,171,155	1,187,160	0.27
Missouri	774,396	774,222	<0.01
Oklahoma	312,459	308,604	-0.25
North Carolina	4,388,645	4,394,197	0.03
Tennessee	810,654	813,549	0.07
Texas	4,456,595	4,530,058	0.33
Alabama	3,468,382	3,530,626	0.36
Mississippi	4,724,999	4,753,287	0.12
Georgia	5,899,054	5,955,290	0.19
South Carolina	3,979,274	3,958,338	-0.11
Arkansas	3,407,234	3,406,490	<0.01
Louisiana	6,325,396	6,347,868	0.07
Florida	8,913,578	9,040,669	0.29

Yearly trend

Forested wetland area increased by approximately 0.15% per year from 2011-2016. That translates to a gain of approximately 74,000 acres per year. Forested wetland area overall also increased for most states.

On track to meet SECAS goal

No. The increase of about 0.6% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

[National Land Cover Database (NLCD)]()

Confidence in trend

High. The remotely sensed data used in this indicator provides full coverage of the region and forested wetlands typically have high classification accuracy.

Interpretation

This is a coarse indicator of the overall extent of potential habitat in the forested wetland ecosystem. Extensive conservation investments in forested wetlands, policies restricting wetland development, and growing interest from urban communities in water supply protection and reducing flood risks may be causing the increases in forested wetland area. However, forested wetland area is also very sensitive to timber management decisions and yearly weather fluctuations that facilitate or hinder harvest. It is likely that many complicated interacting factors will drive changes in this indicator in the future.

Forested wetland birds

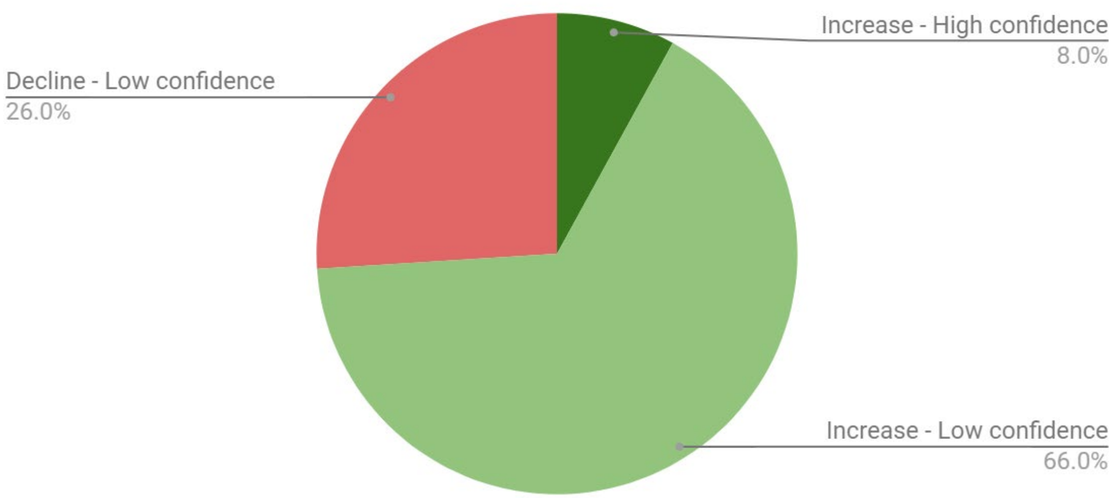


Figure 10. Percent of forested wetland bird species that are increasing or declining by state from 2012-2017.

Table 6. Species trend data from 2012-2017 for each state used in Figure 10 above. Brighter colors indicate higher confidence.

