

Appalachian Highlands Network

Climate Change Resource Brief

Southeast Region
Inventory & Monitoring
National Park Service
U.S. Department of the Interior



High Elevation Communities

APHN parks are situated in one of the most species-rich temperate regions on earth, and protect over 400 species ranked by The Nature Conservancy as Globally Imperiled or Vulnerable, including 27 Federally-listed Threatened or Endangered species. Positioned at the tops of the parks' highest mountains are 7 cold-adapted, endemic communities with many rare species that cannot survive warmer climates. GRSM and BLRI contain 85 percent of all the Fraser fir forests (classified as one of the most critically imperiled ecosystems in the U.S.) that remain in existence. These mountain-top communities, usually shrouded in fog for much of the year, are especially vulnerable to climate disruptions that involve significant warming or shifts in precipitation toward drier conditions. Climate monitoring in APHN parks is centered on maintaining data collection from historic weather stations, some of which have a 90-year period of record. Future plans call for independent arrays of small, remotely deployed recording instruments to obtain accurate onsite measurements in long-term monitoring plots.



BLRI and GRSM contain over half of the highest elevation mountains in eastern North America

Vulnerable Aquatic and Riparian Ecosystems

BISO, with 13 Federally-listed Endangered aquatic species, contains some of the most imperiled freshwater fauna in the NPS system. In addition, BISO and OBRI protect the best remaining examples of a globally imperiled river scour prairie community, the Cumberlandian cobble bar, of which fewer than 500 acres remain in existence. At BLRI and GRSM, mountain wetlands support many boreal relict species, as well as rare species endemic to the Southern Appalachian Mountains, all of which are dependent upon a constant supply of cold groundwater. BLRI protects more than 50 percent of what remains of the globally imperiled Southern Appalachian bog/fen habitat type. Extended droughts or any significant disruption of groundwater flow could exterminate these ecosystems, along with the species dependent upon them. APHN is developing protocols for monitoring rare mussels and fish, as well as monitoring the community structure and composition in cobble bar communities, at BISO and OBRI.



The Big South Fork of the Cumberland River is home to one of the most diverse assemblages of freshwater mussels in the United States (BISO)

Water Quality and Quantity

If climate change predictions are borne out, the aquatic systems in APHN parks will likely experience a decline in precipitation, particularly in spring and summer, and a rising number of intense storm events. In rivers and streams, these changes will reduce the amount of available aquatic habitat during sustained low flow periods, and substantially increase the exposure of aquatic organisms to pollutants, most of which are transported during storm events. A major issue for both BISO and OBRI is upstream water withdrawal, for residential and industrial use. Climate change, in combination with population increases, particularly in the upper OBRI watershed, will likely mean that competition for available water will intensify. Network staff are monitoring streamflow and a suite of water quality parameters, including aquatic macroinvertebrates, in all network parks.



The Cumberlandian cobble bar, an imperiled grassland habitat that is dependent upon scouring floods for survival (BISO, OBRI)