

# Science You Can Use *Tool*

## Map in a Snap: Regenmapper quickly identifies, prioritizes replanting locations

The 2017 fire season in Montana was especially severe, with more than 2,400 wildfires burning about 1.4 million acres across the state. In the aftermath, the Forest Service's Northern Region headquarters helped assess and prioritize national forest recovery needs. The work required hundreds of hours compiling data, matching it with GIS layers and fire boundaries, and considering factors such as slope, aspect, and the presence of nearby tree species.

Research ecologists Zack Holden and Kim Davis of the Rocky Mountain Research Station's Missoula Fire Sciences Lab realized much of the process could be automated and improved using models they were developing to predict postfire conifer regeneration. This insight led to the creation of [Regenmapper](#)—short for Regeneration Mapper—a web-based tool that quickly identifies areas unlikely to regenerate naturally.

The software highlights areas where climate conditions are most favorable for seedling success and those areas too far from a seed source to expect natural regeneration. The tool integrates Forest Service data with these regeneration models and helps land managers prioritize sites based on likelihood of natural regeneration, climate conditions, road access, desired tree species, and existing agency reforestation needs.

A Regenmapper prototype was operational in 2019; a more refined version became available in 2021. Models for additional tree species have been added since. Recently, Holden and Davis secured a \$465,000 NASA grant to fund a data scientist who will add automated fire severity calculations to the program and expand its capabilities to more precisely identify priority planting areas.

### 'Eating an elephant'

One of the forests already benefiting significantly from Regenmapper is the Sawtooth National Forest. When Nelson Mills became the timber



Regenmapper was used to help increase planting by tenfold. A Forest Service employee plants a whitebark pine seedling in the Sawtooth National Recreation Area following the 2023 Ross Fork Fire in southern Idaho. Forest Service photo by Elexis Bernstein.

and silviculture program manager in 2023, he inherited a 15-year backlog of replanting needs from fires dating back to 2008—fires that had burned more than 542,000 acres.

Before adopting Regenmapper, the forest averaged only about 100 acres of replanting a year due to the intensive process of surveying burned areas, acquiring seeds, growing seedlings, and securing replanting contracts.

“It was like eating an elephant,” Mills said. “It was time-intensive, it was labor-intensive, it was cost-intensive.”

### Tenfold increase

Since adopting [Regenmapper](#)—and with fundraising assistance from the Daughters of the American Revolution and the National Forest Foundation—the Sawtooth is now replanting 1,100 acres a year, a tenfold increase. Mills said he values the tool’s flexibility in setting replanting parameters and its climate-data integration to tailor outputs specific to his forest’s needs.

The improved accuracy has enabled the Sawtooth National Forest to develop a forest-wide replanting program that cleared the NEPA process and allows seedlings to be planted as soon as 12 months after a fire in some cases. Despite not being a GIS specialist, Mills said he found Regenmapper straightforward and transformative for the forest’s reforestation work.

“I’m not necessarily a tech savvy guy, but it’s been easy for me to learn,” he said. “And I think anyone could pick it up, if they had a desire to learn it.”

### Management Considerations

- Regenmapper dramatically improves reforestation planning efficiency.
- Climate- and landscape-informed decision making improves seedling regeneration success.
- With faster assessments and targeted plantings, forests can potentially increase the pace and scale of their reforestation programs.



A replanted Douglas-fir seedling grows next to a burnt log in the Sawtooth National Recreation Area following the 2023 Ross Fork Fire in southern Idaho. Forest Service photo by Nelson Mills.

### Further Reading

Holden, Z.A.; Jungck, E.; Davis, K.T.; et al. 2025. [A post-fire reforestation assessment and prioritization tool for the Western United States](#). Fire Ecology. 21: 83.

### Featured Scientists

[Kim Davis](#) and [Zack Holden](#) are research ecologists with the [Fire, Fuel, and Smoke Program](#) at the Rocky Mountain Research Station in Missoula, Montana.

[Paul Meznarich](#) is the author of this Science You Can Use Tool.



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