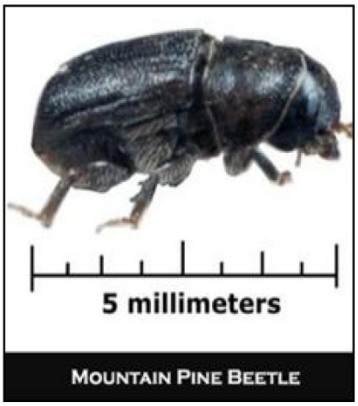
BLM

# Bark Beetle Strategic Plan

## COLORADO




## 2012

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# State Director's Foreword

BLM Colorado manages 8.4 million acres of public land, and 27.1 million acres of federal mineral estate. The lands we manage for the public range from red rock canyons to wide-open sage brush country.

The BLM has the most challenging mandate of any federal land management agency. We manage everything from wilderness to forestry, watersheds and riparian areas to grazing and energy development. The BLM's role in improving the health of forests and rangelands, preserving native species, guarding our fragile biological and heritage resources, supporting economic activities through our forestry, grazing and energy and minerals programs is always at the core of what we do.

Public lands are vital to Colorado. The role our public lands play in our quality of life—in terms of recreation, open space and wildlife habitat—is assuming greater and greater prominence. Today, there are around five million people living in Colorado. Population and urbanization place new pressures on America's landscapes. The BLM and local communities must work together to manage and maintain these places where Americans live, work and play.

One major impact on public lands in Colorado is the current bark beetle epidemic so many of our forests are facing. The impacts of this epidemic range from human safety and infrastructure, to wildfires, erosion and wildlife issues. Studies indicate that bark beetle-killed trees begin to fall within five years of their death. Now is the time to prioritize, plan and act to address the far-reaching impacts of falling trees.

We not only need to act to improve forest health due to our current circumstances, but we must also make a long-term commitment to foster sustainable and resilient forests for the future. This work does not solely rest with our forestry program. The beetles' affects reaches across many different disciplines. In Colorado, we hope to identify future projects and initiatives that address multiple programs and priorities affected by bark beetles.

As with most issues on public lands, the bark beetle epidemic is not purely a forestry issue and it is not purely an issue for one agency or land manager to tackle. We need to continue seeking and building partnerships both in the private and public sector to address this problem on a landscape-scale. The beetles don't stop at the field office or agency boundaries and neither should our work. The only way to truly address this epidemic is to work together to find creative ways to accomplish our goals.

BLM Colorado's bark beetle strategy outlines and identifies the environmental and operational issues the BLM is facing as well as suggestions on how we move forward. We will continue updating this strategy as we get new information, make progress, build partnerships and find out what works on the ground.

Helen M. Hankins

Bureau of Land Management Colorado State Director

# Purpose

Identify the issues, goals, objectives and actions needed to effectively manage the bark beetle epidemic that the Bureau of Land Management (BLM) resource programs face in Colorado.

# Need

Formalize the focus and efforts of BLM Colorado's resource programs to manage bark beetle issues.

# Introduction

Colorado forests are facing insect and disease activity at a level never before seen in recorded history.

The main contributors are the mountain pine beetle, spruce beetle, ips beetle, Douglas-fir beetle and the western balsam bark beetle. Since 1996, bark beetles have affected more than 3.3 million acres statewide, mainly within Lodgepole pine forests. Although this strategy will focus on issues related to bark beetles, many other agents are affecting the health of Colorado's forests. These include Sudden Aspen Decline, Western Spruce Budworm and Dwarf Mistletoe.

BLM foresters are looking at different approaches to creating a more resilient forest ecosystem. The BLM is emphasizing stand structure and species diversity in the wake of current forest disturbance. Our ability to collaborate across ownership boundaries is a key component to effective landscape management.