	Prothonotary warbler	**Swallow-tailed kite**	**Yellow-throated warbler**	**Swainson's warbler**
West Virginia	Decline - Low confidence		Increase - Low confidence	Increase – Low confidence
Kentucky	Increase - Low confidence		Increase - Low confidence	Decline – Low confidence
Virginia	Increase - Low confidence		Increase - Low confidence	Decline – Low confidence
Missouri	Increase - Low confidence		Increase - Low confidence	
Oklahoma	Increase - Low confidence		Increase - Low confidence	
North Carolina	Decline - Low confidence		Increase - Low confidence	Increase – Low confidence
Tennessee	Increase - Low confidence		Increase - Low confidence	Increase – Low confidence
Texas	Decline - Low confidence		Increase - Low confidence	Increase – Low confidence
Alabama	Decline - Low confidence	Decline - Low confidence	Increase - Low confidence	Increase – High confidence
Mississippi	Increase - Low confidence	Increase - Low confidence	Increase - Low confidence	Decline – Low confidence
Georgia	Decline - Low confidence	Increase - High confidence	Increase - Low confidence	Increase – Low confidence
South Carolina	Increase - Low confidence	Increase - Low confidence	Decline - Low confidence	Increase – Low confidence
Arkansas	Increase - Low confidence		Decline - Low confidence	Increase – Low confidence
Louisiana	Decline - Low confidence	Increase - Low confidence	Increase - Low confidence	Increase – High confidence
Florida	Decline - Low confidence	Increase - Low confidence	Decline - Low confidence	Increase – Low confidence

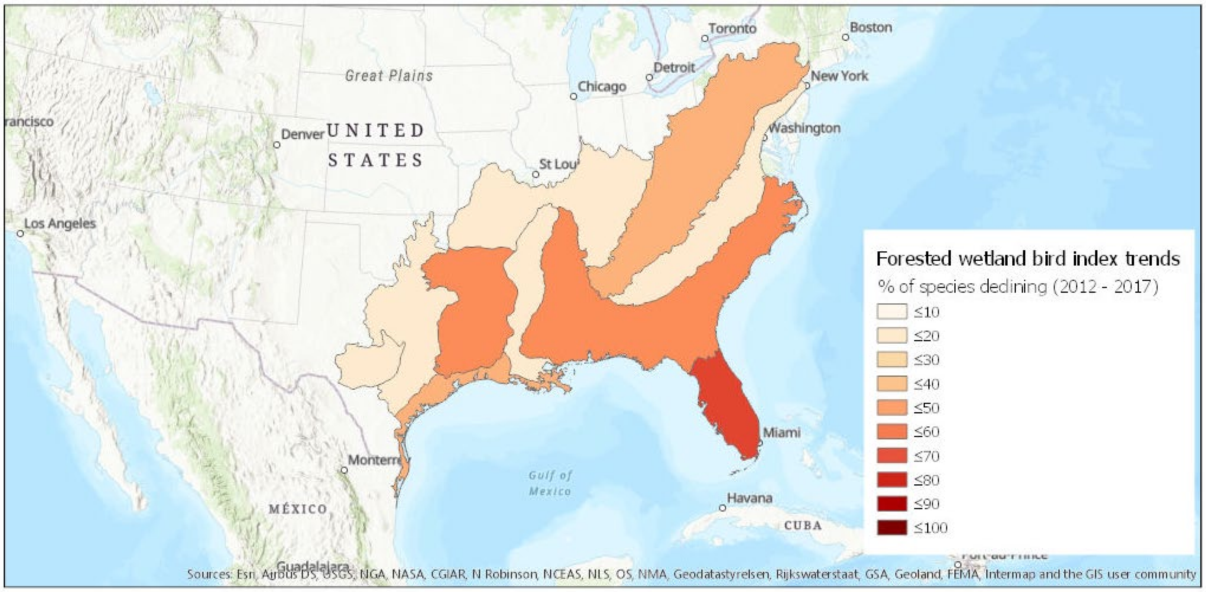


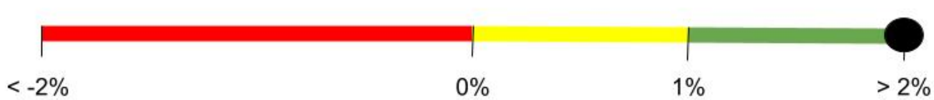
Figure 11. Percent of forested wetland bird species declining from 2012-2017 by Bird Conservation Region (BCR).

Yearly trend

Most states showed increasing trends for forested wetland bird species from 2012-2017. Species selected are Regional Species of Greatest Conservation Need for states in the Southeast, primarily occur in this ecosystem, and have sufficient data for trend analysis in the Breeding Bird Survey. High confidence trends were statistically significant while low confidence trends were not. Averaging species trends across species and states results in an overall 3% increase per year.

