

Rocky Mountain Research Station Science You Can Use Bulletin



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RMRS Science Supports Shared Stewardship Case Study

Everyone In: A Road Map for Science-Based, Collaborative Restoration of Western Quaking Aspen

You can find quaking aspen (or just aspen) across North America, but nowhere is it more important than in the Intermountain West. Aspen stands—rooted within a background of spruce, pine, and fir forests in the West—are beloved by locals and tourists alike, with their golden fall colors in stark and stunning contrast to the darker green conifer trees.

Aspen plays important roles in western landscapes, according to John Guyon, Plant Pathologist for the USDA Forest Service, Intermountain Region, in Ogden, Utah. “When you compare aspen forests to the coniferous forests that they are typically surrounded by, they are significantly more biodiverse in both animal and plants. So, any work on

SUMMARY

With concern over the health of aspen in the Intermountain West, public and private land managers need better guidance for evaluating aspen condition and selecting and implementing actions that will be effective in restoring aspen health. The Utah Forest Restoration Group collaboratively synthesized a step-by-step approach for aspen restoration that was applicable to western U.S. forests. In a successful case study in shared stewardship, these restoration guidelines were applied to a challenging real-world setting. The Monroe Mountain Aspen Ecosystem Restoration Project, addressed diverse public and private lands needs and interests using an “All Hands, All Lands” strategy. The Monroe Mountain Working Group, a set of 21 stakeholder organizations representing broad interests, did background work and used a consensus model to provide recommendations to the USDA Forest Service’s Richfield Ranger District for the Environmental Impact Statement on the restoration plan, which was key to project implementation without litigation and general acceptance by local communities and the broader public. A collaborative effort among Forest Service scientists, the Utah Division of Wildlife Resources, and a local environmental group has revised the original aspen restoration guidelines into a new publication that makes them more useful and helpful to managers.



Aspen trees in the Uinta-Wasatch-Cache National Forest, Utah (photo: E.Greenwood, U.S. Forest Service).



Aspen are a valued tree species in the western United States, adding color and biodiversity to the landscape and acting as natural fire breaks (photo: M. O'Brien, Grand Canyon Trust).

aspen restoration—or even just maintenance—in effect promotes biodiversity. Then, there’s water: aspen forests tend to have more runoff and water production than surrounding conifer stands. And finally, ecologically speaking, aspen is commonly referred to as a ‘keystone species.’ Beyond just biodiversity, it’s a species that, when present, has indicator value for a well-functioning, larger-scale ecosystem.”

Aspen trees grow clonally, and although the root systems can persist for thousands of years, the trees themselves are relatively short-lived when compared to the conifers growing with them. “An 80-year-old tree is a pretty old aspen. We’ve aged aspen to as

old as 300–350 years, but typically they start dying and tipping over at 100–120 years,” explains Rocky Mountain Research Station Botanist Stan Kitchen. For an aspen stand to persist, there must be regeneration where new trees grow from the root system (suckering) to develop into mature trees.

Aspen may be in trouble—why?

Regeneration, or lack thereof, is a problem in some aspen stands. “Many of these persistent aspen stands are getting old. They’re 100 to 150 years old, and there’s no recruitment taking place. Many times, some regeneration [suckering] is taking place, but those trees are not making it to 6 feet tall [a somewhat safe height],

so recruitment is not occurring. You can go and walk around and you see these little suckers—shoots that are starting to come up—and they’re getting eaten by livestock or wildlife, or both in many cases, they just never get a chance to become a tree,” says Kitchen. The older trees still die, and the combination of a lack of recruitment and the death of older trees creates very thin or sparse stands, where there is danger that the whole clone or stand will be lost.