Periodic insect and disease infestations are natural across the landscape, but past management decisions and climatic changes have increased the scale of today's epidemic. Years of fire suppression, decreased active forest management, drought and increased temperatures have altered the natural historic range of variability for disturbance and have made the forests susceptible for unprecedented insect and disease outbreak.

# Bark Beetle Background

Bark beetles are named for their ability to attack, penetrate and complete their lifecycle within the living inner bark of a tree. Bark beetles tend to attack trees weakened by disease, drought or physical damage. As seen by the current epidemic, even trees that were relatively healthy are becoming infested. Once the beetles enter the tree successfully they will emit pheromones to attract mates, drawing more beetles to the tree. During normal endemic periods, trees typically ward off attacks by producing resin to push out the invaders; however, the sheer number of beetles combined with stress caused by

drought overwhelmed these defenses. Bark beetles have a symbiotic relationship with fungi; the best example of this is the mountain pine beetle. The mountain pine beetle carries blue stain fungi within special structures in its head. As the beetle chews through the sapwood the fungi spreads, hindering the trees' ability to produce resin and turns the wood to a bluish-black hue.

# Issues

## Safety

### Falling Trees (Human, Infrastructure)

Research shows that some trees killed by bark beetles in previously unmanaged stands begin falling

approximately five years after death; most dead trees are on the ground within 14 years. Falling trees pose a threat to public safety, especially along travel corridors and in other high-use areas. Currently, the risk of people or property being struck by falling trees has increased. Power lines and other infrastructure are also at an increased risk to damage from falling trees. Damage to power lines could cause wildfires or blackouts. Falling trees are likely to block roadways, thus preventing or delaying emergency and non-emergency responses on public lands.

### Fire

Current bark beetle tree mortality is creating fuel loading characteristics that are difficult to model for predicted fire behavior. Fire behavior is greatly affected by multiple factors including overall stand structure; percent of tree mortality in the stand; arrangement of dead tree fuel loading (dead and standing versus dead and down); and timing of ignition with relation to fuel moistures, weather and topography.

Due to the complex relationship of these variables, it is difficult to predict the characteristics of an individual fire. The loss of tree foliage following mortality should reduce fire behavior severity for the short term; however, as dead trees fall to the ground and tree regeneration becomes established, fire hazard increases over time.

The safety of wildland firefighters will require effective fire behavior predictions for each individual fire. Accurate predictions will allow resource managers to employ appropriate tactics to manage each fire on a case-by-case basis. The number of standing dead trees or snags will likely limit fire suppression activities due to firefighter safety issues. Additionally, the increase in fire duration and intensity is likely to increase firefighter exposure to hazardous conditions.

### Hydrology/Erosion

Conifer forests regulate water resources in forest-dominated ecosystems. The ecosystem's protective canopy provides

important ecological amenities such as the regulation of Rocky Mountain hydrology. The source of water for most western rivers is accumulated during winter and spring snowfall. Forests are responsible for both the distribution of winter snowfall by providing wind breaks that shelter snow from the incessant wind and prolonging snowmelt in the spring because of the shade provided by the tree canopy. Without this protective shading, peak stream-flow would likely occur earlier and be of shorter duration. This hydrology not only affects water resources for humans, but it has important implications for wildlife. Early, elevated spring flow translates into a greater likelihood of dangerously reduced flow and lethally high temperatures for aquatic wildlife species later in the summer.

The steep topography of much of Colorado's forests exacerbates the probability of erosion. Trees that once protected sites from high winds will be gone. The increase of dead and down surface fuels from large-scale tree mortality will likely increase the intensity, severity and duration of surface fires. Nutrients, minerals and organic material are greatly reduced by these types of fires, often resulting in the soil becoming hydrophobic. Hydrophobic soils have a reduced ability to resist erosive forces and a much higher likelihood of large-scale erosion. Additionally sites with hydrophobic soils from severe wildfire take much longer to recover.

