

Rocky Mountain Research Station—Looking Back on 2014



The Rocky Mountain Research Station (RMRS) is one of seven regional units that make up the USDA Forest Service Research and Development organization—the most extensive natural resources research organization in the world. We maintain 12 field laboratories throughout a 12-state territory encompassing the Great Basin, Southwest, Rocky Mountains and parts of the Great Plains (see map). Our research program serves the Forest Service as well as other federal and state agencies, international organizations, Tribes, academia, non-profit groups and individuals.

Science Programs

- Air, Water and Aquatic Ecosystems
- Aldo Leopold Wilderness Research Institute
- Fire, Fuel, and Smoke
- Forest and Woodland Ecosystems
- Grassland, Shrubland and Desert Ecosystems
- Human Dimensions
- Inventory and Monitoring
- Wildlife and Terrestrial Ecosystems

RMRS 2014–2017 Strategic Research Priorities

RMRS seeks solutions to today's complex resource management problems by applying its unique knowledge and expertise to the most critical science questions. Our strategic research priorities reflect stakeholder needs, unique capabilities of our Station scientists and western geography, and those emerging natural resource and social issues for discovery and applied science. The priorities include:

- Disturbance Ecology
- Fire Sciences
- Human-Landscape Interactions
- Inventory & Monitoring
- Resilient Landscapes
- Species Endangerment
- Water & Watersheds

"Within the backdrop of changing climates and an increasing human footprint, RMRS took a look at our current research portfolio to see where we needed to expand and also where our portfolio should contract. These priorities address broad areas of current concerns for, and thus reflect the greatest potential for us to positively influence, the health, resiliency, and productivity of natural landscapes and communities."

Dr. George S. (Sam) Foster
RMRS Station Director
(Retired)

**RMRS 2014–2017
Strategic Framework**

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Integrating Science Findings

The bimonthly *Science You Can Use* Bulletin is a station publication providing synthesized scientific information for high-priority management needs. The bulletin is available online to land and resource managers throughout the Intermountain West. It synthesizes current research conducted by Station scientists and collaborators on hot topics, and delivers key science findings and management implications to people who make and influence decisions about managing land and natural resources.

RMRS published six bulletins in 2014 covering topics such as wildfire homeowner risk perception, natural resource changes in the Interior West, and the 2013 Northern Colorado flood.

[>> Current and past bulletins.](#)



Disturbance Ecology—Disease Resistance Gene Discovered in Limber Pine

Limber pine face threats posed by the lethal disease white pine blister rust, expanding bark beetle pressure, and climate change in mountain environments. The treeline ecosystems dominated by limber pine are ecologically valuable for watershed protection and diversity. Consequently, limber pine is of conservation concern in the Southern Rocky Mountains. The identification of a disease-resistant gene in native populations of limber pine, early in a blister rust invasion, enables the forest service to optimize cost-effective treatments. Interventions can be timed to maximize forest health benefits.

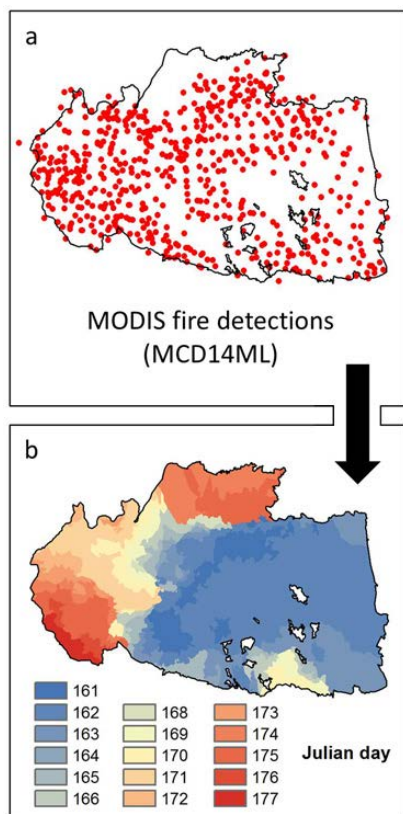


The white pine blister rust fungus is seen here fruiting on a branch of a susceptible limber pine tree in early spring.

