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USDA Forest Service

GSDUpdate

Rocky Mountain Research Station

Grassland, Shrubland and Desert Ecosystems Science Program

All Together Now:
Collaboration in Research and Stewardship for Our 21st Century Lands

Sometimes it feels as though problems as large as those affecting our public lands are insurmountable. This might not seem like a very promising way to begin a look at the stewardship and sustainability efforts our land ecosystems require if we hope to continue to rely on the critical services they provide us, such as clean water, energy, oil and gas, pasture, timber, game and fish, wildlife habitat, and places of solace where we can take a break from our increasingly urbanized and complex world. Daunting? Perhaps for one person, or one community, or one agency working alone. But bring people together, let them collaborate, and look what can be done: When it comes to using resources, we've made changes to the way we do things. Through collaborative consumption, we've learned to crowdsource financing, share digital files, create software, establish lending libraries for hammers, rakes, tractors and more; even rent spare bedrooms to travelers. Our virtual, cyber-ecology is one in which networks are the source for innovation, and everyone can contribute. Its effect has changed the very nature of what we do as users and consumers of goods and services. On the other side of the spectrum, the idea has taken root for our real-world ecologies, those which give us the realms in which we eat, breathe, live. The new mindset has opened up the ways we operate to manage our natural resources, through collaborative studies, stewardship and conservation.

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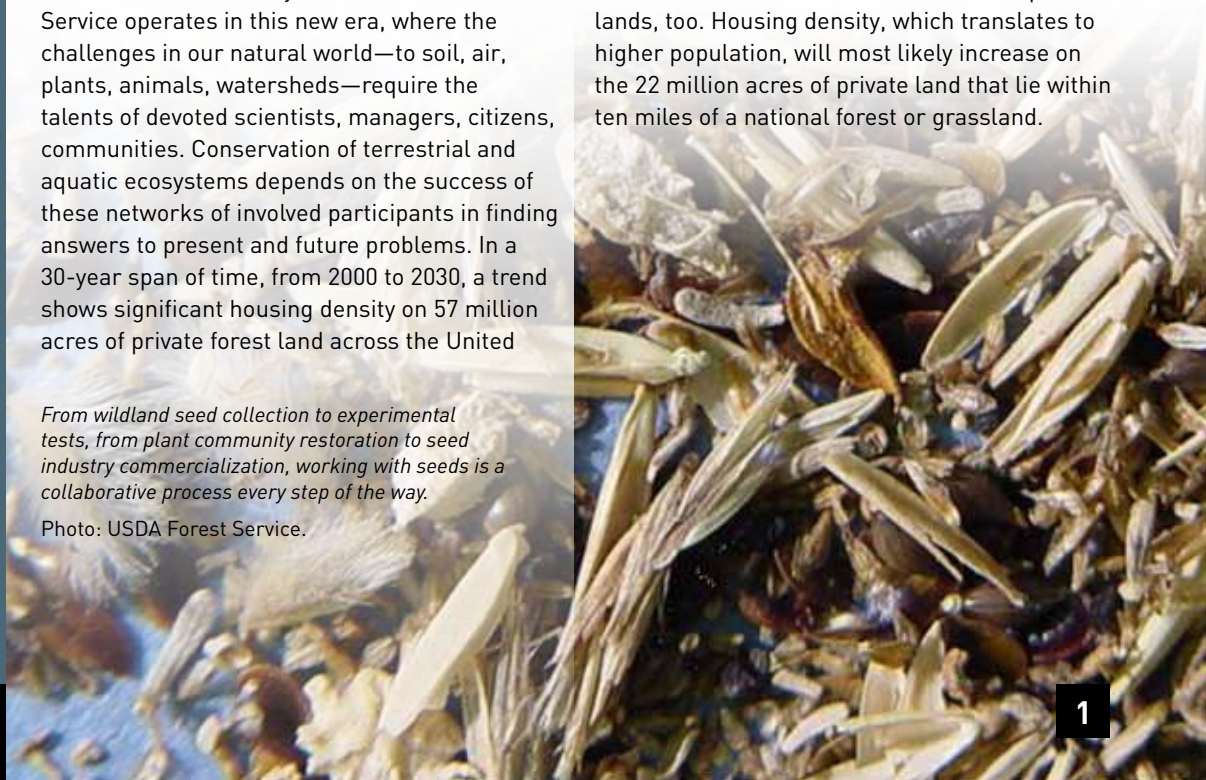
Award-winning Collaborations

