THE BUREAU OF LAND MANAGEMENT'S
VEGETATION REMOVAL PROGRAM

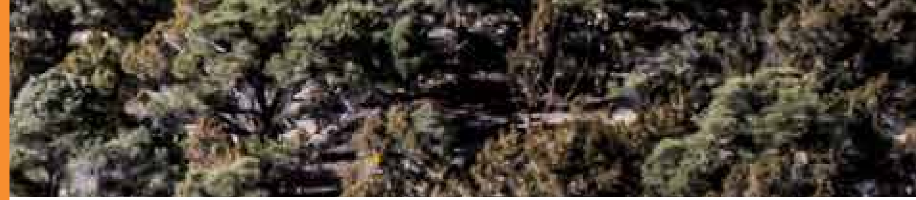
MOVING BACKWARD ON CLIMATE AND 30x30

Every year, the Bureau of Land Management (BLM) spends tens of millions of taxpayer dollars destroying hundreds of thousands of acres of native piñon pine and juniper forests and sagebrush stands throughout the West.

These large-scale vegetation removal projects—often encompassing tens of thousands of acres in a single project—are done in the name of habitat and watershed "restoration."

Relying on techniques developed in the 1950s and 60s, these vegetation removal projects have produced mixed ecological and rangeland results in the past. They also risk exacerbating the climate crisis by decreasing soil stability; removing important carbon sinks from the American West; reducing fire resiliency; increasing the spread of invasive species; and producing dust that accelerates snowmelt in the Colorado Rockies, threatening the water supply on which 40 million people and 15 percent of the nation's agriculture rely.

Mechanical vegetation removal projects are a direct, ongoing threat to the preservation of America's remaining undeveloped public lands and functioning natural ecosystems—ecosystems which must be preserved to meet the 30x30 conservation goal put forth by scientists, which calls for protecting at least 30% of all lands and oceans by 2030 in order to protect global biodiversity and ecosystem services, including those critical for climate mitigation.



WHAT IS A VEGETATION REMOVAL PROJECT?

Vegetation removal projects take many forms. At the most basic level, the BLM uses chainsaws to topple piñon pine and juniper trees, herbicides to kill sagebrush and piñon and juniper saplings, and prescribed fire to remove tree saplings and shrubs.

More commonly, the BLM uses disruptive heavy machinery to kill native vegetation.

Bull Hog Masticators

Bull Hog Masticators mow down trees with giant mulchers attached to front-end loaders or excavators. These machines turn living trees into piles of wood chips and stumps, quickly removing whole stands of native piñon pine and juniper.

The Dixie Harrow Method

The Dixie Harrow Method uses a tractor to drag a 25- to 50-foot-wide frame with large teeth welded to parallel bars, churning soil and uprooting vegetation.

Chaining

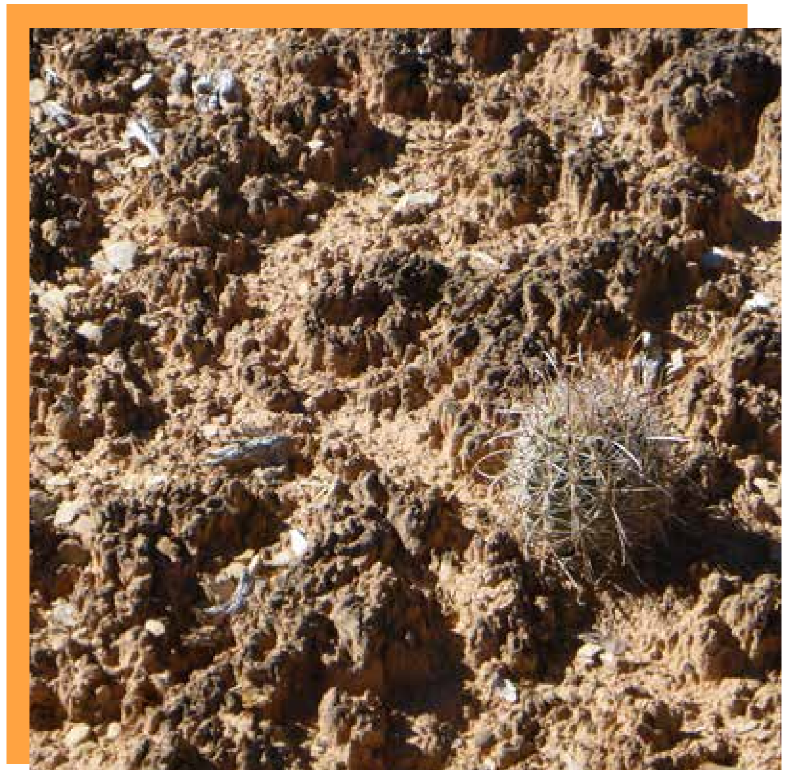
Chaining uses a large anchor chain, which can weigh more than 20,000 pounds, dragged between two enormous bulldozers to tear trees out of the ground, roots and all, flattening hundreds of trees with every pass. As the chains rake across the surface, soils, sagebrush, grasses, and forbs are destroyed. The discarded trees left in their wake can litter the landscape for decades.