Another problem for aspen is competition with conifers. Aspen is not shade tolerant and grows poorly when overtopped by other trees. “In fact,” explains Kitchen, “aspen creates conditions that



A lack of regeneration in aging stands of persistent aspen leads to decline and eventual loss of the stand if the area is not restored. Picture above is of an old stand on the Fishlake National Forest (photo: S. Kitchen, U.S. Forest Service).

some conifers benefit from in terms of shading and nutrient accumulation in the soil near the base of the aspen, essentially promoting conifer establishment and growth.” Conifer trees and aspen can coexist long term together under some circumstances, but they don’t always, and the aspen usually declines as conifers increase.

Periodic fire works in favor of aspen. A high severity wildfire will kill both aspen and conifer trees, but it doesn’t kill the aspen root system and so aspen regenerates quickly from root suckers. Conifers have to start over as seedlings, and so their regeneration is much slower. “If you have the right amount of fire,” explains Kitchen,

“then you maintain a healthy balance between conifer and aspen. You have older stands and you have younger stands in a mix on the landscape. If you completely take away fire it pushes the balance towards the conifer and aspen declines.”

Concern over aspen decline has galvanized many groups across the West to address the problem through collaborative science and management. In 2010, the Utah Forest Restoration Working Group published a guide to address aspen restoration, called *Guidelines for Aspen Restoration on the National Forests in Utah*. Working group member organizations include federal and state agencies, counties and a diverse list of

non-government organizations with vested interests in healthy and productive forests. According to Kitchen, who serves as a science advisor to the organization, “For 10 years, this group has focused a lot of its efforts on testing and refining available aspen restoration science and synthesizing that science into management-friendly guidelines for aspen restoration.”

After publishing the guidelines, the group looked for a test case to evaluate how well these recommendations would work when put into real-world practice. They found what they were looking for on Monroe Mountain, located in the Richfield District of the Fishlake National Forest. District Ranger Jason Kling volunteered Monroe Mountain for this project because “in my mind, the aspen restoration [project] was going to be complex enough that it warranted a collaborative group to

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–Stan Kitchen



come together with representation from each of the different interests. There was just enough social and political interest that to come up with a proposal that could be durable and supported, we needed more people at the table than just the Forest Service.”

From this effort came a couple of exciting developments that should be of interest to managers concerned with aspen health. First, the success of the collaborative effort to restore aspen on Monroe Mountain earned the Richfield District the coveted Forest Service Chief’s Honor Award in 2017, and it is worth delving into what made that project work in light of the Forest Service’s current focus on a “shared stewardship” management approach. Second, in helping to implement these guidelines at Monroe Mountain, Kitchen and his colleagues gained experience and insights which they incorporated into a revision of the guidelines recently published as a Forest Service General Technical Report called *Guidelines for Aspen Restoration in Utah With Applicability to the Intermountain West*. These new guidelines are designed to have broader applicability than those published in 2010. Kitchen explains: “The original guidelines were written primarily for the Forest Service. These new guidelines are based on the principles that are in the original document, but we have learned some things since then that we felt like could make it more useful and helpful to managers

in general. This is a more general reference for anyone, including those managing private or public lands that have aspen on them.”

A case study in Shared Stewardship: the Monroe Mountain aspen restoration project

On Monroe Mountain in southcentral Utah, large swaths of aspen have thrived for thousands of years on the peak’s upper flanks and high volcanic plateau. But these aspen stands are in trouble, and District Ranger Jason Kling knew that he would have to address multiple management challenges within a complex matrix of opposing stakeholder interests in any restoration plan. When he heard in 2011 that the Utah Forest Restoration Working Group was looking for a test case for their new aspen restoration guidelines, he thought Monroe Mountain would be a great candidate because of the challenges it offered and opportunities for restoring natural fire.