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Fire Sciences—New Use of Remotely Sensed Data Help Map Daily Progression of Wildfires

Variable weather conditions have a dramatic influence on fire behavior and fire effects. However, the influence of weather can be difficult to evaluate because current fire progression maps, which chart the perimeter of an actively burning fire, are rarely mapped on a daily basis. As such, it is difficult to associate weather with observed fire behavior or effects because it is not always known what day any given area burned. Scientists developed a new technique using an existing remotely sensed dataset to map the daily progression of fires. This technique provides new opportunities for studying the influence of weather on fire behavior and fire effects.



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In the top panel (a), the thick black line represents a fire perimeter and the red points correspond to the locations of satellite fire detections. Scientists can take this information and use mathematical equations to create a map (b) to show the fire's progression over time.

Human-Landscape Interactions—Homeowners Underestimate Wildfire Risk

Motivated by the combination of high wildfire risk and the concentration of substantial social and economic values, the Rocky Mountain Research Station studied the wildfire risk faced by wildland-urban interface homeowners in Western Colorado in collaboration with the Bureau of Land Management, University of Colorado, and a local wildfire council. The unique research effort pairs parcel level wildfire risk assessments conducted by wildfire professionals with residents' perceptions of wildfire risk. The research finds that despite high levels of awareness and concern about wildfire, there is a general underestimation of property-specific, overall wildfire risk by residents. Most residents reported lower risk categories than the wildfire professional did for five of the ten property attributes assessed. This information is being used to develop wildfire education efforts that seek to improve residents' understanding of the sources of wildfire risk on their properties and subsequently encourage residents to mitigate that risk to facilitate the resilience of communities threatened by wildfire.



Improving the assessment of wildfire risk.

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Inventory & Monitoring—Comprehensive Inventory of Forest Health Trends in New Mexico

The public, forest managers, and scientists now have the most comprehensive inventory of forest health trends in New Mexico's history. The report "New Mexico's Forest Resources, 2008–2012," summarizes the most recent inventory of New Mexico's forests based on field data collected from more than 3,000 forest areas between 2008 and 2012. As New Mexico's forest inventory enters its second cycle in 2015, the existence of remeasurement data will enable more robust analyses of trends in

insects, disease, timber harvest, etc. Researchers will continue to study forest health trends and plan to publish updates every five years.

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Virgin Canyon/Virgin Mesa, west of Jemez Springs, New Mexico; Jemez Mountains; September 2013.

Resilient Landscapes—A Science-Based Framework for Restoring Resiliency to Frequent-Fire Forests

USDA Forest Service and university scientists and managers synthesized 100 years of published forestry science to help forest managers better understand the ecology of “frequent-fire” forests. This forest type, found throughout the western United States, historically experienced frequent but low-severity surface fire events. The report provides a science-based framework that will assist land managers in developing management plans and practices. Returning frequent-fire forests to their historical species composition and structure will increase their resilience to fire, insects, disease and climate change. Implementation of this framework should improve overall ecosystem productivity and function and enhance ecosystem services such as soil productivity, biodiversity, wildlife habitat, clean air, water quality and quantity, wood products, and recreation.

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Snags, logs, and woody debris are important components of frequent-fire forests providing structural diversity, nutrient cycling, and wildlife habitat.

Water & Watersheds—Declining Precipitation and Streamflow in Northwestern US Mountains and Forests Related to Changes in Westerly Winds

Scientists previously attributed earlier and lower stream flows solely to warming temperatures. A recent scientific study on high-elevation climate trends over a 60-year period in the mountains of the Pacific Northwest suggests that an alternative mechanism—decreases in mountain precipitation driven by decreases in winter winds across the region—may compound the changes expected from warming alone. This is important because mountains are a primary water source for the region. Less precipitation leads to reduced runoff for communities, industry and agriculture. Decreased precipitation also exacerbates early snowmelt tied to warming temperatures. Acknowledging the effects of decreasing precipitation requires changes in how resource specialists approach climate change adaptation for water resources and forest management compared to preparing for increased temperature alone. This may present important implications for changes in mountain precipitation and future water availability for other areas as well.

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Mountain rivers, like the Boise River (left), have seen declining flow over the last half-century.