BIOLOGICAL SOIL CRUSTS HOLD EVERYTHING TOGETHER

In the Great Basin and on the Colorado Plateau, the topsoil is held together by cryptobiotic soil. This biological soil crust is formed by living microbiotic organisms.

Covering more than 70 percent of the living ground in the arid Southwest, cryptobiotic soil plays a critical role in capturing rainwater, preventing flash flooding and erosion, and retaining moisture in the ground, allowing native plants to thrive. Cryptobiotic soil crusts also directly mitigate climate change by acting as long-term carbon sinks and significantly contributing to carbon storage in dryland ecosystems.[1]

But biological soil crusts are also very delicate, and the heavy machinery used in mechanical vegetation removal leaves thousands of acres of denuded landscape susceptible to wind and water erosion. Science tells us that "[this] land surface is an important part of the climate system. Humans have . . . caused a fragmentation of the landscape. The surface cover that we see now is both the legacy of past actions and a constraint on current options. Actions taken today will, in the same way, have effects that reach far into the future."[2]



> **"Disrupting the surface stability of large areas using mechanical means may not be viable where dust production is a high risk.[6]"**

> **"A synergistic effect is created when surface disturbance occurs on invaded landscapes during drought years, and large amounts of soil can be lost from an area as a result. Increasing temperatures and decreasing precipitation also decrease soil and ecosystem resilience to land-use impacts, further increasing the frequency and magnitude of erosion events.[5]"**

Mechanical vegetation treatments can cause desertification of healthy piñon-juniper forests. Even immediate reseeding of the area doesn't rectify the increased risk of desertification, because cryptobiotic soil takes decades to grow. Cryptobiotic soil provides stability to water and nutrient cycles that is essential to reducing the risk of desertification. "Any changes in these processes could make rangelands particularly vulnerable to climate change."[3]

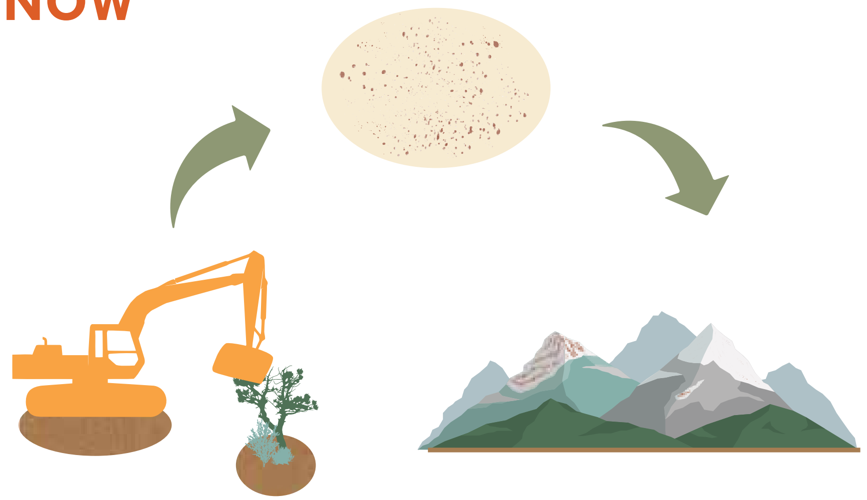
Undisturbed, late-successional biocrusts have significantly higher rates of carbon sequestration, directly contributing to long-term storage of inorganic carbon beneath the soil surface. Carbon loss and leaching from these desert carbon sinks is lowest where soils and vegetation cover remain undisturbed. Therefore, protecting the integrity of biocrusts protects the ability of dryland systems to sequester and store carbon, which is a significant piece of the climate mitigation puzzle.[4]

Desertification leaves a once-healthy arid landscape barren. Soil fertility, native vegetation, and moisture are diminished in a place where the soil was disturbed by machinery.