Monroe Mountain encompasses about 176,000 acres of public lands administered by the Fishlake National Forest along with 12,000 acres of private land. The private landholdings and protection of their structures would have to be considered in any prescribed fire plans. Also, the range has designated “inventoried roadless areas,” some of which share boundaries with private land. Kling explains: “We recognized that if we were to propose any prescribed



RMRS Scientist Stan Kitchen and Fishlake District Ranger Jason Kling (plaid shirt) discuss aspen distribution patterns using a map of Monroe Mountain with the Monroe Mountain Working Group, a group of 21 diverse stakeholders convened to make recommendations for aspen restoration (photo: J. Gale, Utah State University Extension).

fire treatments, there was probably going to need to be some mechanical thinning work that would need to occur beforehand adjacent to those private lands, and given that there were inventoried roadless areas, this just created another complexity that we would have to work through.”

And then there was the issue of stakeholder interest in animals, both wild and domestic. Along with including several active grazing allotments for cattle and for sheep, the mountain boasts world class trophy bull elk hunting opportunities, and offers good deer hunting. The mountain also has Bonneville cutthroat trout, a Forest Service Region IV sensitive species. “When you factor in all these things, there’s just a lot of competing, multiple-use interests, and trying to figure out how to



Repeated browsing by wildlife or livestock produces aspen with a shrubby or hedged appearance, which has a low probability of ever recruiting into the canopy. As part of the Monroe Mountain project, the Utah Division of Wildlife Resources has agreed to an adaptive management plan that takes a balanced approach (livestock and wildlife), that defines browse thresholds, and that lists various actions (some wildlife specific) that could be implemented if browse thresholds are exceeded (photo: F. Bernstein, Grand Canyon Trust).

balance them is quite a challenge,” says Kling.

The Monroe Mountain Working Group was convened as an offshoot of the Utah Forest Restoration Working Group with the charge to collaborate in crafting a plan to restore aspen while considering the interests of the many stakeholders in the area—no easy task. It has 21 members representing environmental nonprofits, state government agencies, university extension, local counties, the livestock industry, and sportsmen’s groups. A key to their success, according to Kling and Kitchen, is Dr. Steve Daniels,

MANAGEMENT IMPLICATIONS

- The success of aspen restoration may rely on cutting, prescribed fire, and/or exclusion of livestock and wild ungulates. Success would require cooperation with the State Forest Service and wildlife agencies and private landowners, complicating the development and implementation of restoration plans.
- Aspen responds well to heavy burning treatments, producing large numbers of suckers. Aspen restoration projects can fail if managers don’t have a good handle on the level of grazing pressure that will challenge new aspen recruits, or if managers employ only partial cutting treatments that expose young aspen to browsing, insect pressure, and sun scald.
- For large projects involving multiple stakeholders and land ownerships, using a consensus model to make recommendations for the project can lead to a more robust project with greater community support during planning and, importantly, during implementation of adaptively managed projects.

a skilled facilitator from Utah State University, who as a neutral party, helps to keep the group on track and talking productively. The group built trust and found common ground by wrestling with difficult issues together on the mountain and in regular (monthly) work sessions. They also employ a consensus model. Kling says, “The way this works is, if somebody brings a proposal to the table, and 20 out of 21 participants agree, but there’s that one group or that one person that, for whatever reason cannot agree, then it becomes that person’s responsibility to rework the proposal and bring it back to the table for the whole group to consider.” The working group is not a decision body, but their role is to make recommendations to the Forest Service, whose representatives participate in meetings but are not voting members of the group.

The working group had lots to do before making recommendations. Researchers provided guidance

from published studies and ongoing research. For example, Kitchen’s research reconstructing multi-century, spatially variable fire and vegetation histories in the region provided critical insights needed by the group to understand the role of fire in maintaining aspen on this and similar landscapes. Additional site-specific data were collected using hybrid teams of volunteers and researchers to address some

Stan Kitchen’s research reconstructing multi-century, spatially variable fire and vegetation histories in the region provided critical insights needed by the group to understand the role of fire in maintaining aspen on this and similar landscapes.



knowledge gaps, such as, which animals eat the aspen sprouts (all of them, as it turns out—cattle, deer, sheep, and elk) and how many younger trees were being recruited in these aspen stands (not many—in some stands, there were no trees younger than 40 to 90 years, and one stand had had no recruitment in 139 years). The result of the 4-year effort was the successful completion of an Environmental Impact Statement (EIS) in 2015 that incorporated recommendations for a 10-year plan to restore 40,000 acres of aspen ecosystems on Monroe Mountain.