## Operations

### Funding

The BLM has three main funding sub-activities that support forestry on BLM-managed lands in Colorado:

- Public Domain Forestry
- Forest Health and Recovery Fund
- Forest Insect and Disease

Although not intended specifically for forest treatments, Hazardous Fuels Reduction is also a key budget component for forestry in Colorado. Approximately 33 percent of BLM Colorado's forestry budget goes to rescission and overhead. Of the remainder, approximately 47 percent goes to labor and base funding while only about 20 percent is directly used to fund projects. If BLM Colorado allocates funding to address the bark beetle issue, it would take time and resources to prepare for increasing forestry treatments. It will take a long-term commitment to forest management to improve the vigor and resiliency of public-land forests in Colorado.

### Personnel

Prior to the late 1980s, the BLM forestry program in Colorado had at least one forester, often two, in every field office; a regular seasonal workforce scattered across the state; and a permanent full-time program lead at the Colorado State Office in Lakewood. Today, the overall forestry program in Colorado has a relatively small level of staffing. There are currently four full-time permanent foresters (two in the Kremmling Field Office, and one each in the Gunnison and Royal Gorge field offices), one full-time term forester in the state office (Program Lead), and several positions throughout other BLM field offices

whose collateral duties include forestry. In the San Luis Valley and the Tres Rios field offices, U.S. Forest Service (USFS) personnel manage forests and woodlands on BLM lands. Today we have on average one field forester per million acres. If BLM had the ability to mobilize more seasonals, volunteers and youth corps, the BLM would be able to plan, implement and administer more projects resulting in a better landscape approach.

### Logistics

The many forest health risks and issues currently impacting Colorado, combined with the fact that many forest product markets are either unsteady or non-existent, have left few options for land managers. Traditionally, timber sales and permits would have constituted sufficient tools to deal with many of these problems in populated and accessible areas. Today, with limited markets, foresters and fire managers have been forced to use more service and stewardship contracts to implement treatments. The greatest direct impact to the federal government from this reality has been significantly increased costs per acre for all forest management-related treatments on public lands. Furthermore, increased urbanization, fuel costs, etc., have resulted in precommercial/forest development-type and slash treatments exceeding $1,200 per acre on average.

## Key Concerns

### Forest Health

Forest lands in Colorado tend to have low productivity rates and management on BLM lands is designed to restore forest health conditions rather than produce commercial timber. The condition of forestlands depends on the forest type. Dry types such as ponderosa pine, Douglas-fir and low elevation mixed conifer have been negatively impacted by the effects of fire exclusion and long-term drought. Lack of fire has allowed dense stand conditions to develop, making them particularly susceptible to large-scale disturbance including wildfire, disease and insect attack.

Forest resiliency is the ability of a stand or forest to recover quickly from disturbance. Most forest scientists believe that the historic forests of Colorado were made up of different age classes, structural and patch-size diversity. Much of the forest landscape in Colorado now lacks this structural pattern, which would have interrupted a bark beetle outbreak. BLM-managed forests should ideally be a mix of tree species and age classes in a mosaic pattern across the landscape. This diversity would contribute to a more resilient landscape than that of a monoculture, single-aged forest. Overly-dense forests increase individual tree stress due to competition for water, sunlight and nutrients. Treatments that thin overly-dense stands result in vigorous, healthy trees that are more resilient to disturbance.

It is necessary to protect and maintain diverse forests in Colorado to support a sustainable ecosystem. The bark beetle epidemic may result in both positive and negative impacts to forest

diversity. Tree species untouched by bark beetles, such as aspen, could be invigorated or released from neighboring conifer competition. Conifer forests should naturally reforest, but these forests will all be about the same age, which is not desired for age-class diversity. Most foresters accept the lack of tree age-class diversity as one of the main reasons the bark beetle epidemic is so large.

