What is Biodiversity?

Biodiversity may be defined simply as "the variety of life," but it is much more than just the number of different kinds of organisms that occur in an area. Across all levels of biological organization, biodiversity includes:

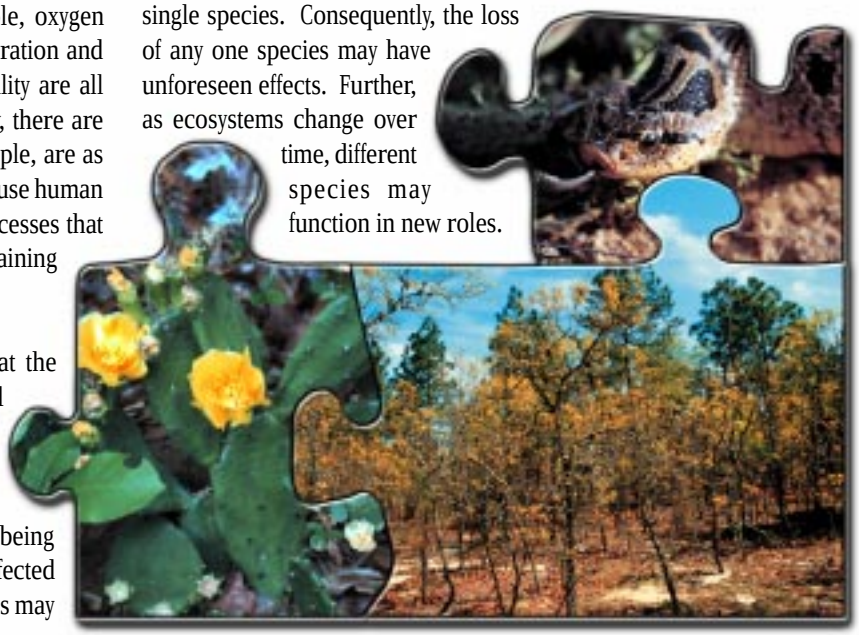
- **genetic diversity**—the variation in heritable characteristics of each species,
- **species richness**—the number of different plant and animal species found in a particular place,
- **ecosystem diversity**—the variety of habitats or ecosystems across the landscape, and
- **landscape diversity**—the arrangement of ecosystems over a large land area.

Biodiversity also encompasses *processes*, such as biogeochemical cycles, biotic and abiotic responses to disturbances, and interactions among living organisms.

Biodiversity provides the basis for a functioning planet, buffering change and conferring resilience over all levels of biological organization. The many direct and indirect benefits of biodiversity include all the resources and processes required for human existence. For example, oxygen production, pollination of plants, global climate control, filtration and storage of water by wetlands, and soil production and fertility are all benefits of the biological diversity of the Earth. Additionally, there are intrinsic or aesthetic values to biodiversity that, to many people, are as valuable as the more tangible benefits illustrated above. Because human technology will never be able to duplicate the myriad of processes that occur every day in nature, our future depends upon maintaining the biodiversity of our planet.