On track to meet SECAS goal

Yes. The increase of about 12% every 4 years is greater than the SECAS goal of a 1% increase every 4 years.



Data source

[Breeding Bird Survey (BBS)]

Confidence in trend

Medium. Despite issues with roadside sampling and detectability for some species, the BBS is a standardized and randomized sample regularly used to estimate bird population trends. The mixed patterns across states and the low number of trends being statistically significant (“high confidence”) suggests that overall, forested wetland birds may be stable, slightly increasing, or slightly decreasing with major variation across states.

Interpretation

This is an indicator of both local and landscape conditions across the forested wetland ecosystem. While there is variation across species and states, forested wetland birds appear to be on track to meet the SECAS goal. This may be due to the extensive conservation investments in forested wetlands, policies restricting wetland development, and growing interest from urban communities in water supply protection and reducing flood risks.

While this indicator is on track overall, one area of concern is Peninsular Florida. This is the only BCR where more forested wetland bird indicator species are declining than increasing. Reasons for this could include increasing development farther from the coast and the inability of forested wetlands to migrate inland with sea-level rise.

Landscapes

This cross-ecosystem category includes all terrestrial habitats.

Areas without invasive plants

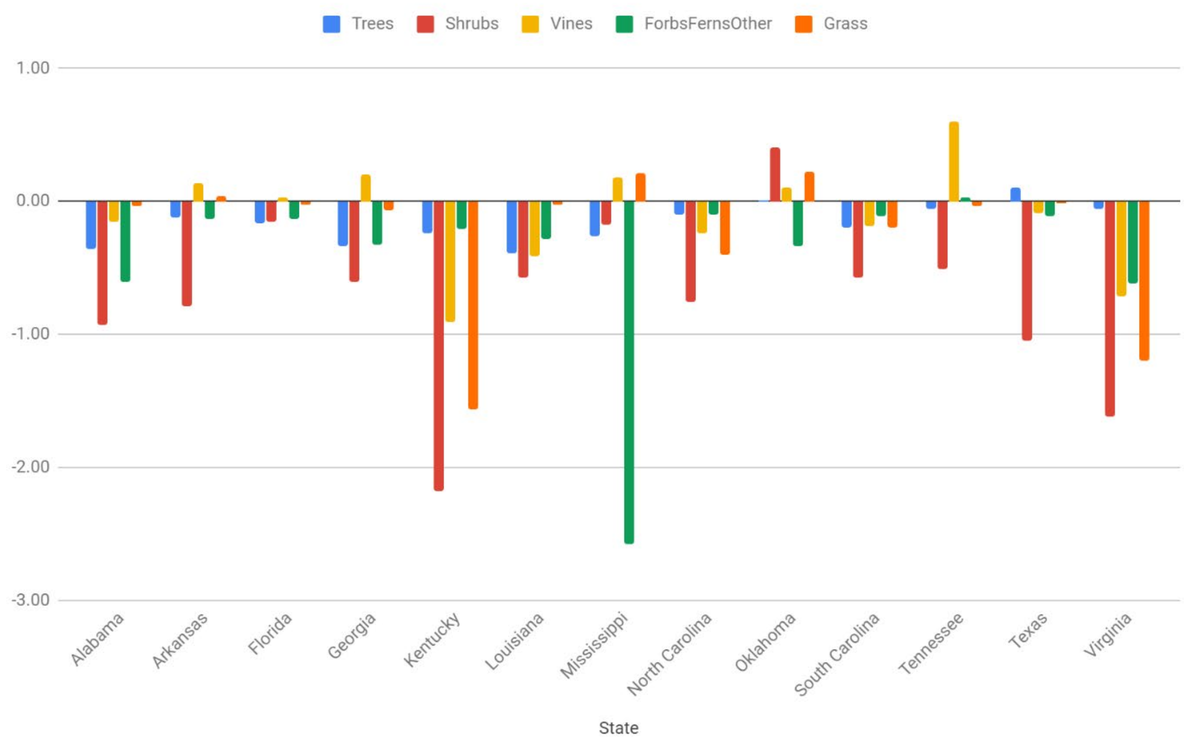


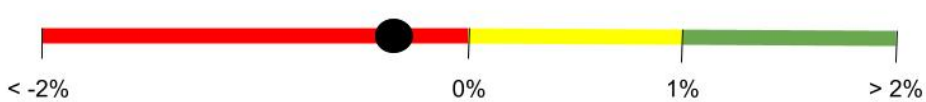
Figure 12. Percent change in areas without invasive plants by plant type, based on the most recent available state data.