Collaboration is the way the USDA Forest Service operates in this new era, where the challenges in our natural world—to soil, air, plants, animals, watersheds—require the talents of devoted scientists, managers, citizens, communities. Conservation of terrestrial and aquatic ecosystems depends on the success of these networks of involved participants in finding answers to present and future problems. In a 30-year span of time, from 2000 to 2030, a trend shows significant housing density on 57 million acres of private forest land across the United States. The increase in homes will affect public lands, too. Housing density, which translates to higher population, will most likely increase on the 22 million acres of private land that lie within ten miles of a national forest or grassland.



From wildland seed collection to experimental tests, from plant community restoration to seed industry commercialization, working with seeds is a collaborative process every step of the way.

Photo: USDA Forest Service.

*Blackfoot Challenge members learn the protocols for monitoring biocontrol releases, such as the toadflax stem mining weevil (*Mecinus janthinus*) on yellow toadflax (*Linaria vulgaris*) near Ovando, Montana.*

Photo: S. Sing

"By building relationships based on mutual trust and respect, we can come together around shared goals and decide together how best to reach them."

– Mary Wagner
Associate Chief
USDA Forest Service

In a speech she gave at a reception in Washington D.C. for Rural Voices for Conservation Coalition in May of last year, Forest Service Associate Chief Mary Wagner acknowledged the breadth and depth of the task at hand. "We know the challenges are daunting," she said. "Regional drought…loss of open space…fire and fuels…invasive species… outbreaks of insects and disease…and the overarching challenge of climate change…today, we face a series of conservation challenges as great or greater than at any other time in our nation's history." To meet these challenges requires place-based conservation, and the Forest Service has joined with a wide variety of stakeholders, across jurisdictions, across ownerships, whether they are public or private, to share goals and work to reach them for our landscapes. According to Wagner, "The key is partnerships and collaboration. By building relationships based on mutual trust and respect, we can come together around shared goals and decide together how best to reach them." When collaborators need to know what tool to use to eliminate those invading plants; or how to recover an endangered species and provide what it needs to survive; or how to prepare people to successfully restore damaged lands, they turn to the scientists such as those from the Rocky Mountain Research Station (RMRS) for tests and solutions.

Send in the Weed Eaters: Insects for Biocontrol of Invasive Alien Plants

Imagine you have been given this challenge: Stretching from ridgeline to ridgeline and all the land in between is a watershed where you must reduce invasive exotic plants—those pesky weeds that ruin habitat—to save or keep native species. Imagining an even bigger area, you fly over an entire region where you are tasked with the same problem. Complicating the matter of restoration efforts, stewardship efforts, coordinating and planning, are a myriad of land use and legal challenges that wouldn't allow you to simply go in and make changes to the land without discussion and cooperation. "Weed control under these conditions is seldom routine," says Dr. Sharlene Sing, a research entomologist with the RMRS's Bozeman Lab. It's easy to feel small when faced with a challenge as large as controlling invasive weeds on these scales, but with the support of scientists like Sharlene, collaborative partnerships find they can accomplish big goals. Specializing in weed biocontrol, Sharlene advises collaborators on policy and other decision-making activities; keeps them updated on relevant research results; initiates new research projects, especially when land managers find gaps in knowledge that will allow them to implement restoration plans; and demonstrates how to put a weed biocontrol effort in place and monitor the results. Sharlene will also supply weed biocontrols for a project—determining which insect agents will best do the job to combat an unwelcome plant species—and then assess and report on how well those insects are working to reduce the targeted weed. Sharlene shares her expertise with a number of collaborative partnerships such as the Northern Rockies Invasive Plant Council (NRIPC), which was formed to support the management of invasive exotic plants in the northern Rocky Mountain states; the Elkhorns Cooperative Management Area (ECMA), a collaboration between the Forest Service, Bureau of Land Management and Montana Department of Fish, Wildlife and Parks that works to manage a 250,000 acre project area with the involvement of local ranchers and private landowners; the Blackfoot Challenge, which coordinates efforts to conserve and enhance natural resources and a rural way of life throughout the Blackfoot River Watershed among various stakeholders, both public and private. Collaborative stewardships such as these require the quality, science-based knowledge that researchers like Sharlene can provide. She also supports the efforts of the Greater Yellowstone Coordinating Committee (GYCC) in which the various members seek to implement coordinated and cooperative management to keep the Greater Yellowstone area the jewel that people all over the world treasure. Why does she work so hard to contribute to so many entities? Sharlene explains, "Collaborative stewardship ultimately functions as a research reality check." The close interaction and information exchange between private and public land managers and scientists, she says, means that researchers will be more likely to conduct relevant studies that will address knowledge gaps, and therefore yield results that managers can put to use on the ground.

