

Flying Squirrel

and other threatened mammals of the Appalachian mountains

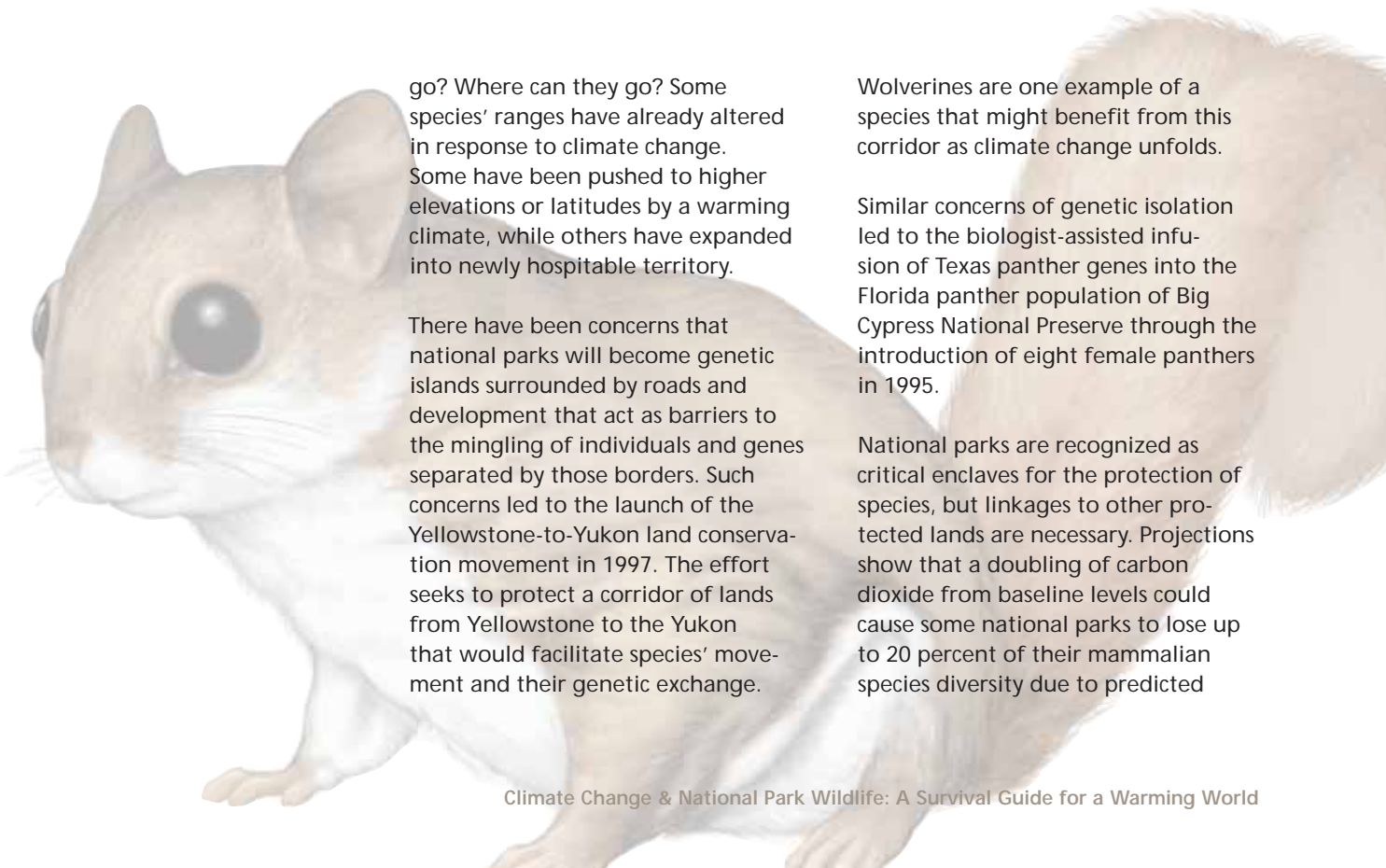
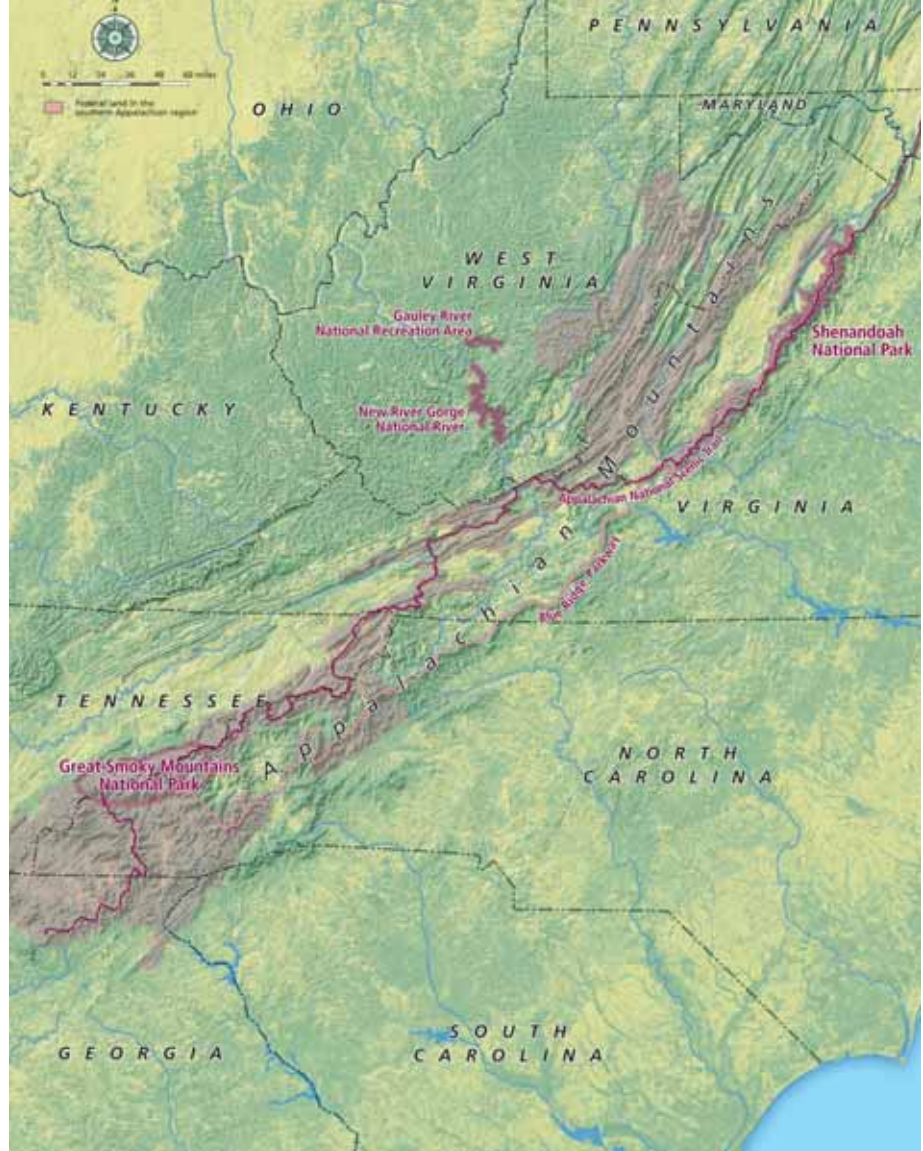
The climate is not static. Ice ages come and go, pushing rivers of ice south and then pulling them back north across continents as temperatures and snowfalls rise and fall. Animal and plant species either stay ahead of these icy incursions and adapt, or perish. After the glaciers retreat, the plant and animal species that have shifted geographically sometimes remain in their new locations. But when climate change unfolds relatively quickly, as we are seeing today, many animals — like the northern flying squirrel — may not be able to stay ahead of the curve.

