

Sonoran Desert Network

Upland Vegetation and Soils Protocol



Trip Summary Report
Chiricahua National Monument
December 5, 2011

Purpose: To briefly summarize the 2011 field season of uplands vegetation and soils monitoring at Chiricahua NM.

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Vital signs and other parameters sampled during this visit

- Vegetation cover
- Species/life form frequency
- Soil aggregate stability and bulk density
- Biological soil crust cover
- *NEW* Fuels incorporated into soil cover measures

A brief description of each vital sign and parameter can be found in Appendix A.

Sampling highlights/notes

- ❖ Ten plots were established this field season, bringing the total number established since 2007 to 48 plots. This season (2011) marked the fifth and final year of sampling in the rotating panel design; therefore, 2012 will be our first year of re-visiting plots established in 2007. The map in appendix B shows locations of all plots established.
 - ❖ Sampling was conducted during September. Because efforts were made to continue earlier SODN work of collecting fire-severity data at all existing and potential uplands plot locations, each work day involved establishing a new monitoring plot as well as visiting as many other sites as possible in the surrounding area. Fire-severity data will be summarized in a separate report.
 - ❖ All 10 plots sampled this year had at least partial fire damage from the Horseshoe II fire.
 - ❖ Plot V501_04 was moved <50 m upslope from its original position, as it fell at the bottom of a very steep drainage.
 - ❖ Plot V501_05 was moved approximately 10 m to avoid the park boundary fenceline.
 - ❖ The following invasive plant species were detected during this sampling season:
 - Variableleaf bushbean (*Macroptilium gibbosifolium*), Plot 502_020
 - Stink grass (*Eragrostis cilianensis*), Plot 502_024
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Sampling results

Ten plots were established this year (Appendix B). Plots were established in one elevation zone:

Stratum	Description	Elevation (feet)	Number of plots
200	Thornscrub	2,501–3,700	0
300	Semi-desert Grassland and Chaparral	3,701–4,500	0
400	Madrean Oak Woodland	4,501–6,000	0
500	Temperate deciduous Forest and Coniferous Forest	>6,000	10

How are plot names assigned?

The first three numbers of the plot name signify the sampling stratum in which it is located. In this protocol, the strata used are combinations of elevation and rock-fragment classes.

For example, plots in the 400 strata are considered to be within the elevation band typically associated with Madrean Oak Woodland.

Soil rock-fragment classes were based on rock-fragment modifiers from the most recent soil survey. The 1, 2 or 3 in the “ones place” of the assigned strata is associated with a rock-fragment percentage.

Rock-fragment percentage	Number
<35%	1
35–90%	2
>90%	3

For example, for plot 402_014, the plot is in the Madrean Oak Woodland stratum (402) and the soil rock fragment is 35–90% (402). The last three digits in the plot name (014, in this case) are determined by a randomization algorithm RRQRR and are sampled in numerical order.

What’s ahead?

By the end of June 2012, the data collected over the past five years will be analyzed and a status and trends report will be published in the NPS Natural Resource Technical Report Series. Data from this year’s plots (2011) may be reported separately due to the influence of the fire on cover data values.

In the fall 2012, we will begin to resample monitoring plots in Chiricahua National Monument.

Appendix A: Descriptions of vital signs and associated parameters collected during this sampling trip.

Vegetation cover—Vegetative cover of common perennial species is an effective and traditional monitoring approach for plant populations. Cover is the percentage of ground surface covered by vegetation material, providing both an absolute and relative measure of species and lifeform abundance. This approach allows determination of status and detection of trend within a single species of interest, facilitating the use of “keystone” and “indicator” species, as well as providing focused information on species of management concern (e.g., established exotic invasive species, “flagship” species such as saguaro cacti). Determining the foliar cover of all common perennial species permits direct contrasts of species of interest and ensures that information is not lost if future research or management objectives focus on a species that is currently a lower priority.

Species/Life form frequency—Plant frequency is the number of times a plant species/lifeform is encountered in a given number of plots or sample points, providing a measure of the occurrence and distribution of species within a landscape or strata of interest. Frequency provides an effective index of change over time and space and can efficiently provide information on species/lifeforms that are uncommon or that have highly variable year-to-year distributions, such as most desert annuals.

Density—Columnar cacti (saguaro, organpipe, and senita) and ocotillo are tallied by height class within each of the five frequency subplots at each sampling location. Density will be given as number of individuals/hectare.

Fuels measures—Fuels measures have been incorporated into the monitoring design by replacing “Litter” as a basal cover category on the line-intercept with L0, L1, L2, L3 and L4. Each of these new categories represents different size classes of fuels, from leaves and needles up through 1,000-hour fuels over 3" in diameter. Fuels are recorded along each of the six transects.

Soil aggregate stability and bulk density—Surface soil aggregate stability is the resistance of soil aggregates on and near the soil surface to degradation. Soil aggregate stability provides both an indicator of site disturbance and site resistance to soil erosion and provides insights into soil water-holding capacity and infiltration rates. Soil bulk density is the mass per unit volume of the bulk soil matrix. Due to the destructive sampling techniques, bulk density will only be re-measured if observations indicate disturbances such as fire, landslide, or severe erosion. Bulk densities that are high or low for a given type of soil material can indicate stability and susceptibility of a site to erosion and other impacts like drought.

Soil and biological crust cover—Soil surface cover is the percentage of mineral soil surface covered by substrate class, providing an absolute and relative measure of these objects that influence erosion resistance. Biological soil crust cover is similar in concept, with the categories of interest being species for all lichens. Bryophytes and cyanobacteria serve profoundly different ecological functions but are difficult to identify in the field. Therefore, they are identified to the morphological group level.

Appendix B: Map of plot sampling locations.