DUST ON SNOW: THE CLIMATE CYCLE IN THE WEST

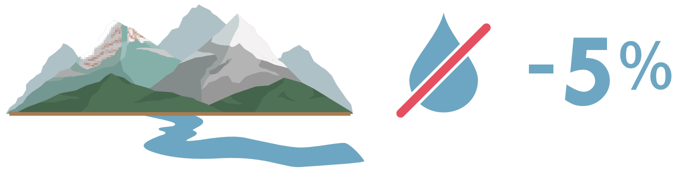
RED DUST ON WHITE SNOW

Here's how it works: Wind storms pick up desert soils from the Colorado Plateau that have been disturbed by activities such as vegetation removal and grazing. Those wind storms then deposit that dust on mountain snowpack throughout the Rockies.



> "It appears that winter precipitation amounts, vegetation cover, and levels of soil disturbance play a large role in determining whether or not dust is mobilized. Soil disturbance appears to be a key factor...[S]ediment cores from mountain lakes indicate that dust deposition in the Colorado mountains increased significantly after increased settlement and expansion of agriculture on the Colorado Plateau in the 19th century.[8]"

> "Disturbed desert soils landing on mountain snowpack in the Upper Colorado River Basin has resulted in a net loss of approximately 5% of the annual flow of the Colorado River.[7]"



Today, dust is being deposited at rates approximately five times those of the era predating European settlement as a result of vegetation removal, grazing, off-road vehicle use, and resource extraction. When that dust lands on snow, it causes enhanced absorption of solar radiation—just like wearing a dark t-shirt outside on a hot, sunny day.

That enhanced solar radiation causes snow to melt faster and sooner than it normally would. Studies of the moderately dusty years of 2005-08 show that dusty snowpack reduced the Colorado River's flow by about five percent (750,000 acre-feet)—or about double what the city of Denver uses each year.

This deposition of dust on snow appears to be increasing. During 2009, 2010, and 2013, scientists observed unprecedented amounts of desert dust falling on Colorado snowpack, about five times more than observed from 2005 to 2008.[7] Various models predict that climate change will cause an additional 7-20 percent reduction in current runoff in the Colorado River Basin.[9]

HOW IT WORKS

Climate change is predicted to cause a 7-20% reduction in Colorado River runoff, exacerbating the cycle of loss.

> **"Traditional restoration techniques applied to western drylands often combine seeding with soil surface disturbance to improve seed-soil contact and seed burial. The soil-disturbing nature of these treatments imparts inherent dust-production risk in more arid regions...leaving large areas of exposed, disturbed soils.[6]"**

THE LIFELINE AND CARBON BANK OF THE SOUTHWEST

On the Colorado Plateau, the Green, Dirty Devil, and San Rafael Rivers wind south to meet the Colorado River, followed soon thereafter (in Glen Canyon National Recreation Area) by the San Juan River. Together these rivers create "the lifeline of the Southwest and…the economic foundation of a significant portion of the western United States."[9]

By increasing dust on snow, large-scale mechanical vegetation removal increases the stress on the Colorado River Basin.

IMPACT OF THE COLORADO RIVER

40 million — More than 40 million people depend on the Colorado River for their water needs.

4 million — The Colorado River irrigates more than 4 million acres of farmland—producing some 15 percent of the nation's crops and about 13 percent of its livestock.

$48 billion — In the Southern California counties that rely most predominantly on Colorado River water, agricultural industries—including farming, food processing, and supporting businesses—produced $48 billion in sales and directly employed 160,000 workers in 2010.

$10 billion — Equally important, the Colorado River Basin supports world-class rafting and freshwater fishing industries, with the total economic value of fishing, hunting, and wildlife viewing throughout the basin calculated at more than $10 billion annually.