Geographic shifts of living communities can be seen at **Great Smoky Mountains National Park** along the Tennessee-North Carolina border. Hike toward the park's mountaintops and you'll find a geographically unusual spruce-fir ecosystem that took hold there about 10,000 years ago when the glaciers of the Wisconsin Ice Age retreated. In the highest and coolest of the Smokies' elevations there are many plant species that today are more commonly found nearly 1,000 miles to the north in the boreal forests of Maine and Canada.

But what will these species do in response to the prospect of higher temperatures resulting from accelerated unnatural climate change? Where will they

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go? Where can they go? Some species' ranges have already altered in response to climate change. Some have been pushed to higher elevations or latitudes by a warming climate, while others have expanded into newly hospitable territory.

There have been concerns that national parks will become genetic islands surrounded by roads and development that act as barriers to the mingling of individuals and genes separated by those borders. Such concerns led to the launch of the Yellowstone-to-Yukon land conservation movement in 1997. The effort seeks to protect a corridor of lands from Yellowstone to the Yukon that would facilitate species' movement and their genetic exchange.

Wolverines are one example of a species that might benefit from this corridor as climate change unfolds.

Similar concerns of genetic isolation led to the biologist-assisted infusion of Texas panther genes into the Florida panther population of Big Cypress National Preserve through the introduction of eight female panthers in 1995.

National parks are recognized as critical enclaves for the protection of species, but linkages to other protected lands are necessary. Projections show that a doubling of carbon dioxide from baseline levels could cause some national parks to lose up to 20 percent of their mammalian species diversity due to predicted

shifts in distribution ranges that would move their habitat beyond a park's borders. **Great Smoky Mountains National Park** can expect to lose nearly 17 percent of its mammalian species as the park's largely temperate deciduous forest is transformed into a warmer mixed forest, similar to those found to the south. Among the species expected to be lost from the park under this change are the red squirrel, northern flying squirrel, and southern red-back vole. **Shenandoah National Park**, 469 miles to the north, and connected via the **Blue Ridge Parkway**, also stands to lose the red squirrel and the southern red-back vole.

Just as some of the species currently living in the Smokies and Shenandoah are expected to shift their ranges north as climate change effects accumulate, species currently living farther south can be expected to move north into these parks. However, these movements can occur only if there are corridors connecting suitable habitats.

Fortunately, one north-south linkage already exists: the **Appalachian National Scenic Trail**. Covering 2,175 miles and 250,000 acres from southern Georgia to northern Maine, the trail passes through **Shenandoah National Park**, **Great Smoky Mountains National Park**, and lands administered by various federal and state agencies along the way. It already serves as a vital corridor that provides habitat for flora and fauna up and down the Eastern Seaboard. Warblers, wild turkey, and once-endangered peregrine falcons are among the bird species that rely on the Appalachian Trail corridor. Overall, the corridor provides habitat for more than 2,000 rare, threatened, and endangered species, including more than 80 that are globally rare.

SOLUTIONS

Though protected from development, the Appalachian corridor is not

immune from outside impacts, beginning with the estimated 4 million hikers it receives each year. With that in mind, the Appalachian Trail Conservancy, operating under an agreement with the National Park Service, is monitoring the pulse of this corridor to better understand the threats to its environment. With its vast network of volunteers, the Conservancy (through its Appalachian Trail MEGA-Transect project) is assessing how outside factors — invasive species, air pollution, and urban sprawl, for instance — are affecting the leafy corridor. Other entities, such as the Smithsonian Institution Conservation and Research Center, are also involved in projects along the trail.

By monitoring the environmental impacts along the trail corridor, land managers will be better able to manage the landscape for its long-term health. Developing monitoring programs to track climatic, biological, and ecological change will enable managers not just to see what's changing, but also evaluate the effectiveness of their management strategies and make adjustments in a timely fashion. It's expensive to conduct monitoring programs and implement management strategies; therefore, it will be critical for Congress, the Department of Interior, and other entities to provide adequate support to the National Park Service and its partners involved in this work.

However well the Appalachian mountain chain has served as a corridor in the past, there is no guarantee that it will function equally well as a corridor under rapidly changing climatic conditions. We must therefore foster cooperation and coordination among government agencies and landowners neighboring national parks to accommodate shifts in species distribution that occur in response to climate change. Cooperation is essential to ensure the preservation of species, and the preservation of functioning ecosystems.

We Can Safeguard Appalachian Wildlife from Climate Change

Stop contributing to climate change

Wildlife species like the northern flying squirrel, red squirrel, and southern red-back vole could be driven out of Great Smoky Mountains and Shenandoah national parks if we fail to reduce carbon dioxide pollution and global warming that is transforming temperate deciduous forests into warmer mixed forests.

Give Appalachian wildlife freedom to roam

Protecting the network of existing federal and state conservation lands throughout the Appalachian Mountains, continuing to monitor wildlife migration patterns, and conserving additional lands that may be needed for the region to support wildlife migration, will help the plants and animals of the Appalachian region secure suitable new habitat as the climate warms.

Reduce and eliminate existing harms that make Appalachian wildlife more vulnerable to climate change

Air and water pollution, as well as encroaching development, are major existing stresses on the forests and wildlife of the Appalachian region. By reducing pollution and keeping inappropriate development at bay, we can help wildlife better cope with the new stresses wrought by climate change.