Blackbrush-Joshua Tree community

Photo: Management and Engineering Technologies International Inc. (METI, Inc.)

Wild horse grazing in the SMNRA

Photo: METI, Inc.

No Place like Home: Determining Distribution of Rare Species to Make Conservation Management Choices

How do you protect plants and animals that call only one place home while providing recreational opportunities for the people of southern Nevada? This is the situation in the Spring Mountains National Recreation Area (SMNRA) in the Clark and Nye Counties of Nevada. Comprising roughly 316,000 acres of National Forest System lands, the Spring Mountains are home to 58 sensitive species, including 24 endemic species (14 plants, 7 butterflies, 1 mammal, and 2 spring snails). Dr. Burton Pendleton, research ecologist at the RMRS's Albuquerque Lab, works as part of a large team that seeks to answer that tough question: "You need distribution data—the locations of individuals and populations of the species—to determine rarity and make the best management choices that will preserve the biological resources of the SMNRA." Small district offices do not have the personnel necessary to conduct inventory and monitoring studies on the large scale required for the SMNRA, so they often involve Forest Service researchers to fill this need.

The SMNRA covers a very large elevational range and contains six major vegetation communities, which are home to thousands of species. A number of stressors affect the SMNRA, including fire, human activities, disease, climate change, and exotic and invasive species such as wild horses and burros. These can impact rare species like the Charleston ant (*Lasius nevadensi*), and Clokey's Greasebush (*Glossopetalon clokeyi*). Inventorying and monitoring this complex system requires a cooperative effort from many areas of expertise, and the team Burton works with brings together the expertise of scientists from three RMRS programs, two universities, National Forest and Region staff, and consultants with experience with this type of project. Burton serves as an author of inventory and monitoring reports and synthesis reports, and he also leads the team that assembled and evaluated the information available for each species covered by a conservation agreement. People, such as land managers and planners, can use the synthesis of this information to evaluate the status of each species. Knowing the status of various species helps planners and others put improved adaptive management practices in place throughout the SMNRA.

Botanists Make Much Use of Time

In his poem urging *carpe diem*, which translates to the familiar "seize the day," seventeenth century Cavalier poet Robert Herrick wrote: "Gather ye rosebuds while ye may, Old Time is still a-flying; And this same flower that smiles today, Tomorrow will be dying." *Carpe diem*—that's the goal of the U.S. Bureau of Land Management's Seeds of Success Program and a good motto for all botanists who hope to secure a legacy seed bank for future restoration needs. Faced with a number of climatological challenges as well as a variety of disturbances that are rapidly changing ecosystems, scientists and land restorationists require the seeds of today if they hope to propagate the plants of tomorrow. Nancy Shaw, research botanist with the Rocky Mountain Research Station Boise Lab, Matt Fisk, biological technician, and Scott Jensen, botanist, see the work they perform in partnership with the Bureau of Land Management and Seeds of Success Program as critical to providing the resources necessary to restore damaged grasslands, shrublands, and deserts, and especially the sagebrush ecosystem. "Although many people don't realize it," Matt says, "half of the Forest Service lands within our station's service area are grasslands, shrublands, or deserts."

Among the goals the trio works on is ensuring that there are genetically diverse, regionally adapted plants, especially forbs, for re-establishing degraded landscapes, and that there is sufficient knowledge and technology available to allow restorationists to plant self-sustaining native communities on disturbed sagebrush rangelands.