This plan, which has now been underway for 4 years, includes

actions (burning, thinning, fencing, and others) that address the two primary causes of aspen decline on Monroe Mountain: conifer encroachment and over-browsing of aspen suckers by domestic and wild animals. The Utah Division of Wildlife Resources was a Cooperating Agency on the EIS. Also, many of the landowners agreed to thin conifer on their property with help from the State, reducing the risk of catastrophic wildfire and allowing both the State and Forest Service to cooperate in reducing unwanted wildfire risk to these properties.

One of the notable aspects of the Monroe Mountain Aspen Restoration EIS is that it proposed

to treat 40,000 acres and was never challenged in court, as often happens with a project of this scale and complexity and level of local notoriety. “If we had just taken the non-collaborative approach, for example with Forest Service people only—as we do sometimes—I’m pretty sure that our plan would not have been as good as the one we now have and wouldn’t have had nearly as much support,” says Kling, adding, “We have a lot of partners and a lot of stakeholders that are right there helping us every step of the way. It really is an ‘all hands, all lands’ project. We’re doing good things for the land, and at the end of the day I think that’s what really matters.”



The mature trees in this aspen stand in the Ashley National Forest are declining, but the density of 1,000 recruits per acre exceeds the 500 per acre minimum threshold recommended for stands to be self-replacing (photo: S. Goodrich, Ashley National Forest (retired)).

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RMRS Scientist Stan Kitchen and Fishlake District Ranger Jason Kling work with members of the Monroe Mountain Working Group, a group of 21 diverse stakeholders convened to make recommendations to the USFS in the Monroe Mountain Aspen Restoration Plan (photo: J. Gale, Utah State University Extension).

Does it need medicine? Using science to prioritize aspen restoration dollars

A new publication called *Guidelines for Aspen Restoration in Utah With Applicability to the Intermountain West (RMRS-GTR-390)*, led by Stan Kitchen of RMRS, refines earlier guidelines and broadens their applicability. “It provides better context through a stronger literature review of the ecology and condition of aspen in general. We revised the basic steps of assessing condition and finding the right treatment, and we added the step of clearly identifying symptoms of decline, their root causes, and potential responses,” says Kitchen.

Kitchen explains that this document is set up to diagnose and treat problems with aspen in a way that is analogous to medical diagnosis. “The first step,” he says, “is to decide whether the ‘subject’ is even sick or not.” Projects should start by determining which aspen stands need treatment, and which stands are functioning well. “Because,” he points out, “there’s no need to go in and cut a bunch of aspen if it’s already functioning fine. But there are areas that can, and should be, considered for some change in management.”

How is that determination made? Kitchen says that some symptoms show that things are not right. One example would be a persistent

aspen stand that is clearly thinning, or where the older trees are dying without any recruitment of suckers. “Our benchmark is that there ought to be at least 500 recruits per acre as an indication that the stand is maintaining itself, even when the older trees are in a stage of decline. If you’re not seeing at least 500 recruits per acre, that’s a red flag.”

“Another warning sign would be when you go to a stand, and see a lot of dead aspen on the ground, a few live aspen trees, and the rest is just dense conifer,” continues Kitchen. Sagebrush is a shade-intolerant shrub that favors drier sites but can grow under open aspen stands, because aspen lets a lot of light through. But if you see a substantial amount of sagebrush in aspen, and again without that recruitment of aspen suckers, it’s an indication that the stand is in decline and that it may need remediation.

If a stand is in trouble, it is best to figure out what is causing the problem rather than jumping to prescribing a treatment...It is important to match the prescription, or management action, to the root cause of the problem.