Yearly trend

Most states showed declining trends for areas without different types of invasive plants. The most recent data available varied for each state, with some as old as 2016 and others as recent as 2019. Averaging trends across plant type and states results in a 0.33% decline per year.

On track to meet SECAS goal

No. The decline of about 1.3% every 4 years is not on track to meet the SECAS goal of a 1% increase every 4 years.



Data source

Forest Inventory Analysis (FIA) data extracted using the [Southern Nonnative Invasive Plant Extraction Tool (SNIPET)]

Confidence in trend

Medium. While data for some states was a few years old, the statistically randomized design of the FIA program, its long history of tracking trends, and the sample size across all states suggest these data provide a reasonable estimate of the trend.

Interpretation

This is an indicator of local conditions across terrestrial ecosystems. This indicator suggests that work to reduce the spread of specific invasive species is having an impact. Without the ongoing work to reduce invasives, landscape and climate change in the Southeast would likely lead to far worse trends. However, this indicator also shows that additional attention to invasive plants will be required to get on track to meet the SECAS goal.

Notable trends for this indicator include: 1) Improvements in areas without invasive vines in Tennessee mostly due to reductions in Japanese honeysuckle, 2) Improvements in areas without invasive shrubs in Oklahoma mostly due to reductions in shrubby and Thunberg's lespedeza, 3) Declines in areas without invasive forbs in Mississippi due to large increases in liriope, and 4) Declines in areas without invasive grasses in Kentucky, Virginia, and the Carolinas mostly due to increases in Japanese stiltgrass.

Freshwater aquatic

This ecosystem includes rivers and streams draining into the Atlantic Ocean and Gulf of Mexico.