### Wildlife Habitat

Wildlife species populations that favor mature, dense tree habitat are likely to decline due to the bark beetle epidemic. Wildlife species populations favoring open or early seral habitat should thrive. Future conifer forests will all be about the same age; therefore, these forests will again lack the mosaic of age-class diversity across the landscape, which may result in a simplified wildlife habitat. Woodpeckers play a role in reducing beetle numbers during endemic periods, but do not control the beetles during epidemics. Several other bird species feed on adults exposed during flight or as they attack trees.

Wildlife, including various song birds and small mammals, use pine seeds. During late summer and fall, birds stash these seeds for winter use and squirrels harvest and store large numbers of pinecones and seeds in middens. We expect to see a decline in wildlife use in areas where 80-90 percent of pine- seed-producing trees have been killed by bark beetles.

In addition, pine forests are critical to other wildlife. At some time during the year, the fauna that benefit from the forests include elk, mule deer, big horn sheep, pronghorn antelope and various other small mammals. For example, elk typically calve in high country forests during spring or early summer. In these environments, conifers often provide their only cover for thermal regulation and protection from predators.

In short, conifer forests provide the foundation for some of the most intact ecosystems/wildlife habitats on the North American continent.

### Climate Change

Average global temperature increases have negative implications on insect and disease trends as well as large-scale fire danger. As temperatures rise, trees become stressed and more susceptible to bark beetles, likely increasing the scale and frequency of bark beetle epidemics in the future.

### BLM Forestry Program Integration

The current bark beetle epidemic and the multiple endemic causes of tree mortality in Colorado require attention from all program specialists within the BLM. No individual program has the skills, staff or funding to impact the outcome of these forest insects and pathogens. Prioritizing and developing National Environmental Policy Act projects that consider all aspects of land management may reduce the negative consequences of tree mortality.

### Interagency Collaboration

Collaboration between agencies is essential to combatting bark beetle outbreaks across the landscape.

While we recognize the policies and regulations guiding each agency often differ, we also recognize that the outbreaks do not stop at ownership boundaries. We must continue to work with our neighboring agencies to manage our forests at the landscape level. Combining our goals and increasing our capacity will greatly benefit the lands we manage.

# Goals, Objectives, Actions

## Goal 1 – Safety

**Falling Trees (Human, Infrastructure):** Reduce the threat to public safety and Infrastructure posed by dead, beetle-killed trees within travel corridors and in other high-use areas.
**Objective:** Identify and prioritize high risk areas.
**Action:** Where feasible, remove and use dead trees, thereby improving public safety along travel corridors and high priority infrastructure.

**Fire/Hydrology/Erosion:** Reduce fire and erosion risk where appropriate.
**Objective:** Be aware of different fire and erosion risks associated with varying stand conditions.
**Action:** Where feasible, remove and use dead trees to reduce future wildfire severity.

## Goal 2 – Operations

**Funding/Personnel:** Prioritize funding and work toward creative staffing/ capacity building to address current needs in affected areas.
**Objective:** Prioritize funding internally and work with volunteers, stakeholders and conservation corps to build capacity and support for necessary projects.
**Action:** Hire additional staff as funding is available and partner with other organizations and agencies to accomplish more treatments.

**Logistics:** Increase forest industry capacity.
**Objective:** Work with forest product stakeholders and the public to encourage a vibrant forest industry.
**Action:** Through stewardship and timber sale contracts, plan projects that provide forest products to build capacity among contractors, mills and local markets.

## Goal 3 - Key Concerns

**Forest Health/Wildlife Habitat/Climate Change:** Ensure forests in Colorado are sustainable and provide healthy and diverse wildlife habitat.
**Objective:** Plan and implement for a more resilient and diverse forest landscape.
**Action:** When planning forestry treatments, maximize age class, patch size and species diversity.

**BLM Forestry Program Integration:** Collaborate with other natural resource disciplines within the BLM to be more efficient and accomplish common goals.

