



Indicator 1.07

Number and Geographic Distribution of Forest-Associated Species at Risk of Losing Genetic Variation and Locally Adapted Genotypes, 2003–2014

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What is this indicator and why is it important?

This indicator provides information on the number and distribution of forest-associated species and infraspecies (e.g., subspecies, varieties) at risk of losing genetic variation across their geographic range. Comparing current geographic distributions with historical distributions is the basis for identifying the species and infraspecies whose range has contracted significantly (based on per-State presence and absence). Human activities, like land use conversions, climate change, the alteration of native habitats, the introduction of exotic species, and direct exploitation, are accelerating changes in species distributions. The size of a distribution is often related to the number of genetically distinct populations that exist. Consequently, species and infraspecies that currently occupy a smaller portion of their former distribution signal a potential loss of their genetic variation. This erosion in genetic variation makes species less adaptable to environmental change, increases the risk of extinction, and lowers the overall resilience of forest ecosystems.

What does the indicator show?

The geographic distributions of most forest-associated species (based on current and historical State-level occurrence records) have not been appreciably reduced. Geographic distribution data for forest-associated species show that 90 percent fully occupy their former range, ranging from 68 percent for freshwater fishes to 94 percent for vascular plants. The number of forest-associated species that now occupy less than 80 percent of their distribution varies by species group (fig. 7-1). Species groups with at least 5 percent of species occupying less than 80 percent of their former ranges include birds, mammals, and freshwater fishes. For most groups, species exhibit substantially lower rates of range shrinkage compared to infraspecies (fig. 7-1), suggesting that genetic diversity within infraspecies is at greater risk. Geographically, States that have lost the greatest number of species and infraspecies associated with forests are concentrated in the mid-Atlantic and Central States (fig. 7-2). The rate of shrinkage from former geographic range varies considerably among species groups. For forest birds exhibiting shrinking ranges, the average rate of shrinkage is 57 percent. Excluding endemic Hawaiian birds, range shrinkage for birds is 26 percent, which is similar to the 25 percent average rate of shrinkage for forest mammals with shrinking ranges.