Large-scale mechanical vegetation removal also reduces the region's ability to mitigate the climate crisis by reducing the landscape's ability to safely sequester carbon. Forests of juniper and piñon pine store a disproportionate amount of carbon compared to other land cover types, such as sagebrush and grasslands. Studies have found that the expansion of shrubs and trees actually sequesters carbon, and removing them could result in the release of stored carbon into the atmosphere.[10]

> "There is a general agreement that terrestrial systems in the Northern Hemisphere provide a significant sink for atmospheric CO_2[12]"

The BLM often argues that mechanical vegetation removal of juniper and piñon pine woodlands is necessary to prevent wildfires. They claim a wildfire would also release the stored carbon into the atmosphere, based on the assumption that 30-80% of trees combust in a high severity blaze. However, new research shows that the complete combustion of mature trees is negligible (less than 5%), and estimates of carbon emissions from wildfires were exaggerated by as much as 83% over actual emissions.[11]

> "Thinning and overstory removal activities in pinyon–juniper ecosystems that seek to reduce hazardous fuel load should also be expected to cause relatively rapid declines in surface soil carbon and nitrogen storage.[13]"

> "Attempts to maintain or restore past conditions [by providing] increasingly greater inputs of energy from [land] managers could create forests that are ill adapted to current conditions and more susceptible to undesirable changes.[14]"

CAUSES AND CONSEQUENCES

A recent review of the causes and consequences of dust and erosion on public lands found that "restoration of degraded dryland is a critical management tool for reducing erosion of surface soils by wind and generation of dust...Most broad-scale restoration approaches are aimed at restoring vegetation and entail some level of soil disturbance, without including dust reduction as a management goal."[6]

NEW APPROACHES:

1. Must be achievable at broad scales
2. Must minimize risk of wind erosion
3. Must reach vegetation and soil objectives, particularly in more arid regions

Recommended Guidelines for Reducing Climate Impacts of Vegetation Removal Projects

Implement the least intensive, lowest risk actions first, leaving all surface-disturbing activities as a last resort. Low risk/low cost actions include removing cattle from the subject landscape and aerially seeding with native species.

Align vegetation removal goals with the soil type of the area. For example, the BLM often argues that piñon-juniper is "encroaching" into sagebrush habitat, but if the soil type shows that it is expected to be a piñon-juniper forest, then the project lacks a scientific basis. Similarly, if the project area contains old-growth piñon-juniper forest, the "encroachment" theory lacks merit.

Take a precautionary approach to project size. Large-scale vegetation removal should not occur until the BLM develops defensible procedures and methods that ensure a high likelihood of project success.

Develop scientifically robust monitoring protocols and utilize untreated reference areas to ensure that there is a baseline against which results can be compared.

Include adequate funding for long-term monitoring and development of peer-reviewed scientific literature as part of project proposals. The BLM should partner with the US Geological Survey when possible to assist in long-term monitoring.