If a stand is in trouble, it is best to figure out what is causing the problem rather than jumping to prescribing a treatment. Kitchen explains that the list of causes usually boils down to a few possibilities. “Lack of disturbance due to altered fire regimes often tips the balance towards conifer domination in these stands. The second common problem is too many mouths to feed—whether the animals are domestic or wild—for the amount of food out there. The third is climate change. Some stands may have established 150 years ago when conditions were wetter and cooler, and now that it is drier and warmer, they can be pushed to the edge despite good management.”

It is important to match the prescription, or management action, to the root cause of the problem. “There are many things that can be done to help aspen,” suggests Kitchen, “and we discuss passive vs. active restoration in the new GTR. Passive restoration might be as simple as reducing the number of livestock or holding some hunts that would allow for some animals to be removed; or putting up fence to provide additional protection. Passive activities may be all that is required for some stands to get to a healthier place. Active restoration might involve mechanical treatments like cutting and removing conifers to get regeneration going. Prescribed fire is another active restoration activity. Oftentimes a combination



Aspen trees grow clonally, and although the root systems can persist for thousands of years, the trees themselves are relatively short-lived when compared to the conifers growing with them. (photo: S. Kitchen, U.S. Forest Service).

of actions is needed; it's not simply a matter of one problem and one response.”

Finally, monitoring and adaptive management are critical to the ultimate success of treatments. An important part of the Monroe Mountain Aspen Project is to monitor both the aspen pretreatment condition and the response to treatments. “It's also important to have healthy reference areas for comparison so that you can know what you are aiming for,” says Kitchen. “Also, we promote an adaptive management approach where you treat, you monitor, then you ask, ‘If we're not quite reaching our objectives yet, what can we do differently to reach our objectives?’”

Some parting thoughts on aspen management ...

John Guyon, who has decades of experience with aspen and is retiring this year, has a few ideas about some of the pitfalls managers face in aspen restoration. “The times I have seen aspen management treatments fail,” he explains, “is often when the managers didn't have a good feel for what the grazing pressure was. And they came in and they treated, and then everything got grazed off. So that's an important thing to understand.” He also emphasizes that managers shouldn't be afraid to burn aspen: “For aspen, the dominant disturbance mechanism is big heavy burning fires.”

Finally, he warns, “If you do only partial cutting treatments to open

up an aspen stand that leaves some residual suckers, they tend to get hit heavily by insects and diseases and sun-scalded. Then, instead of getting a good suckering response, we have a bunch of trees that are gradually dying, drawing down the carbohydrate reserves of that root system.”

A bright spot for aspen is that there is widespread agreement that it is worth all the effort to collaborate and find ways for people with opposing interests and viewpoints to come together with restoration and management plans. And, as

KEY FINDINGS

- Aspen stands are declining in many parts of the Intermountain West, requiring that people and agencies collaborate across boundaries and interests to make recommendations for maintenance and restoration.
- Two of the main issues with aspen decline are overtopping by conifers and browsing of aspen shoots (suckers from the clonal root system) by both livestock and wildlife, leading to die-off of older stems and lack of recruitment of new stems.
- Large and successful collaborative aspen restoration projects, like Monroe Mountain in the Fishlake National Forest of Utah, can serve as a model for these types of projects to other forests.
- A new publication on guidelines for restoring aspen revises an earlier set of recommendations and gives them applicability beyond Utah to the Intermountain West and applies to anyone trying to manage aspen on both private and public land.