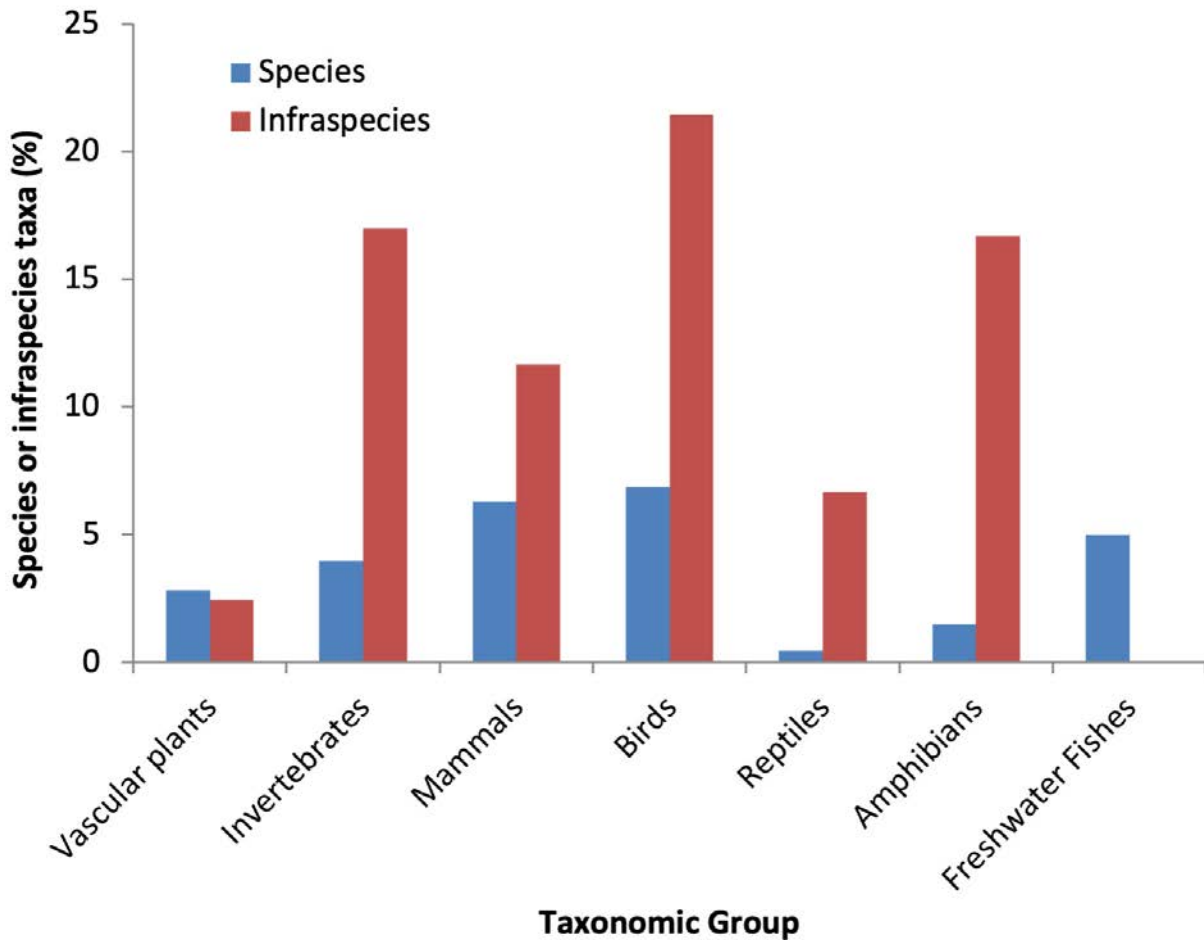


Figure 7-1—Species or infraspecies taxa percentage of vascular plants, vertebrates, and select invertebrates associated with forest habitats that occupy less than 80 percent of their former geographic distribution (based on State-level occurrence data). Source: NatureServe (2014).

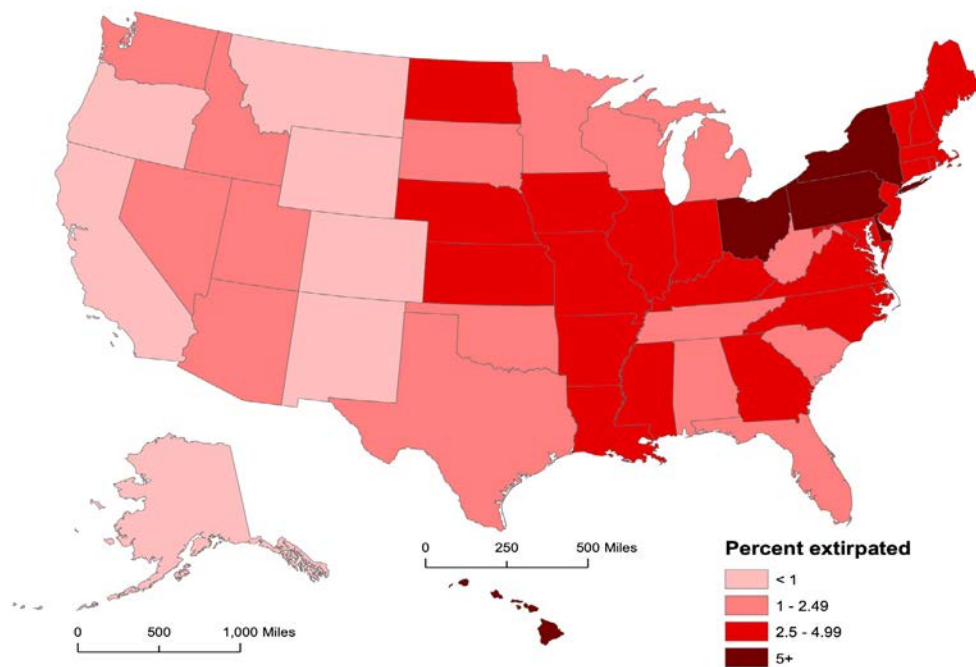


Figure 7-2—The percentage of forest-associated species (vascular plants, vertebrates, and select invertebrates) that have been extirpated within each State. Source: NatureServe (2014).

