

## Patuxent Wildlife Research Center

# Bringing an Injured Section of Forest Along the Appalachian Trail Back to Health



**The Challenge:** The National Park Service's Appalachian Trail passes through a severely damaged mixed oak forest on Blue Mountain in eastern Pennsylvania. Dating back to the 1890's, emissions of zinc and possibly other metals from the two smelters in Palmerton, PA have caused large scale destruction of the native forest and a loss of habitat for wildlife. As part of a Natural Resource Damage Assessment, the U. S. Geological Survey is cooperating with the U. S. Fish and Wildlife Service, the National Park Service, and Pennsylvania state agencies in quantifying the loss of natural resource services of the forest ecosystem as a whole, considering the forest's structure, its function, and the habitat it provides for wildlife.



**The Science:** Tree and shrub cover were measured and then related to soil zinc concentrations along a 13 mile transect on Blue Mountain. The zinc in the soil stunted root growth, killing the rootlet tips, and making the plants susceptible to drought. The initial damage to the forest came slowly, but as the forest canopy opened, the remaining stressed trees succumbed to the harsh conditions on the windswept mountain ridge. Loss of soil through erosion led to barren areas. Tree seedling density dropped precipitously, since seedlings root in the most contaminated layer of soil on the surface. To compare the sensitivity of tree species to zinc, various species are being grown experimentally on soil from the site. Seedling growth will be related to soil zinc concentration, and methods to reduce zinc phytotoxicity are being tested.



**The Future:** Research on phototoxicity is meant to support the restoration plans on the mountain. After the site is cleaned up (remediated), the U. S. Environmental Protection Agency and other agencies plan to return the site to a healthy state (restoration), by adding soil, amending it, and planting trees. Trees require protection from wind, a secure place to root, and fertile soil containing organic matter to promote the soil ecological processes that supply nutrients. Soils will also be limed to reduce the toxicity of zinc.