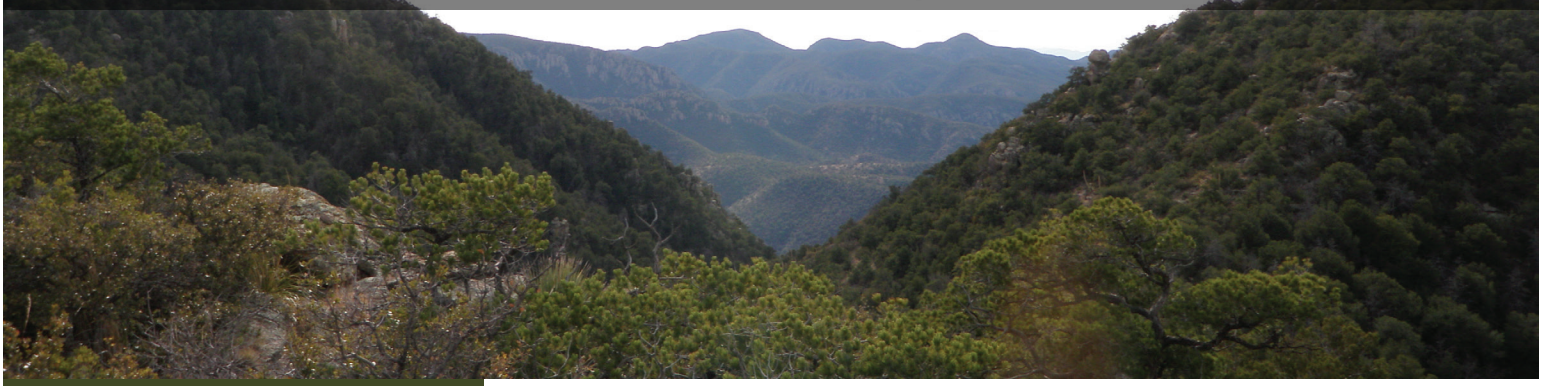


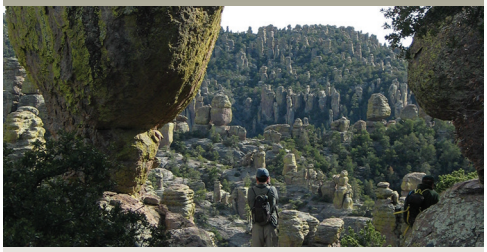
Vegetation & Soils Monitoring

at Chiricahua National Monument, 2007–2010

Stratum 402 (Rocky, mid-mountain, 4,500–6,000')

Stratum 501 (Non-rocky, high-mountain, >6,000')

Stratum 502 (Rocky, high-mountain, >6,000')



Stratum 503 (High-mountain rock outcrops, 6,000')

Background

In 2011, Chiricahua National Monument saw its first landscape-scale fire in 125 years. The Horseshoe II Fire burned across 223,000 acres of the Chiricahua Mountains, making it one of the largest wildfires in state history.

Prior to the fire, the Sonoran Desert Network conducted monitoring of terrestrial vegetation and soils at Chiricahua NM from 2007 to 2010. The results, summarized in a recent report, provide a baseline against which we can measure and track post-fire conditions through future monitoring.

Our monitoring objectives were to determine status and trends in vegetation cover and frequency, soil cover, surface soil stability, and biological soil crust cover. Despite a reduced sample size (a fifth year of monitoring, scheduled for summer 2011, was precluded by the fire), our data met the standards required for analysis. Our monitoring occurs at 46 permanent plots in four different area types, or strata (see photos at left), defined by elevation and the percentage of rock fragments in the soil.

Results

Our findings revealed that although the dynamic attributes of soil function at the monument were probably within the range of natural variability before the fire, terrestrial vegetation appeared to diverge from long-term conditions. Specifically, our findings suggest that the lack of significant fire prior to 2011 resulted in an unusually high cover of fire-sensitive woody plants throughout the monument.

Prior to EuroAmerican settlement, relatively common ground fire and occasional extensive canopy fire were the norm at Chiricahua NM (Swetnam et al. 1989; Baisan and Morino 2000). This pattern is commonly seen throughout montane systems of the American Southwest (Covington and Moore 1994), typically resulting in more open-canopied woodlands, savannas, and, at lower elevations, desert grassland than we found during our sampling in 2007–2010.

Instead, our sampling confirmed the predominance of woody plant cover throughout the monument, such as border pinyon pine and pointleaf manzanita. In fact, vegetation cover values for shrubs and trees combined were some of the highest we had recorded in any network park to date.

US FOREST SERVICE

Firefighters on the Horseshoe II Fire.

Management Assessment Points

These findings were reflected in our management assessment points for the monument. Across our monitoring program, we advocate the use of management assessment points as a bridge between science and management. These are "pre-selected points along a continuum of resource-indicator values where scientists and managers have agreed to stop and assess the status or trend of a resource relative to program goals, natural variation, or potential concerns." In other words, if a measurement reaches a certain level that has been determined to be possible cause for concern, scientists and managers will stop and have a conversation about it. Assessment points serve as a potential early warning system where scientists and managers pause, review the available information, and consider options.

During the monitoring period, recommended assessment points were reached for several factors—most commonly, fire hazard. On all strata, the percent cover of plants that were dead was 5% or greater. On three of four, the percent cover of litter and duff on the ground was 50% or greater. Together, these points indicate an abundance of potential fire fuels.

Unfortunately, natural processes rarely respect human schedules. The Horseshoe II Fire occurred before we were able to analyze the results of this first round of long-term monitoring at the monument, so conversations that should have been triggered by the assessment points never had a chance to happen before the conflagration. Our ability to see the fire foreshadowed in our results and assessment points gives us good reason to expect that they will prove useful in the future, however. Whether the Horseshoe II Fire restores pre-settlement conditions or sends vegetation on a new trajectory should also become apparent, and interactions between fire effects and climate change may yield novel fire regimes and vegetation responses.

Management assessment points met in the years leading up to the Horseshoe II Fire, by stratum.

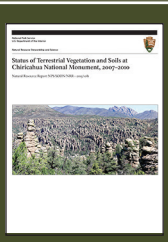
	Assessment point			
	Erosion hazard	Exotic plant dispersal	Fire hazard	
Stratum	Surface soil aggregate stability (with no overhead canopy) <Class 3	Extent of exotic plants > 50%	Litter + duff >50%	Percent cover of dead plants >5% (field)
402				
501				
502				
503				

Literature Cited

Baisan, C. H., and K. A. Morino. 2000. Fire history in Chiricahua National Monument. Laboratory of Tree-Ring Research, University of Arizona, Tucson, Arizona.

Covington, W. W., and M. M. Moore. 1994. Southwest ponderosa pine forest structure changes since Euro-American settlement. Journal of Forestry 89:39–47.

Swetnam, T. W., C. H. Baisan, P. M. Brown, and A. C. Caprio. 1989. Fire history of Rhyolite Canyon, Chiricahua National Monument. NPS Cooperative Park Studies Unit Technical Report No. 32, University of Arizona, Tucson, Arizona.



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