What has changed since 2010?

Terrestrial vertebrate taxa can be compared between this indicator report to findings from the 2003 (USDA Forest Service 2004) and 2010 (Robertson et al. 2011) indicator reports. Among these groups, range contraction of species occupying less than 80 percent of their former range increased the most among forest-associated birds and mammals but decreased for amphibians and reptiles (fig. 7-3). A broader accounting of species that inhabit forests has occurred because of new habitat affinity data. Some of the apparent changes in extirpated species may be attributable to differing treatment of data for some groups, such as vascular plants and invertebrates, which were not included in the 2003 report analysis.

Why can't the entire indicator be reported at this time?

Estimates of species' geographic distributions are fundamental to conservation plans. Although historical records, species collections, and expert opinion are available to estimate the distribution of most vascular plant and vertebrate species, much of these data for those species groups that collectively represent numerous species (e.g., many invertebrates, fungi) is lacking. Even among vascular plants and vertebrates, additional data are needed to refine the coarse State-level analysis reported here to quantify species range changes across the landscape. Reconstruction of former distributions is hampered by the absence of comprehensive historical records. Although efforts are underway to document species distributions, these compilations are often based on expert opinion that provides an estimate of the current or recent range only. Because a species' geographic distribution is dynamic, a statistically designed inventory that permits an objective and systematic assessment of range occupancy over time is needed to fully meet the intent of this indicator.

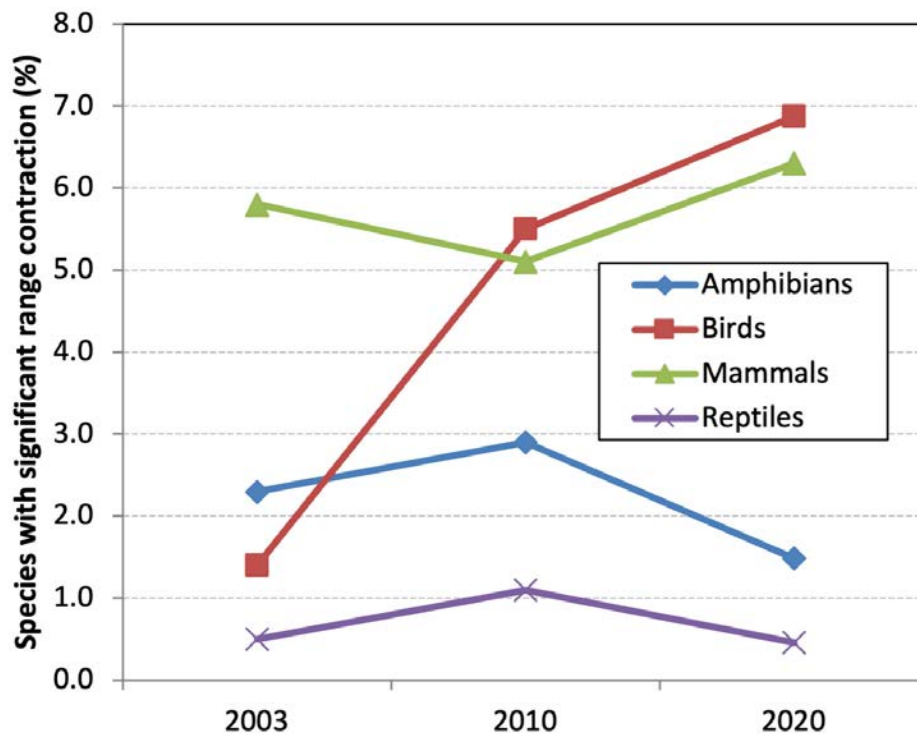


Figure 7-3—A comparison of findings from the 2003, 2010, and 2020 indicator reports (actual reporting dates were 2002, 2009, and 2014, respectively) for forest-associated terrestrial vertebrates' percentage of species that now occupy less than 80 percent of their former geographic distribution (based on State-level occurrence data). Source: NatureServe (2014).

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