Ecological Connectivity in EPA Region 4

Q: What are the trends in the extent and distribution of the Nation's ecological systems?

The above question pertains to all 'Extent and Distribution of Ecological Systems' Indicators, however, the information on these pages (overview, graphics, references and metadata) relates specifically to "Ecological Connectivity in EPA Region 4". Use the right side drop list to view the other related indicators on this question.

Introduction

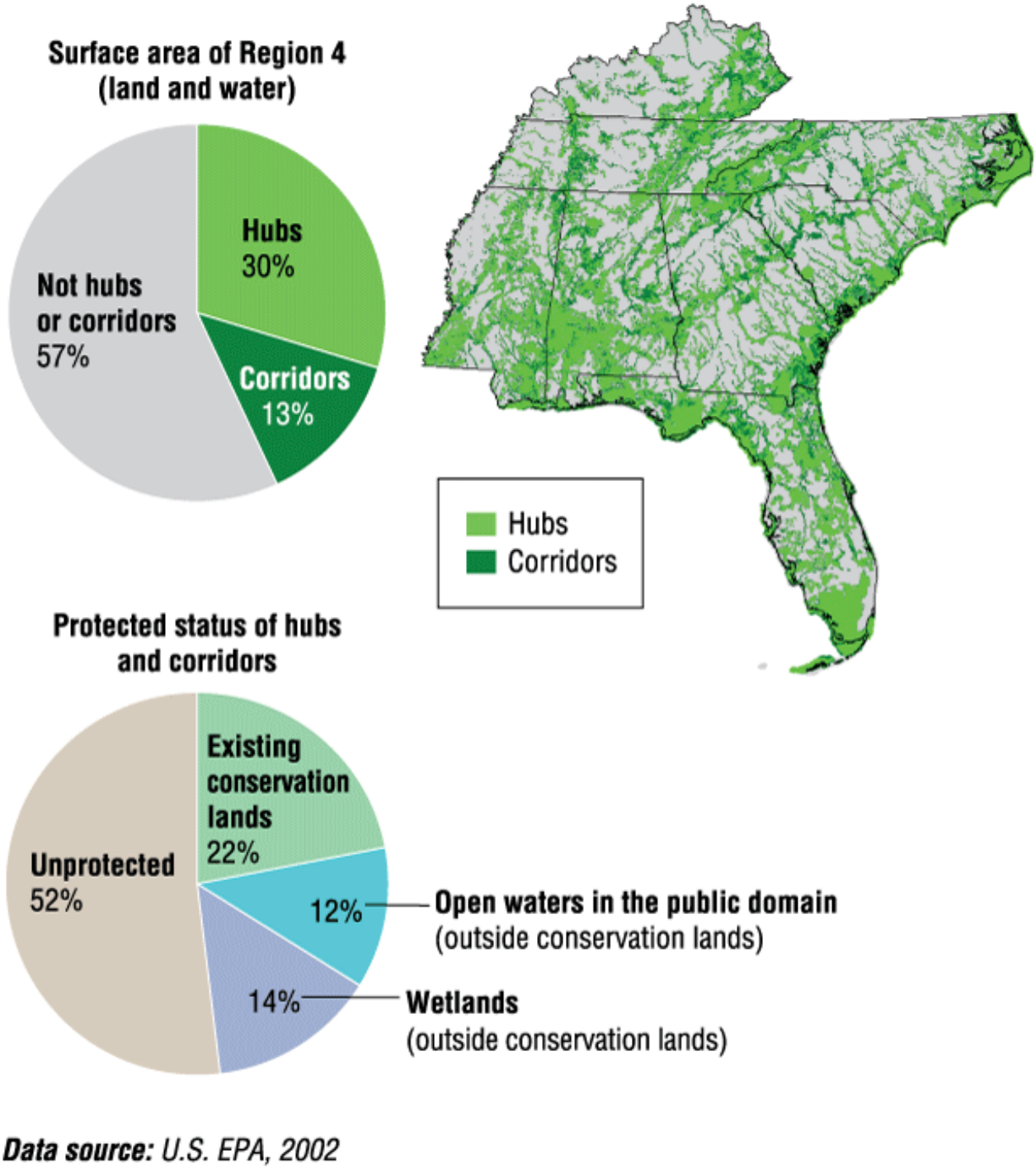
As part of their natural functioning, ecological systems remove particulate matter and carbon dioxide from the air, purify surface and ground water, reduce flooding, and maintain biological diversity. These functions depend on a connected ecological "framework" of high-quality land consisting of central hubs interconnected by corridors that provide for the movement of energy, matter, and species across the landscape. This framework of connectivity is threatened by agricultural and silvicultural practices, road development, and "urban sprawl" that fragment the landscape. Maintaining ecological connectivity protects the entire system.