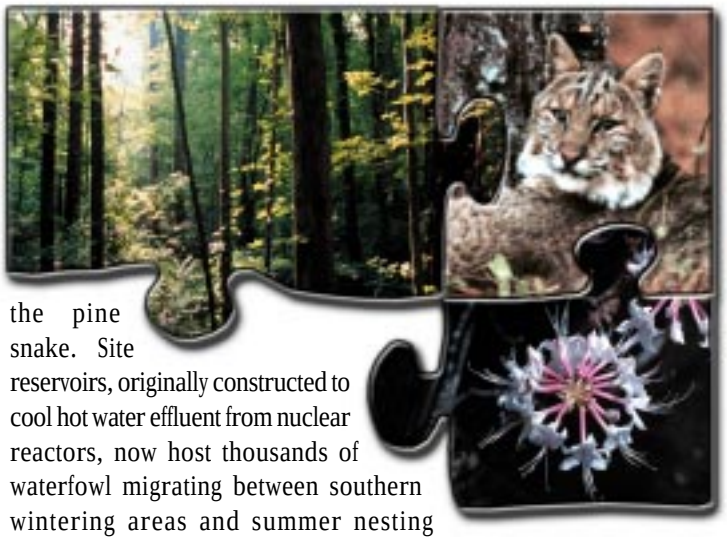
Scientists and others have become increasingly alarmed at the accelerating losses of biodiversity at all levels of biological organization. Increases in human population coupled with continued conversion of lands for agriculture and development have resulted in increasing losses of genetic diversity and species richness worldwide. Landscapes are being altered and fragmented and ecological processes are being affected at a growing rate. Although the highest rate of biodiversity loss may currently be in tropical regions, a 1996 assessment by The Nature Conservancy estimated that one-third of U.S. species are at risk for extinction. In the U.S. the conversion of lands for agriculture and development has led to dramatic losses of grasslands, wetlands, and old-growth forests. For example, less than 1% of the original 500 million acres of grasslands that once comprised North America's Great Plains remain undisturbed by human activities; it is estimated that half the wetlands of the lower 48 states have been converted for agriculture or other uses since Colonial times; nearly all old-growth forest has been eliminated from the eastern U.S.

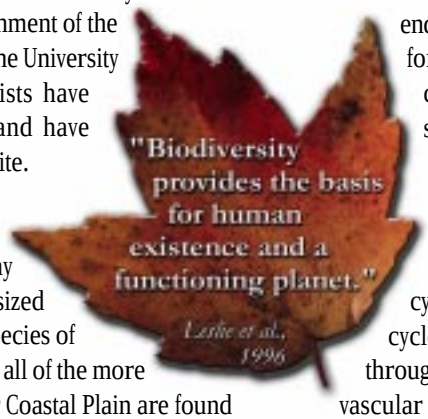
The consequences of biodiversity losses are difficult to measure accurately, but continuing losses ultimately compromise ecosystem integrity—loss of biodiversity results in species, ecosystems, and landscapes becoming less resilient. Although recent scientific studies have shown that relatively few species serve as *keystones*, or critically important "drivers" of ecosystem dynamics in any particular ecosystem, it is impossible to know with certainty the absolute importance of any single species. Consequently, the loss of any one species may have unforeseen effects. Further, as ecosystems change over time, different species may function in new roles.