Large-Scale Aspen Restoration Projects in Other Utah Forests

The largest-ever aspen restoration program in Utah, currently in the planning stages, is a joint project between the Uinta-Wasatch-Cache National Forest (which is everything along the populated Wasatch Front) and the Ashley National Forest in northeastern Utah. Numerous partners and researchers (including RMRS scientist Stan Kitchen) are involved in project planning to help define areas that need treatment, identify the most effective treatment options, and prioritize treatments on the landscape, including identifying where there are opportunities to work across boundaries with the State. The scale of this project is unprecedented in Utah, and it will increase the pace and scale of restoration on the landscape within aspen stands and in surrounding areas. Increasing the extent and improving the condition of aspen on the landscape will provide for more opportunities to manage future wildfires for resource objectives and to suppress fires with undesirable effects.

To date, most aspen research in Utah has been in the central and southern parts of the State. This project will help RMRS and universities to change that and provide numerous opportunities for research and adaptive management in northern Utah. It is expected that the National Forests' analysis and preparation of the NEPA document will streamline planning efforts and enable work to get done on the ground quickly. Ideally, the project will lead to improved aspen forest health, watershed conditions, and ecosystem resiliency, minimizing the impacts from climate change and the longer, more severe wildfire seasons. The planning effort will build on existing relationships with State partners and provide the foundation for identifying and prioritizing treatments across boundaries. This large-scale project will also serve as a useful model for other National Forests in the region and the Intermountain West where aspen restoration is needed and provide lessons learned for navigating the NEPA process and prioritizing work across a large landscape.



Ashley National Forest (photo: U.S. Forest Service).

Jason Kling explains, having buy-in through participation in the process from the stakeholders can help the project beyond the proposal stage. “Having a collaboration like this can provide help with some sensitive issues that come up during the project. For example, we exceeded our browse thresholds last summer. We anticipated and planned for this, and now as we’re making some grazing and State wildlife adjustments, those are more supported, because we’re able to build on the social and political support for the project. I think operating under a consensus model makes that social and political side a little bit easier.”

FURTHER READING

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“In some cases, having a collaboration like this can provide help with some sensitive issues that come up during the project. For example, we exceeded our browse thresholds last summer. That’s not really a surprise. We anticipated and planned for it, and now as we’re making some grazing and State wildlife adjustments, those are more supported because we’re able to build on the social and political support for the project. I think operating under a consensus model makes that social and political side a little bit easier.”

–Jason Kling



Without periodic disturbance, aspens can be replaced by conifers at some locations. The aspen in this stand (Gentry Mountain, Manti-La Sal National Forest) appears healthy but is approaching an ecological threshold where shading by the dense conifer will lead to aspen decline (photo: S. Kitchen, Rocky Mountain Research Station).

SCIENTIST AND MANAGER PROFILES

The following scientists and managers were instrumental in the creation of this Bulletin:



STAN KITCHEN is a Research Botanist with the Grassland, Shrubland, and Desert Ecosystems Program of the USDA Forest Service’s Rocky Mountain Research Station in Provo, Utah. He earned his M.S. in Horticulture and Ph.D. in Wildlife and Wildlands Conservation from Brigham Young University. He has broad experience unraveling the impacts of invasive species, climate variability, and disturbance on natural systems with interest in long-term patterns of fire and drought in forested and non-forested systems of the Interior West. Connect with Stan at <https://www.fs.usda.gov/rmrs/people/skitchen>.



JASON KLING is the Richfield District Ranger of the Fishlake National Forest in Richfield, Utah. He earned a Bachelor of Science degree in Fisheries and Wildlife Management from Utah State University. He has been the Richfield District Ranger since 2010. He has broad experience in resource management, collaboration, NEPA. He has great interest in using and allowing the appropriate disturbances to help improve forest health at a landscape scale level.



JOHN GUYON has been employed by the USDA Forest Service, Intermountain Region, State and Private Forestry, Forest Health Protection in Ogden, Utah, for the last 29 years. He received his M.S. in Forest Pathology from Colorado State. He has broad experience in determining the impacts of forest insects and diseases on forests of the Interior West, and a deep abiding interest in the ecology and disturbance ecology of aspen ecosystems.



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Photo: S. Kitchen, U.S. Forest Service

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