

## Case study

### Shenandoah National Park

Decades of acidic deposition (a.k.a. “acid rain”) from regional air pollution has negatively impacted soil and water quality in the Meadow Run Watershed, located in a Congressionally designated wilderness area in the southern district of Shenandoah National Park. Long-term acidic deposition has altered the chemistry in the soil and stream, stripping nutrients such as calcium and magnesium from the soil and reducing the system’s overall ability to buffer acid inputs. Increased acidity in the stream has reduced the richness and abundance of aquatic insects and fish such as brook trout (*Salvelinus fontinalis*). Consequently, Meadow Run is listed as impaired under the Clean Water Act due to its elevated acidity (low pH). Acidic deposition has also been found to negatively impact songbirds, plants and forest health in watersheds like Meadow Run. These degraded conditions affect visitor experience within the park and wilderness.

There have been dramatic reductions in emissions of the air pollutants that cause acidic deposition (e.g., sulfur dioxides and nitrogen oxides) as a result of Clean Air Act requirements implemented over the last two decades. Yet, we have learned that many sensitive watersheds, including Meadow Run, do not have the capacity to restore naturally. Computer models indicate that current air pollution reduction programs in conjunction with normal bedrock weathering will not restore the acidity in Meadow Run to pre-pollution levels for nearly a hundred years. A final decision has not been made, but the NPS is considering restoration options to reduce the negative effects of long-term acidic deposition in the Meadow Run Watershed. These options include the application of limestone sand to the project area to mitigate the negative effects of acid rain (referred to as “liming”). Liming has proven to be an effective method for improving soil and water chemistry to restore terrestrial and aquatic ecosystems, with beneficial effects for plants and wildlife stressed by acid deposition.

The Meadow Run watershed consists mostly of steep, remote terrain and the entire project area is within designated wilderness. Liming would be conducted by helicopter to minimize impacts to wilderness and avoid impacts to soil and vegetation associated with ground-based application methods (no helicopter landings would occur in wilderness areas). Potential impacts to wilderness character are being considered in the decision and include both long-term beneficial improvements to the natural character of wilderness along with short-term impacts to other features of wilderness character (i.e., untrammeled and opportunities for solitude or primitive and unconfined recreation). Learn more about the Shenandoah Meadow Run Watershed Restoration project on the on the park’s [story map](#) project page.