



Aspen Monitoring



Aspen grove in Grand Canyon-Parashant National Monument. NPS photo / Nicole Hupp.

Background

Quaking aspen (*Populus tremuloides*), a distinctive member of the willow family, is the most widespread deciduous tree species in North America. It ranges from Alaska to Mexico, from the Atlantic to the Pacific coasts, and from sea level to 12,000 feet in elevation. Poplars and willows, including aspen, were among the first species to establish when the continental glaciers retreated after the Pleistocene, resulting in their spotty distribution in western mountain landscapes.

While aspen do regenerate through seeds, in the west, they largely regenerate through sprouting new trees from roots. Thus, many aspen within a grove are clones, and such aspen stands in these regions lack the genetic diversity of stands where reproduction through seeds is predominant. Aspen are also dependent on fire for creating opportunity to establish in new areas.

Aspen are an important resource in two parks in the Mojave Desert Network (MOJN), occurring in both Great Basin National Park (GRBA) and Grand Canyon-

Parashant National Monument (PARA). In addition to their spectacular annual fall display of golden leaves that draws visitors, they also provide habitat for wildlife and play an important role in the ecosystem. Aspen stands support a rich diversity of other plant and animal species, and where aspen stands have declined, researchers have also noted declines in other species in those habitats. In GRBA, they also bear witness to the history of Basque and Peruvian shepherders through the carvings in their bark, dating back to the late 1800's. These carvings, or 'arboglyphs,' provide a record of the area's cultural history.

What are the Threats to Aspen?

Aspen have been declining across the western U.S. over the last century. Many decades of fire suppression have resulted in expansion of coniferous forest into areas previously dominated by aspen stands. Browsing, by both domestic livestock and native deer and elk, can also limit the growth and regeneration of aspen stands.

Sudden Aspen Decline, or SAD, is the more recent phenomenon of widespread and sudden death of aspen

stands. SAD has been observed in many regions in the west but not yet in GRBA or PARA. Researchers think that drought in combination with hotter spring and summer seasons may cause SAD. Drought stressed trees are also more susceptible to insect pests and diseases.



Aspen trunk carved with a sheepherder's name (left, NPS photo / Vianey Murphy) and aspen leaves in fall color (right, NPS photo).

Monitoring Aspen

Aspen is a focal resource in MOJN because of its ecological and aesthetic significance. Aspen stands are among the most biologically rich plant communities in the Intermountain West, and they bring many recreational visits to the parks, thus supporting local economies. MOJN monitors aspen in GRBA and PARA to better understand how the population may be changing over time and how they are responding to the threats they face. Information about aspen collected by MOJN will also contribute to the effort of other western parks and organizations seeking to understand the threats to aspen, especially considering climate change.

Objectives

The goal of this monitoring protocol is to obtain information that will inform management decisions to ensure the aspen stands continue to regenerate in the parks. Our primary monitoring questions are:

- 1) Are aspen populations stable, declining, or increasing?
- 2) Are aspen clones regenerating and at what level? What is the long-term trend in regeneration of park aspen populations and in individual stands?
- 3) What is the density of live and dead aspen stems? Is the live and dead stem density declining or increasing in the parks and in individual stands?
- 4) What is the status and trend in conifer density within aspen stands?
- 5) What is the variability of regeneration in plots within an aspen stand and between different aspen stands?

Sample Design

Target populations addressed in this protocol differ between GRBA and PARA. In PARA, where aspen stands are small and discreet, the target population includes all stands within the park. In GRBA, aspen occur alone and in stands mixed with conifers. The target population for GRBA is a spatially-balanced, random sample of pure aspen stands and aspen-conifer stands. In both parks, plots are established to survey the stands on a rotating basis and are resurveyed every five years.

Management Applications

Aspen monitoring will provide park managers with information that has multiple applications:

- Monitoring this iconic tree species will provide information needed to develop adaptive strategies and restoration efforts to help perpetuate aspen stands.
- Combining aspen data from MOJN with data from other parks in the western US allows park managers to problem-solve together and collaborate on solutions across the larger region where aspen occur.
- Sharing information about the importance and condition of this tree species with the public will enhance visitor experiences and contribute to protecting the ecosystems where they are found.

More Information:

The protocol [narrative](#) and [standard operating procedures](#) for aspen 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>