**Objective:** Find ways to accommodate other disciplines' goals into forestry work.
**Action:** Participate in the Integrated Vegetation Management Team and continue to be involved in other interdisciplinary teams.

**Interagency Collaboration:** Collaborate with landowners and other agencies to increase treatment efficiency in areas where these partnerships make sense.
**Objective:** Work with private, state, local and federal partners to efficiently use funding to treat affected areas.
**Action:** Prioritize and communicate future projects with other agencies.

# Updates/Lessons Learned

This document is meant to have a positive impact to Colorado's Forestry Program as a whole and will be updated regularly as needed. The BLM intends to update this document with lessons learned to better inform future forest managers.

# By The Numbers

All numbers in the figures below were derived using Geographical Information Systems (GIS). They include acres from all forest and woodland tree species on BLM-managed lands. The bark beetles referenced in this information include mountain pine beetle, spruce beetle, ips beetle, Douglas-fir beetle and western balsam bark beetle. The GIS files used and their stewards are:

- Statewide Colorado Bark Beetle Affected Acres – Colorado State Forest Service
- Greater than 30% Slope Acres – U.S. Geological Survey, National Elevation Dataset (NED)
- BLM Land Base Acres – BLM
- BLM Wilderness Acres – BLM
- BLM Wilderness Study Area Acres – BLM
- BLM Road and Trails – BLM
- BLM Field Office Delineation – BLM

The information gathered by this GIS exercise will be used to prioritize treatments for affected BLM acres.

**Figure 1**

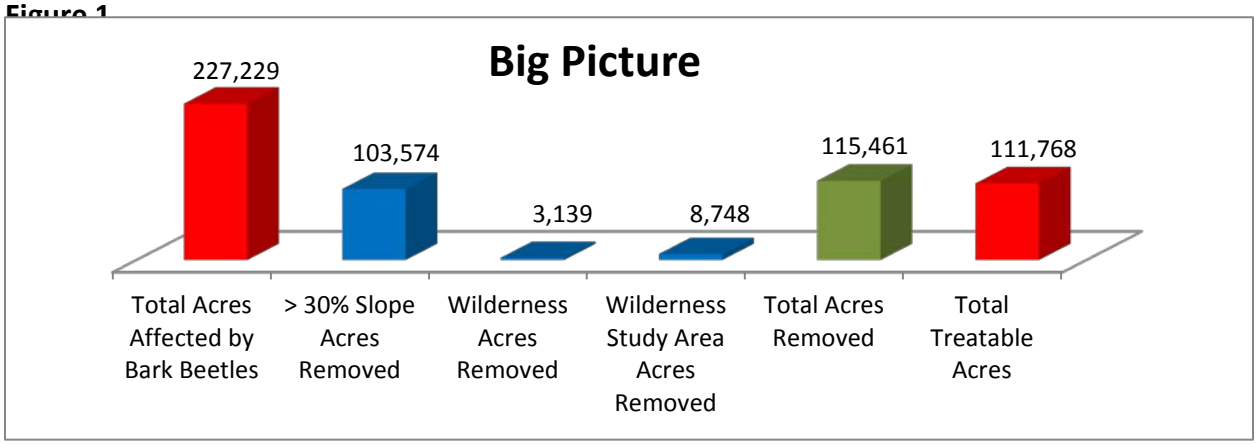


Figure 1 represents a look at the total BLM ownership in Colorado. (L to R) The first column (Red) shows the total BLM-managed land affected by bark beetles in Colorado. The next three columns (Blue) show BLM-managed lands that are either affected by operational or regulation limitations and are subtracted from the total to give the fifth column (Green). The last column (Red) shows the total BLM-managed acerage affected by bark beetles minus the total acres removed (Green).