Water quality

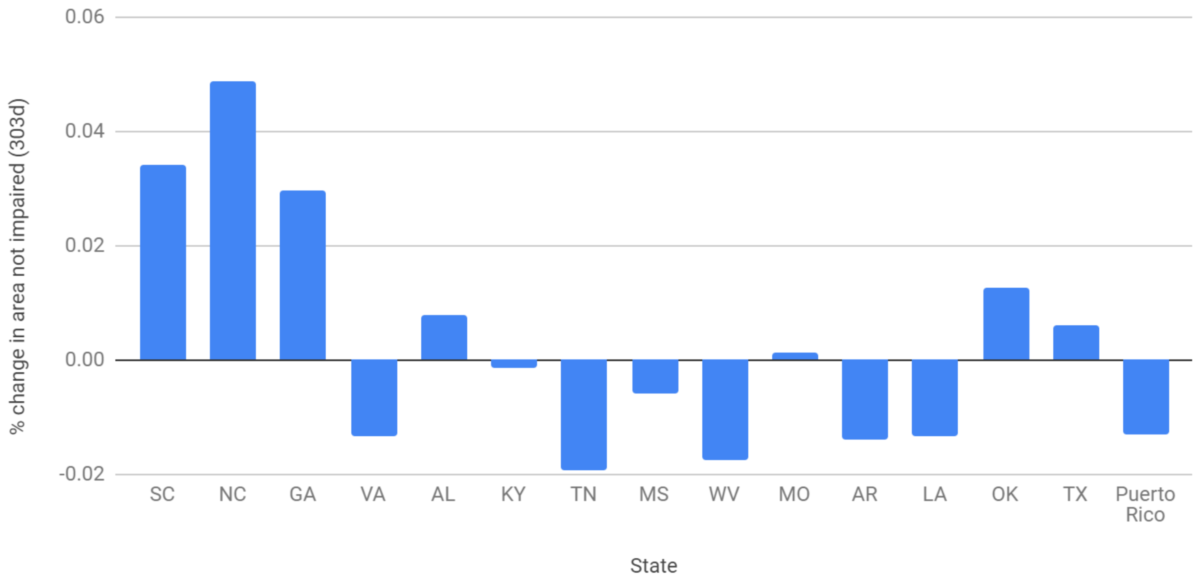


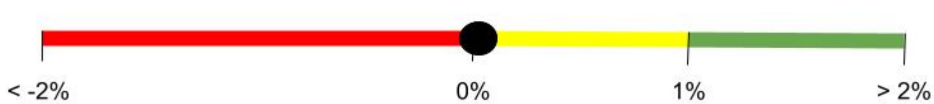
Figure 13. Percent change in area not impaired from the three most recent 303(d) assessments available per state.

Yearly trend

When averaged across state trends, overall water quality increased by approximately 0.003% per year. For all states except North Carolina, the most recent data available was 2014, 2016, or 2018. For North Carolina, the most recent data was 2010. Florida did not report its data in a format that allowed for trend estimates.

On track to meet SECAS goal

No. The increase of about 0.012% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

[EPA 303(d) Clean Water Act reports]

Confidence in trend

Low. Estimating water quality trends can be particularly challenging. While there are extensive survey efforts and approaches for standardization across state-specific 303(d) reports, yearly weather variation over multiple years and different state standards can complicate estimates of water quality trends.

Interpretation

This is an indicator of overall water quality across the freshwater aquatic ecosystem. Given the low confidence in the trends, it's important to not read too much into these initial numbers. That said, these numbers suggest mixed trends across different states and a lack of strong consistent improvement or decline across the Southeast.

Aquatic connectivity

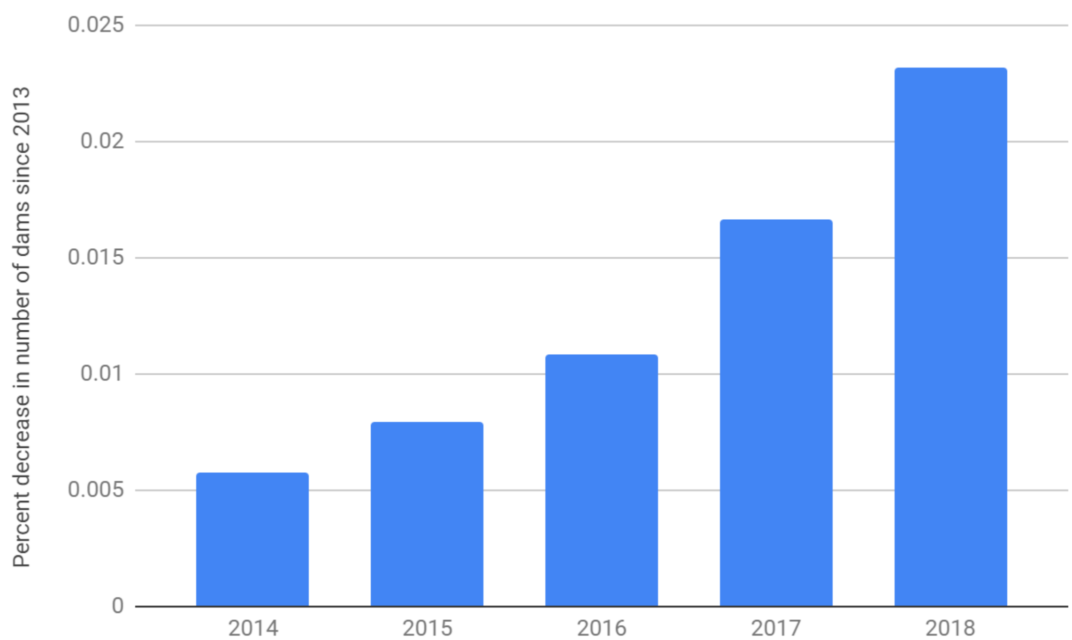


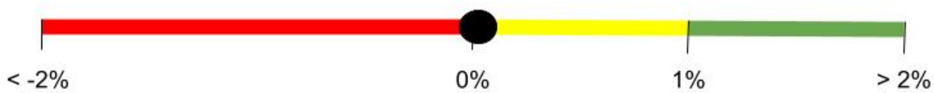
Figure 14. Percent decrease in number of dams since 2013, from 2014-2018.