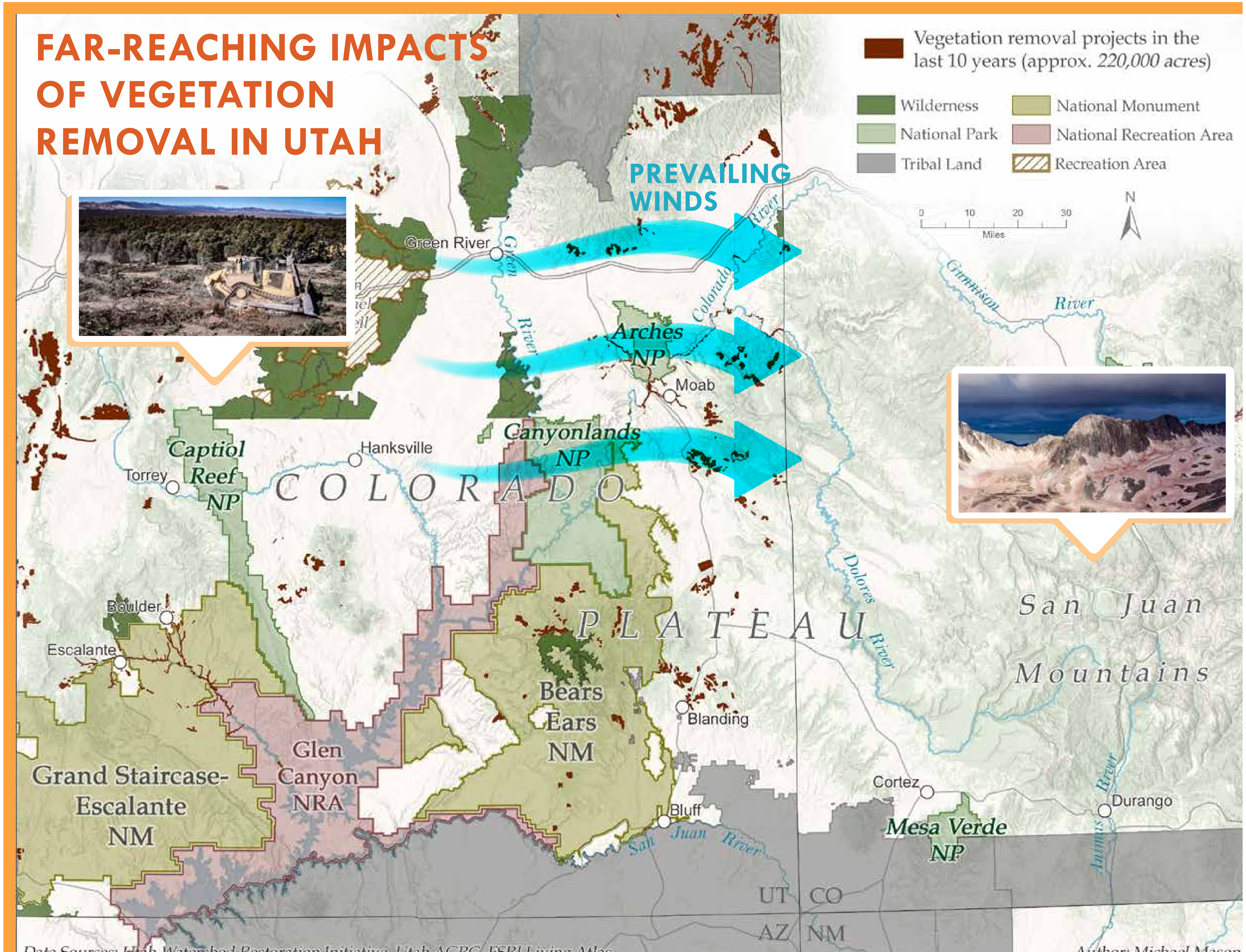
Analyze the impact of vegetation projects on biological soil crust and non-game species dependent on piñon-juniper forests and sagebrush stands.

Stop vegetation removal on wilderness-quality lands, including Wilderness Study Areas and BLM-identified lands with wilderness characteristics. There are millions of acres of BLM-managed public lands in the West that lack wilderness quality where the BLM can develop and test methods and strategies for consistently achieving desired results.

Set meaningful goals and parameters for vegetation removal projects that define success or failure and account for climate impact. Failing to identify specific desired outcomes limits the agency's and the public's ability to meaningfully analyze project efficacy.

Prioritize climate mitigation when considering the location and size of vegetation removal projects and take a careful, scientifically sound approach to vegetation removal and monitoring.

FAR-REACHING IMPACTS OF VEGETATION REMOVAL IN UTAH



> "In general, greater caution will be required in relatively dry and windy locations with fine sands. Such locations are highly prone to erosion and lie where restoration is generally challenging. To quantify risk of dust with varying climate scenarios across the landscape, improvement of site-specific models is needed which account for biotic and abiotic factors...Results of such models may trigger use of minimal soil-disturbing approaches, soil stabilizers, or both.[6]"

> "Unlike the challenging, international efforts to reduce global carbon emissions, mitigation of soil disturbance and stabilization of soils in dust source regions is achievable through local, regional, and national efforts, and could have a near-term impact on dust emission.[7]"

> "For the future of rangelands, it is important to reduce the vulnerability of these systems to climate change.[3]"

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Photo of dust on snow in the San Juan Mountains on pgs. 6, 7 and 15 by Peter McBride. Used by permission.

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