

Sonoran Desert Network

Upland Vegetation and Soils Protocol



Field Summary Report
Coronado National Memorial
October–November 2012

Purpose: To briefly summarize the 2012 field season of uplands vegetation and soils monitoring at Coronado National Memorial.

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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
- Fuels incorporated into soil cover measures
- *New/Fire* Composite Burn Index
- *New/Fire* Minidisc Infiltrometer

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

Sampling highlights/notes

- Five new uplands monitoring plots were established this year, bringing the total number of established plots within the memorial to 26.
- Eighteen previously established uplands monitoring plots were resampled this season (2012) in conjunction with the Sonoran Desert Network (SODN)'s fire-severity monitoring following the 2011 Monument Fire. Two plots (V503_001, V503_009) were not resampled this year due to time constraints. One plot (V402_005) was partially completed (Line 1 and Subplot A of vegetation, and all of the soil stability and biological soil crust samples) but left unfinished due to border activity and time constraints.
- SODN performed Composite Burn Index (CBI) and Minidisc Infiltrometer sampling to track fire effects on vegetation and soils, respectively, following the 2011 Monument Fire. These components are only included in the uplands protocol during fire-severity sampling. Please see Appendix A for more details on these parameters.
- This new fire-severity data (CBI) will be shared with the National Park Service fire program at the national level, to assist them in further evaluating fire-severity mapping efforts conducted immediately post-fire. In addition, SODN intends to utilize the Infiltrometer (which gives a categorical rating of soil repellency) and severity data to evaluate and track the recovery of vegetation and soils over time.
- Border activity in the park increased this year. Armed smuggling groups were sighted, and increasing traffic was documented in the drainages on the south face of Montezuma Peak. Crews are required to carry a radio at all times and prearrange a contact prior to entering the field, even in non-escort areas.
- Plot V402_009 was moved 5 m, at a bearing of 258 degrees, to avoid a drainage.
- Plot V402_010's origin was changed to corner 50m, 0m, then moved 18 m at a bearing of 248 degrees to avoid capturing a large drainage.

- The following invasive plant species were detected during this sampling season:

Scientific name	Common name
<i>Cynodon dactylon</i>	Bermuda grass
<i>Erodium cicutarium</i>	redstem stork's bill
<i>Eragrostis curvula</i>	weeping lovegrass
<i>Eragrostis lehmanniana</i>	Lehmann's lovegrass
<i>Sida abutifolia</i>	spreading fanpetals
<i>Ipomoea purpurea</i>	tall morning-glory

Sampling results

Five plots were established this year (Appendix B). Plots were established in two elevation zones:

Stratum	Strata	Elevation (feet)	Number of plots
400	Madrean Oak Woodland	4,501–6,000	4
500	Temperate deciduous Forest and Coniferous Forest	>6,000	1

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% (02). 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?

In 2013, SODN will establish the five remaining plots to complete the full five-year sampling design for Coronado NMEN. By the end of June 2013, the data collected during this field season will be analyzed and an annual report completed. This report will continue to review the overall sampling design, present the plot data, and include a section on the results of the fire-severity work.

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/Lifeform 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, such as 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.

Composite Burn Index—Composite Burn Index, or CBI, is an ocular estimation of change in vegetation and groundcover aimed at creating a generalization of fire effects in a given area. This is calculated by comparing or estimating previous vegetation and groundcover composition and relative abundance to an ocular estimate of current conditions. Values are given in numeric classification between 0.0 (unburned) and 3.0 (highest severity). CBI is only performed during fire severity monitoring.

Minidisc Infiltrometer—The minidisc infiltrometer uses water infiltration rates to assess how a fire has affected soil composition by evaluating the repellency (lack of infiltration) of the burned soils. Measurements are taken 5 m upslope of the middle of each subplot and at previous bulk density sampling locations. Infiltrometer sampling is only performed during fire-severity monitoring.

Appendix B: Plot sampling locations