**Figure 2**

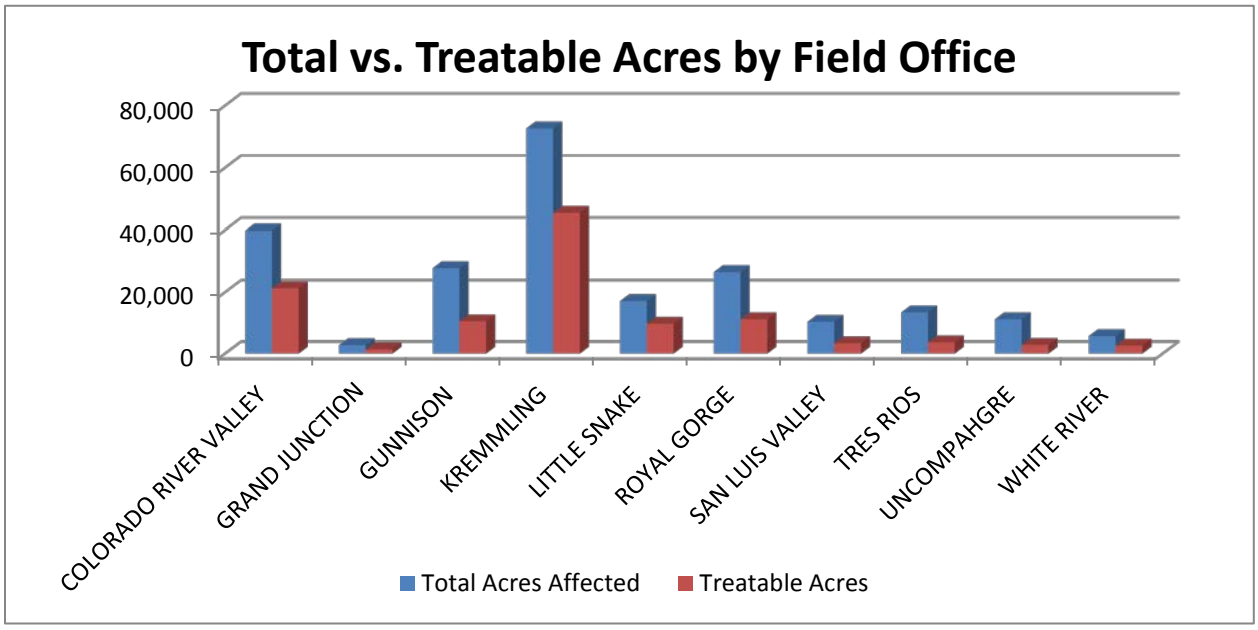


Figure 2 represents total bark beetle affected BLM-managed acreage by field office versus the total treatable BLM-managed acreage by field office. Treatable acreage is categorized as acres left after removing >30% slopes, BLM-managed wilderness areas and BLM-managed wilderness study areas.