The Ecological Connectivity Indicator (ECI) developed by EPA Region 4 (Durbrow et al., 2001) consists of a framework that captures the connectivity of important natural areas and ecological systems across the landscape of the Region (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee). Four ecological aspects contribute to the functionality of the ECI infrastructure (see Carr et al., 2002, for additional details). The most important of the four, hub and corridor connectivity, forms the basis for this indicator. Hub and corridor connectivity shows the connections among critical ecological systems in the Region. Hubs are large areas of important natural ecosystems such as the Okefenokee National Wildlife Refuge in Georgia and the Osceola National Forest in Florida. Connections, referred to as "corridors," are links to support the functionality of the hubs (e.g., the Pinhook Swamp which connects the Okefenokee and Osceola hubs). The ECI framework is based on land cover data obtained from the 1992 National Land Cover Dataset (NLCD), which was constructed from satellite imagery (Landsat) showing the land area of the contiguous U.S. during different seasons (i.e., leaves-on and leaves-off) during the early 1990s. In many locations, the best available Landsat images were collected between 1991 and 1993, with data in a few locations ranging from 1986 to 1995.

What The Data Show

The hub and connection framework covers 43 percent of the total land and water resources in EPA Region 4—30 percent classified as hubs and 13 percent as corridors (Exhibit 6-6). Currently, 22 percent of this framework area is protected as conservation land, 12 percent is in the public domain as open water, and an additional 14 percent is classified as wetlands, for a total of 48 percent of hub and corridor acreage being afforded some type of long-term protection.

Exhibit 6-6. Ecological hubs and corridors in EPA Region 4, based on 1992 NLCD



Data source: *U.S. EPA, 2002*

Limitations

- Trend information is not available for this indicator. The most important data layer used in the

ECI development is the NLCD from the early 1990s. Establishing trends in the indicator may be limited by the availability of comparable land cover/land use data in the future.

- Due to both the limited availability of data (ecological data not available or not in digital or geographic information system [GIS] format) and the Southeastern Ecological Framework (SEF) parameter that sets a size threshold of 5,000 acres for ecological hubs, the results do not comprehensively include each and every ecologically important area in the Southeast. The appropriate geographic scale of connectivity depends on the species and communities that are the focus of particular protection efforts (Carr et al., 2002).

Data Sources

The hub and corridor map was provided by EPA Region 4's SEF project, and is available as a GIS data layer from the SEF Web site's data page (U.S. EPA, 2002) (http://geoplan.ufl.edu/epa/data.html). The summary statistics shown in the pie charts in Exhibit 6-6 are presented in Carr et al. (2002). This analysis was based on the 1992 NLCD (USGS, 2005) (http://landcover.usgs.gov/natllandcover.php) and several additional datasets described in Carr et al. (2002); input data layers can be obtained on CD by following instructions on the SEF Web site (U.S. EPA, 2002).

References

Carr, M.H., T.D. Hoctor, C. Goodison, P.D. Zwick, J. Green, P. Hernandez, C. McCain, J. Teisinger, and K. Whitney. 2002. Final report: Southeastern Ecological Framework. Region 4. Atlanta, GA: U.S. Environmental Protection Agency. http://geoplan.ufl.edu/epa/download/sef_report.pdf

Durbrow, B.R., N.B. Burns, J.R. Richardson, and C.W. Berish. 2001. Southeastern Ecological Framework: A planning tool for managing ecosystem integrity. In: Hatcher, K.J., ed. Proceedings of the 2001 Georgia Water Resources Conference. Athens, GA: University of Georgia.

U.S. EPA (United States Environmental Protection Agency). 2002. The EPA Southeastern U.S. Ecological Framework project. http://geoplan.ufl.edu/epa/index.html

USGS (United States Geological Survey). 2005. National Land Cover Dataset 1992 (NLCD 1992). Accessed 2005. http://landcover.usgs.gov/natllandcover.php