



Spring Vegetation Monitoring



Grapevine Spring (AZ) in Lake Mead National Recreation Area, December 2017. NPS Photo / Nicole Hupp.

Background

The Mojave Desert Inventory and Monitoring Network (MOJN) encompasses nine national parks and over eight million acres that include diverse habitats and range in elevation from below sea level to over 13,000 feet. Riparian habitats are a tiny fraction of this area, and across North America represent only 1% of the land area. Much of this riparian habitat in MOJN is located at desert springs and is limited to small and isolated areas in otherwise arid desert landscapes.

Despite their very small area, desert springs support disproportionate biodiversity and can be considered keystone ecosystems; their ecological importance far exceeds their area. Their isolation presents significant barriers to movement of organisms across the harsher surrounding upland desert; species at desert springs are highly adapted to and dependent on these resources. As biodiversity hotspots, desert springs are heavily used by both resident and migratory wildlife and are home to many aquatic species found nowhere else.

What are the Threats and Why do We Care?

The historical and current threats to riparian ecosystems are many and include mining, grazing, surface water diversion, groundwater withdrawal, introduction of invasive plant and animal species, and climate change. These are predominantly human-caused issues, and many have had cascading impacts beyond initial disturbance, such as changes in fire regimes and impaired water quality.

The incredible species that have evolved in these environments are sensitive to even small disturbances in their habitat, whether natural or human-caused. Many of these riparian areas have been shown to host species-specific relationships between animals and vegetation. Studies have shown unique relationships between birds and bats with the vegetation communities found at desert springs in the southwest. Large mammals, like the desert bighorn, rely on these 'island habitats,' which often represent the only surface water available for large areas and provide key vegetation for forage. When this spring habitat is impaired, native species are lost and exotics can gain a foothold.

In MOJN parks, several species of special concern are associated with riparian habitats, including the Southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), several species of pupfish (*Cyprinodon* spp.), and the relict leopard frog (*Rana onca*).

Monitoring Spring Vegetation

While the water resources in these riparian habitats in the western US have been widely studied, much less attention has been focused on the vegetation communities they contain. In order to protect these unique, fragile resources and the important ecosystem services they provide, MOJN is monitoring the hydrology and aquatic invertebrates of these springs — as part of the Selected Large Springs and Desert Springs monitoring protocols — and the riparian vegetation associated with them through this Spring Vegetation monitoring protocol.

Objectives

The goals of this monitoring protocol are to collect baseline data about desert spring vegetation and to detect changes in community composition at select desert springs in MOJN parks. Our primary monitoring questions are: 1) What are the status and trends in plant community composition? 2) How is species diversity and richness associated with natural and human-related disturbances changing over time? Additionally, we will assess 1) distribution and abundance of target invasive plant species, and 2) distribution and abundance of overstory tree species of special management interest.

Sample Design

The target vegetation communities addressed in this protocol are those found at selected perennial springs in MOJN. These monitoring sites are co-located with the sites monitored in the Selected Large Springs protocol, plus 5 additional sites. This co-location ensures efficiency when resources and staffing may be limited.

We sample spring vegetation on a three-year rotation, with up to four springs (depending on park management needs) in the sample frame selected for annual sampling, if under active management (such as invasive plant removal).



Saratoga Spring in Death Valley National Park, January 2017.
NPS Photo / Nicole Hupp.

Spring vegetation monitoring began in 2019 and is conducted at springs in Death Valley National Park (5), Joshua Tree National Park (3), Grand Canyon-Parashant National Monument (3), Lake Mead National Recreation Area (4), and Mojave National Preserve (3).

Management Applications

Desert springs are unique and difficult to monitor; a lack of information makes it challenging to use science to inform management decisions at these springs. Spring Vegetation Monitoring will provide park managers with information that has multiple applications:

- Early detection of target invasive plant species as well as non-native burros and horses will help us understand how these species can be managed
- Understanding the frequency and extent of natural and anthropogenic disturbances provides managers with the information to develop appropriate and timely responses.
- Understanding the relationships between hydrology, vegetation, and wildlife at springs can lead to a more complete picture of how springs work and how parks can be effective stewards. This will assist park managers in targeting limited financial resources and personnel time toward addressing the highest priority concerns.
- Sharing information about vegetation at these unique springs and their condition with the public will enhance visitor experiences and contribute to protecting these fragile ecosystems.

More Information:

The protocol [narrative](#) and [standard operating procedures](#) for spring vegetation monitoring were published in 2018.

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To learn more about the Mojave Desert Network Inventory and Monitoring Program, please visit our website at:
<https://www.nps.gov/im/mojn/index.htm>