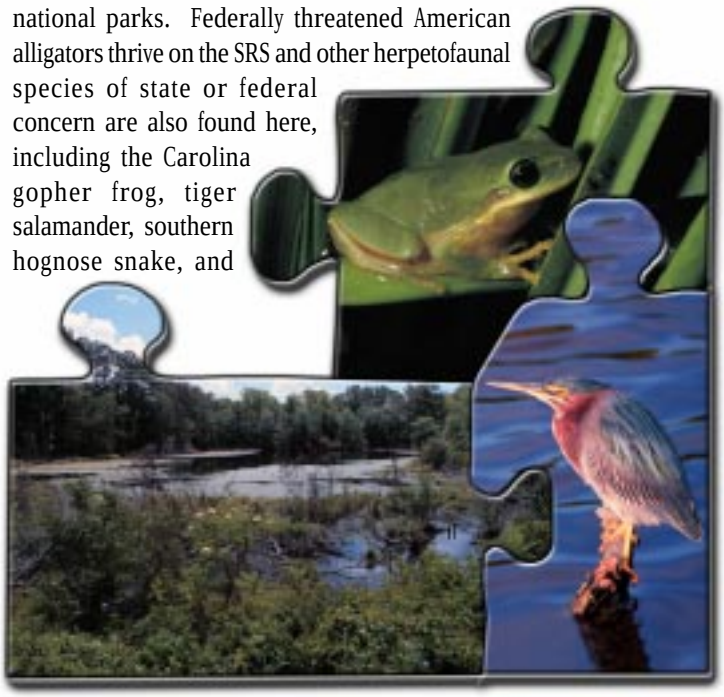
Biodiversity of the Savannah River Site

Biodiversity in the southeastern United States results from many factors, including the moderate climate and long growing season, topography that ranges from dry ridges to wet bottomlands, a history of moderate disturbances, including fire and windstorms, and the conjunction of the Piedmont, Sandhills, and Coastal Plain physiographic provinces. The biological diversity of the 310-square mile Savannah River Site (SRS) is unique within the Southeast. Only about 10% of the total land area of the SRS is developed or used for industrial purposes by the Department of Energy (DOE). The remainder of the Site is managed for timber, forest products, and wildlife by the U.S. Forest Service or is relatively undisturbed, providing baseline Set-Aside or "control" areas and sites for long-term ecological research. These Set-Asides include representative habitats of the SE U.S. and thus are important in enhancing the biodiversity of the SRS. Upon establishment of the SRS in 1951, the Atomic Energy Commission recognized the need to inventory the natural resources of the Site. Initial biological inventories were conducted by researchers from The University of Georgia and the University of South Carolina. These early surveys led to the establishment of the Savannah River Ecology Laboratory (SREL) by The University of Georgia. For over 45 years, SREL scientists have conducted ecological research on the SRS and have continued to document the biodiversity of the Site.





Studies by SREL scientists and others have documented that the biodiversity of the SRS may be greater than that of any other comparably sized area of the Upper Coastal Plain. Seventy-nine species of freshwater fish live in SRS wetlands and virtually all of the more than 50 species of mammals native to the Upper Coastal Plain are found on the Site. Additionally, Upper Three Runs Creek, a blackwater stream that flows through the SRS, has the highest reported biodiversity of aquatic macroinvertebrates of any stream in the western hemisphere. The SRS also is home to 42 species of amphibians and 59 species of reptiles, more than have been recorded from any other publicly owned land area in the United States, including the Everglades and Great Smoky Mountain national parks. Federally threatened American alligators thrive on the SRS and other herpetofaunal species of state or federal concern are also found here, including the Carolina gopher frog, tiger salamander, southern hognose snake, and the pine snake. Site reservoirs, originally constructed to cool hot water effluent from nuclear reactors, now host thousands of waterfowl migrating between southern wintering areas and summer nesting grounds. Winter surveys have documented that more of some species of diving ducks use SRS wetlands than all other inland freshwater habitats in South Carolina. The SRS also provides nesting habitat for the federally endangered red-cockaded woodpecker and foraging habitat for the endangered wood stork, which nests in colonies close to the Site. The genetic diversity of both of these species has been well studied by SREL scientists.



The SRS hosts a diversity of plant communities–from dry upland sandhills, through moderately moist hardwood slopes, to bottomland hardwoods and cypress-tupelo swamps–which maintain natural nutrient cycles and control the movement of nutrients and water through watersheds. More than 1,500 species or varieties of vascular plants have been documented to occur on the SRS, including the federally endangered smooth purple coneflower and 34 plant species of conservation concern in South Carolina. This represents very high species richness for an area of this size. In addition, habitats that are increasingly rare in the southeastern U.S. remain on the SRS, including pockets of sandhills-scrub oak and hundreds of Carolina bays and other temporary depressional wetlands. Long-term ecological studies in these areas have confirmed their importance to maintenance of the biodiversity of this region of the U.S.

Thus, although past management of the SRS focused on national security needs, it also resulted in the maintenance and enhancement of the biological diversity of this vast tract of land. Maintaining the biodiversity of the SRS will require continued commitment and an acknowledgment by stakeholders that conserving biological diversity is an important Site mission. The SRS is faced with increasing threats from outside its borders, including development within the Upper Three Runs Creek watershed, continued agricultural and silvicultural conversion of natural habitats, and increasing industrial impacts to the Savannah River. Federal lands such as the SRS offer unique opportunities to help maintain regional biodiversity in the face of such impacts. If the Savannah River Site is to continue as a center of high biological diversity in the Southeast, sound ecological stewardship must be a top priority.

Introductory material excerpted from "Conserving Biodiversity on MilitaryLands" 1996 M. Leslie et al. The Nature Conservancy. http://www.srel.edu [1 April 1999]

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