

Washes Monitoring in the Sonoran Desert Network

Importance

Ephemeral and intermittent drainages serve as critical habitat and travel corridors for resident and migratory species in the Sonoran Desert and Apache Highlands ecoregions, and provide important ecosystem services, such as flood dissipation, sediment transport, and habitat connectivity. Ephemeral and intermittent drainages also provide insights into the processes and conditions of the watersheds they drain. Washes are dynamic landforms subject to rapid changes in flow pattern and channel shape. Geomorphic characteristics of wash channels interact with biological components (flora and fauna) to determine the kind, extent, and configuration of riparian ecosystems. When investigated in combination, geomorphological and biological indicators can provide a powerful index of overall watershed condition and function.

Monitoring washes of primary drainages in Sonoran Desert Network (SODN) parks provides an important indicator of watershed condition and integrates several ecological and geomorphological processes, such as soil erosion, nutrient cycles, the occurrence and magnitude of disturbance events, surface and groundwater quantity and quality, and the abundance and distribution of riparian-obligate species. Washes monitoring provides information on watershed processes as well as on the consequences of land-management practices on watersheds containing SODN parks.

Monitoring Objectives

Specific, measurable objectives are to determine status and long-term trends in:

Channel morphology

- Cross-sectional area, sinuosity, channel slope, and sediment-size distribution

Riparian vegetation

- Cover of dominate and common (>10%) perennial riparian species
- Frequency of uncommon perennial species and selected non-native invasive annual and perennial species

Water quantity

- Frequency and magnitude of flood events

PROTOCOL SUMMARY



NATIONAL PARK SERVICE

Wash monitoring, Tonto National Monument.

Sampling design

The sampling design for the wash monitoring protocol employs selected permanent sampling locations on each major watershed in each park, and is designed to provide information on watershed processes. The sampling frame, or the population for which information will be collected, is the index reach, a morphologically uniform, 150-m length of wash. Channel morphology and riparian vegetation are examined across the entire index reach. Index sites will be re-visited every five years, with a contingency for resampling after 100-year flood events or other major disturbances.

Methods

Channel morphology—Using survey-grade equipment, we locate three evenly distributed, permanent channel cross-sections in each index reach. We create a longitudinal profile and perform particle-size surveys throughout each reach.

Riparian vegetation—Vegetation sampling is conducted on several 20-m transects along each of the three permanent channel cross-sections. Sampling is conducted in three zones: the channel bottom, the banks, and the transition-zone area adjacent to the wash channel. Vegetation data are recorded within three structural categories using the point-intercept method, with points spaced every meter. Soil cover is recorded to substrate class (e.g., sand, gravel). In the two meters surrounding the transect, frequency data are collected on plant taxa not encountered during point-intercept sampling. Data on

tree and shrub recruitment are collected in a 20-m-wide band transect surrounding the permanent cross-section. Large trees or saguaros are mapped and vigor metrics are collected (e.g., basal area, height).

Water quantity—Crest gages and logging pressure transducers are used to collect data at index reaches.

Products, Scope, and Schedule

An annual summary report documenting effort and initial findings is produced in December of each year. A status and trends report will be completed after five years of data are collected. Information on washes is also communicated through live presentations, resource briefs and other written summaries, and podcasts and other media produced and distributed

through the network website and the Learning Center of the American Southwest (www.southwestlearning.org).

Protocol Status

The protocol and standard operating procedures are currently being written and tested. A draft of the washes protocol will be completed in early 2011. Washes monitoring will be conducted at Chiricahua NM, Coronado NMem, Fort Bowie NHS, Organ Pipe Cactus NM, Saguaro NP, and Tonto NM.

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Preparing to monitor a wash site at Organ Pipe Cactus NM.