Species Endangerment—New Research on Resilience of Sagebrush Ecosystems Used for Improving Sage-Grouse Habitat

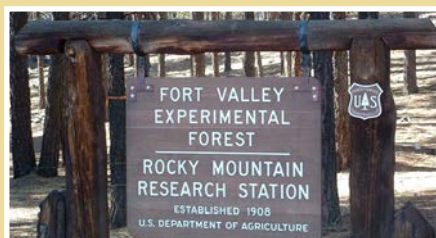
New research from RMRS on sagebrush ecosystems is being put to use to benefit Greater Sage-Grouse habitat on federal lands across the intermountain west. An interagency effort initiated by the Western Association of Wildlife agencies and led by RMRS scientists was used to develop a strategy for decreasing the impacts of invasive grasses and wildland fire on sage-grouse habitat. In August 2014, the Bureau of Land Management issued guidance through an instructional memorandum (IM 2014-134) to its offices across California, Idaho, Nevada, Oregon, and Utah to begin implementing the report's findings.

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The greater sage-grouse (Centrocercus urophasianus).

Experimental Forests & Rangelands



A unique and valuable part of the infrastructure within which we conduct research is a network of experimental

forests, ranges and watersheds. They are living laboratories where Forest Service scientists conduct studies and demonstrate research results for our stakeholders. The Station administers and conducts research on 14 experimental sites. The Fort Valley Experimental Forest near Flagstaff, Arizona, established in 1908, is the site of the first Forest Service research investigations in the Nation. RMRS also oversee activities on 273 research natural areas.

>> [Visit our Experimental Forests & Ranges website.](#)

Working with Tribes

Tribes and indigenous groups have centuries of local-relevant experience in managing natural resources. This knowledge is vital to the Forest Service R&D mission of utilizing science to improve the health and sustainable use of our Nation's diverse forests and grasslands. RMRS works with tribes across the Interior West—the White Mountain Apache on timber harvesting and vegetation recovery after fire, fish genetics with the Inter-Tribal Fish Commission, white-pine restoration on the Flathead National Forest in Montana, and native plant and tribal nursery management across the west and beyond. RMRS scientists mentor and consult with youth, tribal colleges, students and councils.

The “FireWorks for the Pikunii Nation” is an educational program in partnership with the Missoula Fire Sciences Lab that combines information on the way of life of the Pikunii (Blackfeet) people with information on the science of wildland fire. This project includes learning activities unique to the Pikunii people and also materials from the original FireWorks program, supplemented and enhanced by Pikunii knowledge and traditions.



A sliced view of a fire carrier carved from a buffalo horn filled with several different kinds of wood and other materials that burn very slowly.

Engaging Communities

RMRS works with communities and youth to talk about the importance of science and why natural resource research is important to the future of healthy communities and ecosystems. We also create awareness and interest for growing science leaders for the future. In 2014, RMRS exposed high school students to water science at the Priest River Experimental Forest in northern Idaho, installed a pollinator garden

at the Albuquerque Lab for local primary schools and developed a one-week summer camp for at-risk students in grades K-12 in Missoula, MT.



RMRS scholarship students present research at the 2014 Senior Forester Academy at the Northern Arizona University Centennial Forest Camp. (Photo: NAU Centennial Forest)

Budget & Workforce

The success of our research programs and scientists would not be possible without the critical team support provided by our administrative employees and science staff support. Most are located at Station headquarters in Fort Collins, Colorado; others work at laboratory locations. The Station's workforce in 2014 was composed of 460 employees: 345 permanent, 30 term and 85 temporary employees that enhance our service capability. Our 2014–2017 Strategic Business Plan outlines how we transition to a financially sustainable business model while continuing to excel in research and delivery of scientific tools and knowledge. In Fiscal Year 2014, RMRS secured \$64.8 million for research and operations from federal appropriations, partners and clients. Total expenditures were \$61.6 million.

Rocky Mountain Research Station science informs and inspires; our research enhances the resiliency of landscapes and human communities.

We invite you to join us.

Other USFS Client Support (e.g. NFS, S&PF, Wildland Fire)

\$5.9M

Outside Client Support

\$6.0M

Other Administrative Funds

\$2.7M

Appropriated Research

\$41.7M

Joint Fire Sciences

\$1.5M

National Fire Plan Research

\$7.0M

FY 2014 Incoming Funds – \$64.8

Salaries & Personnel

\$37.9M

Operating Expenses

\$11.9M

Cooperators

\$11.8M

FY 2014 Expenditures – \$61.6

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