Yearly trend

Aquatic connectivity, based on overall number of dams, increased by 0.004% per year from 2013-2018.

On track to meet SECAS goal

No. The increase of about 0.016% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

Southeast Aquatic Resources Partnership Aquatic Barrier Database (data available on request; contact kat@southeastaquatics.net)

Confidence in trend

Low. While a small increase in overall connectivity is likely, estimating the magnitude of that change is difficult. Tracking dam removals and the year they are removed is still a challenge. Estimating the overall number of dams in the region can also be a challenge. The current data are probably underestimating both the number of dam removals and the total number of dams in the region.

Interpretation

This is an indicator of species' ability to access habitat within rivers and streams of the region. While the increases are relatively small, this is another example of an ecosystem condition that is improving over time. Maintaining improvements in aquatic connectivity may be a challenge in the near future as coastal communities explore creating new dams and reservoirs in response to increased flooding from intense storms and sea-level rise.

Beach and dune

This ecosystem extends from the nearshore ocean across sand, gravel, or shell intertidal beaches, and into more stable and vegetated dunes.

Beach birds

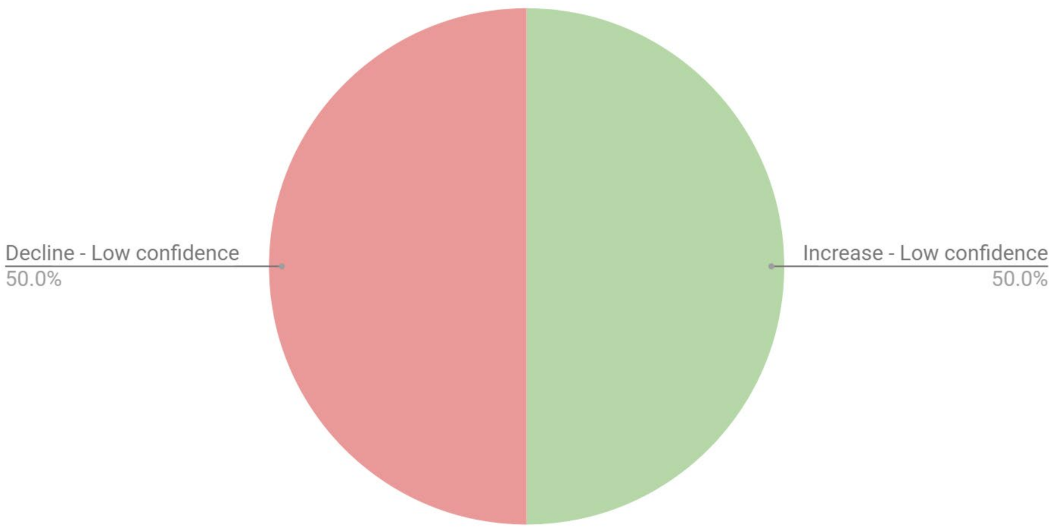


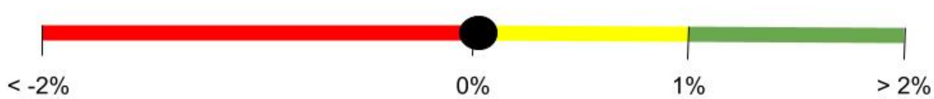
Figure 15. Beach bird trends and confidence.

Yearly trend

When averaged across species, beach birds increased by 0.003% per year from 2011-2016. Piping plover and whimbrel increased by 0.02% and 0.03% per year, respectively. Red knot and willet declined by 0.02% and 0.01%, respectively.

On track to meet SECAS goal

No. The increase of about 0.012% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

[International Shorebird Survey (ISS)]

Special thanks to Adam Smith (Canadian Wildlife Service, Environment and Climate Change Canada) and Paul Smith (Environment and Climate Change Canada) for providing data and estimates for this report. Special thanks to Manomet for overall coordination of the ISS.

