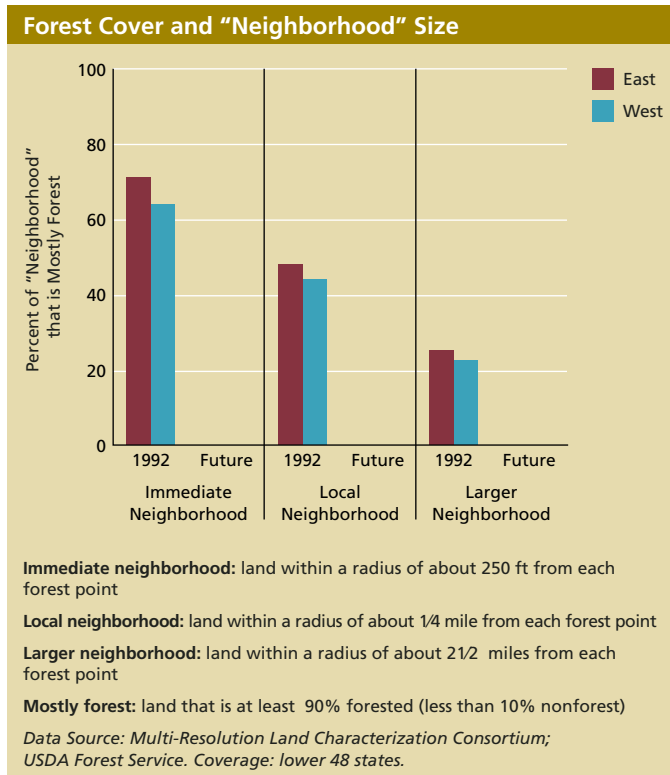




SYSTEM DIMENSIONS	CHEMICAL AND PHYSICAL	BIOLOGICAL COMPONENTS	HUMAN USES
Extent	Nutrients, Carbon, Oxygen	Plants and Animals	Food, Fiber, and Water
Pattern	Contaminants Physical	Communities Ecological Productivity	Recreation and Other Services

Forest Pattern and Fragmentation



What Is This Indicator, and Why Is It Important?

Imagine that it was possible to measure, for each tree in the nation's forests, whether that tree was surrounded by more-or-less complete forest cover, or whether its "neighborhood" contained a substantial amount of nonforest cover (agriculture, developed areas, recently cleared land, roads, railroads, powerline rights-of way, etc.). Some trees have only small forested neighborhoods, while others are surrounded by larger forested regions.

This indicator describes a tree's forest neighborhood according to the degree of forest cover within various distances. Thus, the "immediate neighborhood" of a particular tree is everything within about 250 feet in all directions. This "immediate neighborhood" is "mostly forest" if the land is at least 90% forested. A tree's "local neighborhood" extends about 1/4 mile in all directions, and its "larger neighborhood" extends about 2 1/2 miles. This analysis relies upon computer analyses of satellite data on millions of individual forest points. While these points (called "pixels") are not individual trees—they are squares about 100 feet on a side—they serve much the same purpose.

"Forest fragmentation" describes the degree to which forested areas are being broken into smaller patches and interspersed with nonforest areas. Research has shown that forest close to nonforest cover is often warmer and drier, more likely to be affected by wind, and more likely to be invaded by non-native species. In addition, forest animals that live near developed areas, farmlands, or roads are more likely to be affected by collisions with cars, increased hunting pressure, noise, lights, predation by cats and dogs, etc.

These effects may be felt at different distances from the nonforest edge. In addition, some species are quite sensitive to these effects, while others are less affected. Because these variations in both effect and response by species mean that there is no single distance threshold for the extent of such effects, this indicator presents a range of different neighborhood sizes.

What Do the Data Show? About two-thirds of all points in both eastern and western forests have land cover that is mostly forest—that is, 10% or less of the area is nonforest—within their immediate neighborhood (roughly 250-foot radius). About a quarter of all forest points are surrounded by larger (roughly 2 1/2-mile radius) neighborhoods that are "mostly forest." Tracking this indicator through time is important, because it will help distinguish between natural forest patterns and changes caused by human activity.

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📍 Forest Pattern and Fragmentation *(continued)*

Discussion This analysis does not distinguish between fragmentation caused by human activity (development, agriculture, etc.) and natural patchworks of forest and nonforest cover. Many western forests in particular are characterized by natural intermingling of forest and grasslands or shrublands.

The satellite remote sensing data presented here can generally identify forest features that are at least 10,000 feet square, or about 100 feet on a side. Thus, features that are narrower than about 100 feet—for example, some roads, powerlines, residential development within otherwise-wooded areas, or other small nonforest land uses—are missing. (Somewhat larger features may also be missed if they are split between multiple pixels.) Future analyses could include these smaller features by using satellite data that can discern smaller nonforest areas, or using ancillary information, such as mapped databases showing the location of these smaller features.

This analysis treats all nonforest land uses similarly, whether they are clumped together, spread evenly across a landscape, or strung together in a line (e.g., as a road or powerline). Different types of breaks in forest cover may affect forests in different ways—concentrations of nonforest cover may have major impacts on local habitat suitability, while linear features such as roads can serve as barriers to species movement. Future analyses might weight some nonforest areas or patterns more than others.

The “neighborhoods” used in this analysis are intended to provide a perspective on forest pattern, not to represent the habitat needs of particular species.

The technical note for this indicator is on page 240.