

Analysis of Herbaceous Vegetation on a Serpentine Barren

Abstract

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An ongoing study of herbaceous species in a grassland and on exposed bedrock in a serpentine barren in central Maryland has been conducted since 2000. The study area is a 500 m² plot in Bare Hills, a serpentinite outcrop near Baltimore City. Annual vegetation monitoring of flowering times has provided a seasonal recording of presence/absence of herbaceous species. The objective of this study is to examine the unique, serpentine herbaceous flora over a period of years to decades to assess patterns of vegetation change and stability, and the relative importance of the "serpentine factor" (i.e. high Mg/Ca ratio, Cr and Ni concentrations, dry soil, etc) in determining species composition. Since 2000, seventy herbaceous species have been recorded in the plot with 49 species occurring regularly between March 25th and October 30th (the growing season). The other 21 species appeared in only 1-3 years. There is one serpentine endemic species, the serpentine chickweed *Cerastium velutinum* var. *villosissimum*, and 5 species that are rare or of need of monitoring in the state of Maryland. They are Small's ragwort *Packera anonyma*, the grass *Dichanthelium oligosanthes*, fame flower *Pemmeranthus teretifolium*, and the sedges *Cyperus aristatus*, and *Fimbristylis annua*. *Pemmeranthus* is highly rare in Maryland and is a species of conservation concern. The species that first appears each year in late March is the parasol sedge *Carex umbellata*, followed a week or so later by the early saxifrage *Micranthes virginiensis* (formerly *Saxifraga virginiensis*). The newest colonizer, blue curls *Trichostema dichotomum* appeared for the first time in 18 years in 2018. Over 85% of these herbaceous species are typical of dry or nutrient poor soils, or exposed rocky surfaces of non-serpentine shale barrens, indicating that the high magnesium soil chemistry of serpentinite plays a minor role in affecting plant establishment, while dry, nutrient poor and rocky soil conditions play a dominant role. From 2000 to 2013 virtually no change in species composition at selected sites occurred throughout the study area and along transects (conducted in 2009 and 2013), however a number of successional changes have begun in the period beginning in 2014. Grasses dominated by Little blue stem *Schizachyrium scoparium*, *Dichanthelium oligosanthes* and the sedge *Scleria depauperata* have spread onto the exposed bedrock sites reducing fame flower habitat of exposed rocks and thin soil and reducing the fame flower population. Non-native species such as Chinese silver grass *Miscanthus sinensis* and the native greenbrier *Smilax rotundifolia* have expanded onto study site as well. Conservation or restoration of the exposed bedrock in selected areas may be required to prevent the further decline of *Pemmeranthus* and other unique species.