Confidence in trend

Low. All trend estimates have high statistical uncertainty. This is mostly due to low sample sizes along the South Atlantic and Gulf coasts.

Interpretation

This is an indicator of beach habitat quality. The mixed trends highlight the challenges and opportunities within this ecosystem. Habitat modification, climate change, and human disturbance continue to pose problems, but conservation action throughout the Atlantic and Gulf coasts also seems to be making an impact. As these birds are migratory, conservation actions and threats impacting their populations occur both within the Southeast and in other parts of the species' ranges.

Estuarine and marine

This ecosystem extends upstream into tidal flats and salt marshes, and seaward into the open ocean covering the extent of U.S. waters.

Coastal condition

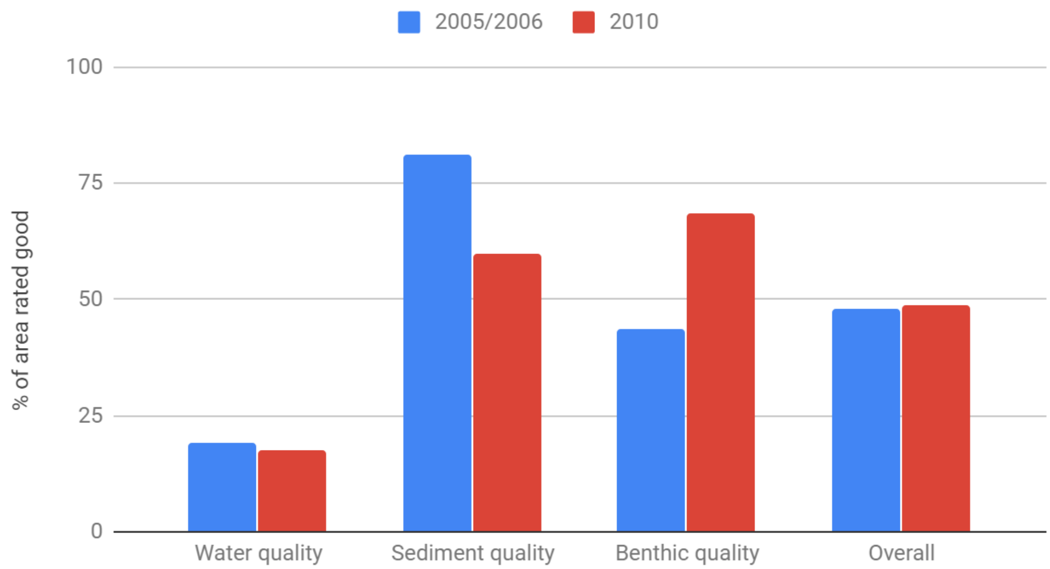


Figure 16. Percent of the Southeast rated "good" for various coastal condition metrics in 2005/2006 and 2010.

Table 7. Trends for each of the subregions used in Figure 16 above (South Atlantic, Gulf of Mexico).

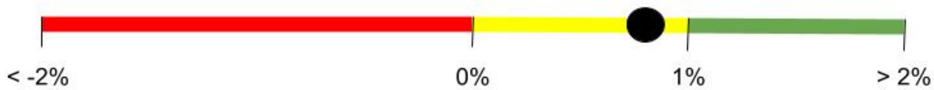
	Water quality	**Sediment quality**	**Benthic quality**	**Overall**
South Atlantic	7.80	-27.30	13.90	-1.87
Gulf of Mexico	-9.90	-14.50	35.40	3.67

Yearly trend

When averaged across subregions, overall coastal condition increased by 0.19% per year from 2005/2006 to 2010. Condition declined in the South Atlantic and increased in the Gulf of Mexico.

On track to meet SECAS goal

No. The increase of about 0.76% every 4 years is not enough to reach the SECAS goal of a 1% increase every 4 years.



Data source

[National Coastal Condition Assessment]

Confidence in trend

Low. While this is a well-designed, randomized survey, benthic quality can undergo large yearly variations based on weather that do not necessarily indicate trends in coastal condition.