**Figure 3**

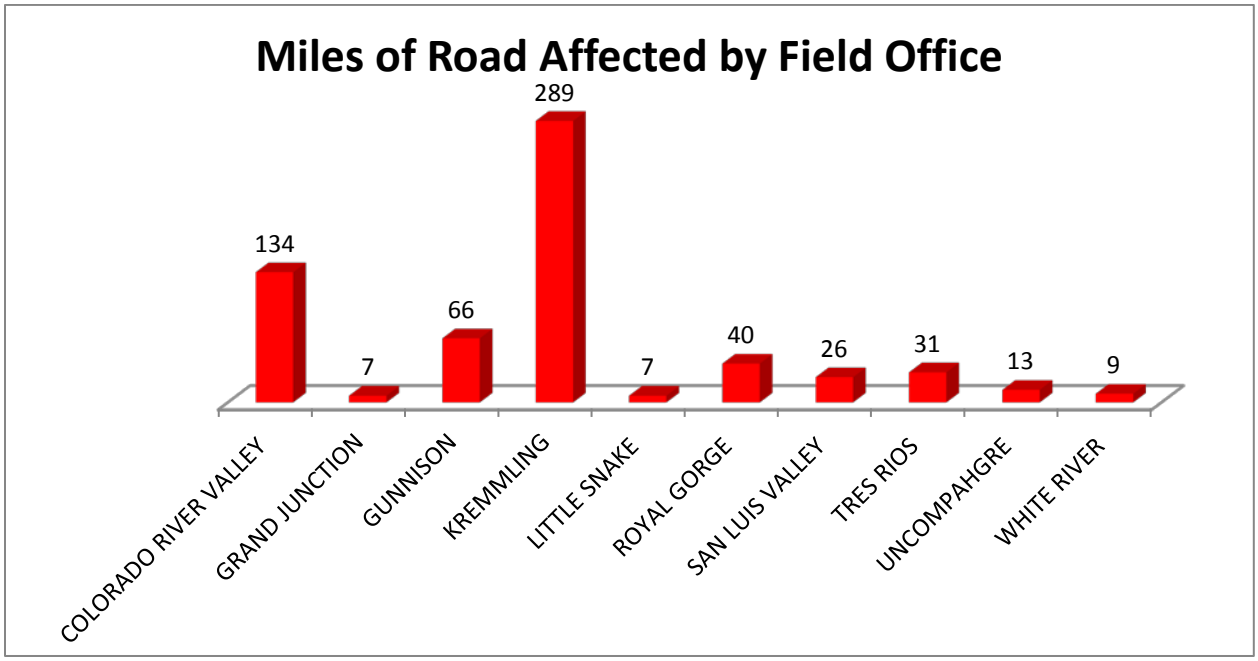


Figure 3 represents the total bark beetle affected BLM-managed roads and trails (in miles) of all categories, by field office.

**Figure 4**

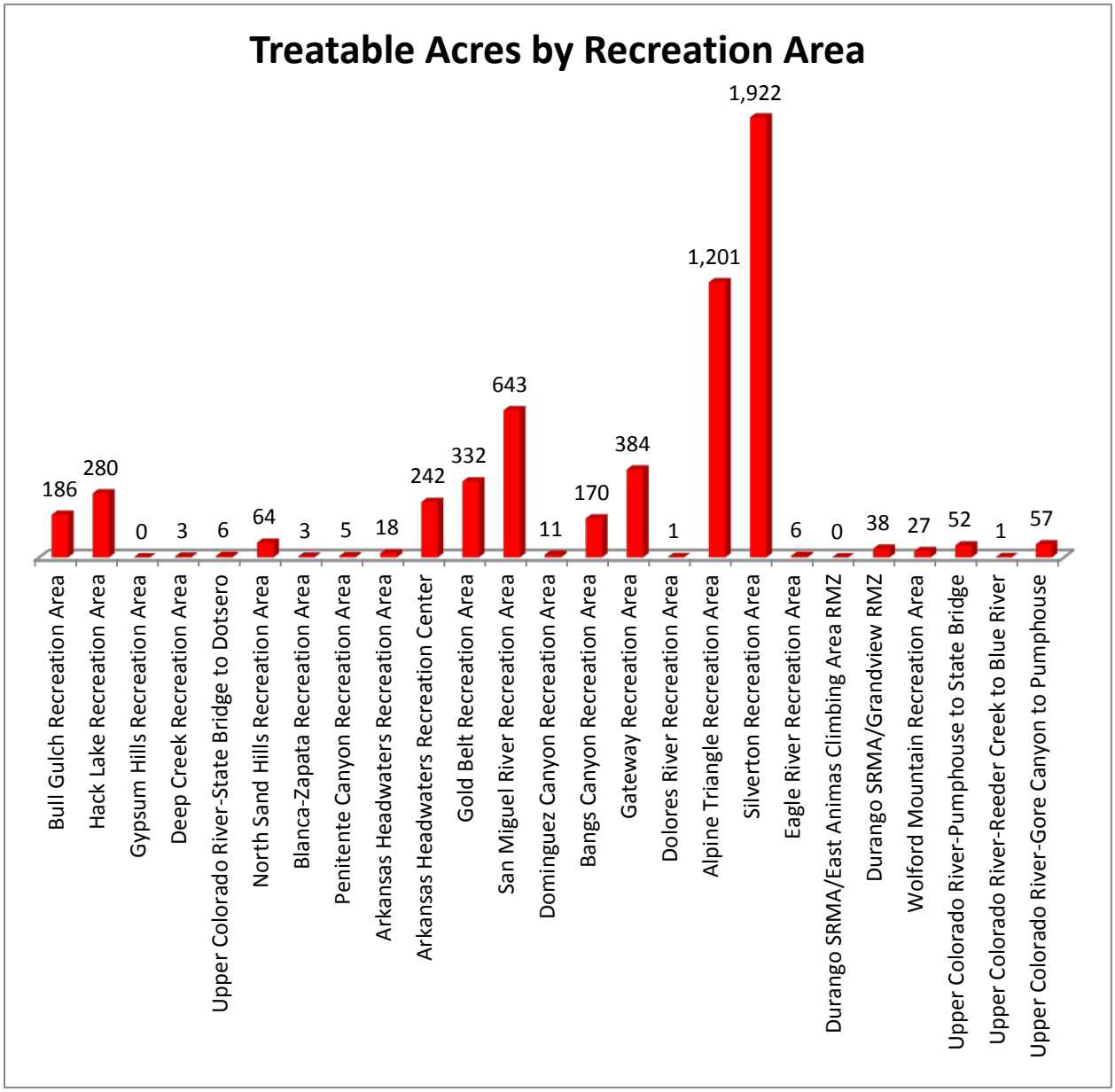


Figure 4 represents total bark beetle affected BLM-managed recreation acreage by field office. Treatable acreage is categorized as acres left after removing >30% slopes, BLM-managed wilderness areas and BLM-managed wilderness study areas.

# Photo Credits

**Document Cover, Mountain Pine Beetle**
Wikipedia
http://en.wikipedia.org/wiki/Mountain_pine_beetle

**Page 2, Photo 1, Mountain Pine Beetle & Match Head**
Biozine
http://biologybiozine.com/articles/feature/bark_beetles_wreak_havoc_in_we.php

**Page 2, Photo 2, Mountain Pine Beetle Damage**
New York Times
http://www.nytimes.com/2008/11/18/science/18trees.html

**Page 3, Photo 1, Fallen Tree**
United States Forest Service
http://www.fs.usda.gov/main/r2/recreation

**Page 3, Photo 2, Fourmile Fire**
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**Page 4, Photo 1, Post Fourmile Fire**
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**Page 4, Photo 2, Dollar Sign**
CSU Pueblo Today
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http://csupueblotoday.com/news/funding

**Page 5, Photo 1, People Post Fire**
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**Page 5, Photo 2, Grinder**
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**Page 5, Photo 3, Pine Cones & Needles**
Boulder County
http://www.bouldercounty.org/live/environment/land/pages/foresthealth.aspx

**Page 6, Photo 1, Pine Tree & Needles**
TAPASH Sustainable Forest Collaborative
http://www.tapash.org/

**Page 6, Photo 2, Earth**
Windows to the Universe
http://www.windows2universe.org/earth/earth.html

**Page 6, Photo 3, Black Bear**
National Geographic
http://animals.nationalgeographic.com/wallpaper/animals/photos/baby-animals/baby-black-bear/

**Page 6, Photo 4, Big Horn Sheep**
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**Page 7, Photo 1, Integration**
Willy Peter Schaub Blog
http://blogs.msdn.com/b/willy-peter_schaub/archive/2011/06/06/toc-tfs-integration-tools.aspx

**Page 7, Photo 2, Collaboration**
The Agency Collaboration Blog
http://agencycollaboration.com/2011/01/