Interpretation

This is an indicator of the overall condition of the water and sediment in the estuaries and nearshore marine areas of the Southeast. Since 2001/2002 (not depicted in graph), condition has been stable or declining in the South Atlantic and improving in the Gulf of Mexico. Data in this assessment predate the Gulf Horizon oil spill and subsequent restoration efforts. Those events will likely impact future trends in Gulf condition.

Fisheries

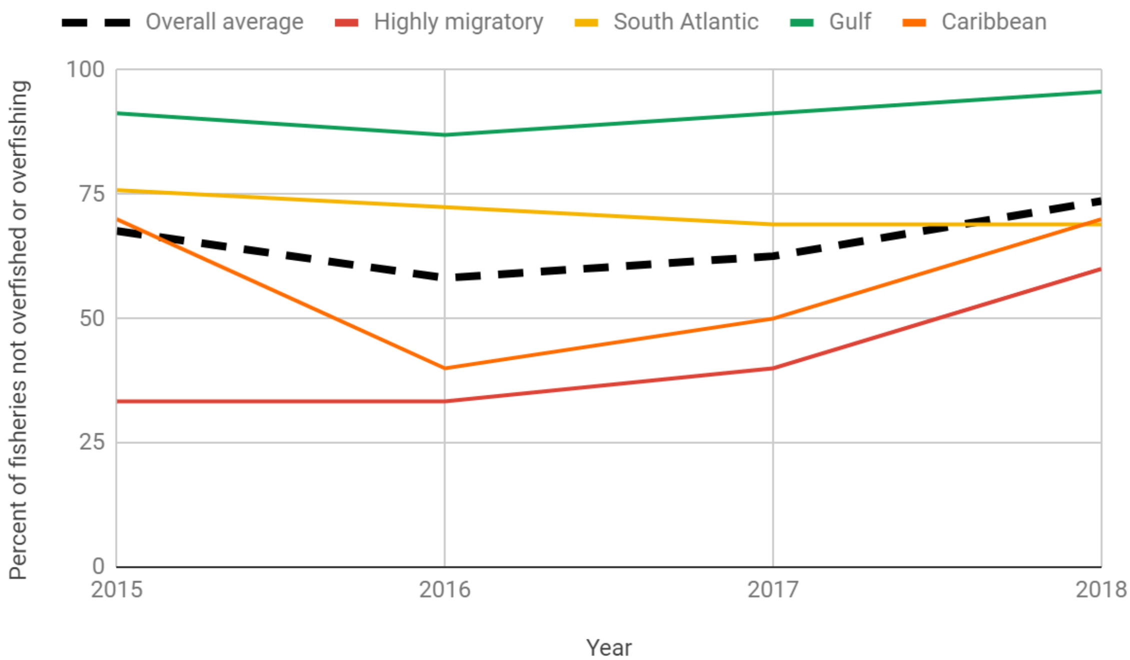


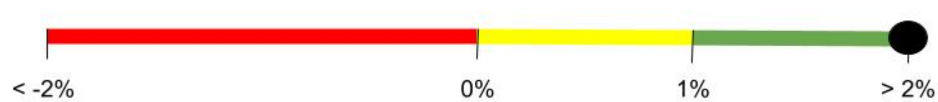
Figure 17. Percent of fisheries not overfished or overfishing from 2015-2018.

Yearly trend

Overall fisheries condition has improved by approximately 0.56% per year from 2015-2018. The condition of highly migratory, Gulf, and Caribbean fisheries improved while South Atlantic fisheries condition declined.

On track to meet SECAS goal

Yes. The increase of about 2.2% every 4 years is greater than the SECAS goal of a 1% increase every 4 years.



Data source

[NOAA reports to Congress on the status of U.S. fisheries]

Confidence in trend

Medium. Stock status assessments can be challenging, but extensive work and data go into assessing these statuses every year.

Interpretation

This is an indicator of management for the most important estuarine and marine fisheries of the Southeast. Fishing is only one of the many stressors faced by the fisheries of the Southeast. Overall improvements in fishery management make important contributions to the SECAS goal, but broader ecosystem-based approaches will be important for sustaining fisheries at desired levels into the future.