Researchers are currently studying more than 50 plant species, and knowledge gained from their efforts is improving their ability to select the plants that they believe will be best adapted to current and future climate conditions. The team also evaluates a plant's likely contribution to improving habitat for more than 300 common and rare plant and animal species that depend on the sagebrush ecosystem. To have something to study and stash, of course, requires seeds, so fundamental to the research is seed collection from native populations across the Great Basin. With the help of our cooperators, Matt explains, we have collected native grass and forb seed

Scott Jensen filling rangeland drill seed boxes for postfire seeding treatments at a Joint Fire Study site in northern Utah

Photo: U.S. Forest Service

at more than 2,000 sites within the Great Basin over the last 10 years. The effort doesn't stop there. "In addition to using the seed collections for research," Matt says, "when collection size permits, we provide 10,000 seeds to the Seeds of Success program for deposit in the Agricultural Research Service National Plant Germplasm System along with site details, photographs, and herbarium specimens." As you can imagine, this is a large effort. Rocky Mountain Research Station scientists, Scott Jensen explains, have been involved in plant material work for decades in partnership with other agencies to bring new plant materials to the restoration market. He feels that preserving seeds has inherent value, to retain the DNA of native plants at risk of loss because of ongoing disturbances. Preserving seeds means you have a library of plant genetic material. But there's another critical component to all this work. "The immediate value in this massive seed collection effort," Scott says, "is the variety and sources of seed available to plant materials developers, who aim to create seed supplies to be placed back on the landscape in the short term."

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Working to increase the understanding of genetic variability among species destined for restoration purposes, to develop seed zones for species that occur in the Great Basin, and to add to native seed supplies are a number of participants that include land managers, private sector native seed industry personnel, and more than 20 scientists and professionals at federal and state agencies, universities and seed regulatory organizations. Matt Fisk sees collaboration as critically important to the Forest Service because it promotes top notch research to create new management strategies and improves existing ones for our public lands. And, he says, it puts the knowledge on the ground quickly.

Big Basin, Great Problems: Working Together to Find Management Solutions

Picture a basin, a geographic feature so big, it sprawls across parts of Oregon, Idaho, California, Nevada, and Utah. It is a place so beautiful, it continues to attract settlement, despite searing summers and freezing winters. Generations of people thought it a good place to settle, and introduced changes that brought overgrazing, invasive plants, altered fire regimes, and more pressures on limited water resources. That's the story of the Great Basin, an ecological wonderland where landscapes are also imperiled by global changes. How does anyone begin to tackle such great problems? People coming together in a workshop on collaborative research and management in 2006 formed the Great Basin Research and Management Partnership (GBRMP) to work together to identify and prioritize regional issues; collaborate on conservation and restoration efforts; and create new teams to continue to address other issues as they are identified. Through all of this, the GBRMP shares information with participants via a web-based clearinghouse of information. Dr. Jeanne Chambers, plant ecologist with the RMRS Reno Lab, served as RMRS lead in the initial development of the Partnership, and serves as co-chair of the Coordinating Committee.

Harvesting seed for the Seeds of Success Program is critical to building a legacy for the future.

Photos: U.S. Forest Service

Forest Service researchers and managers work together with ranchers to better understand and solve grassland management challenges at the Buffalo Gap National Grassland.

Photo: Brian Dickerson

The GBRMP supports many working groups, and through her participation in several of these, Jeanne has played a role in delivering proposals that garnered funding to collaborative projects in the Great Basin. One of the most notable projects Jeanne has been involved in is the *Bromus* Research Education and Extension Net Program, known as *Bromus* REE-NET, which examines *Bromus* grasses, invasive species that are among the most damaging invasive plants in the arid and semiarid ecosystems of the western United States. Sponsored by the USDA National Institute of Food and Agriculture, *Bromus* REE-NET fosters communications and collaborative studies among *Bromus* experts of the world.

Bromus grasses present many challenges that are linked to more frequent and larger fires that convert diverse perennial communities with more grazing and ecological value to less productive annual grasslands. Originating in Eurasia, *Bromus* grasses seem to have met with little resistance in their new lands. Working with *Bromus* specialists, Jeanne helps communicate research discoveries that hopefully will help managers control the spread of *Bromus* grasses in semiarid rangelands. A major emphasis is networking—through in-person meetings and symposia; a website hosting a *Bromus* database; an Internet chatroom; incentive and direction on presentations, whitepapers, and proposals; and involvement of the extension and management community—to share information. The group Jeanne is involved in synthesizes what is known about how far *Bromus* is spreading, and what the likely patterns of change will be with climate change. They also are examining the causes of the spread—such as the role of soil chemistry, interactions with insects and animals, rainfall patterns—and what can be done through management practices to hinder the invasive species' distribution. "Collaborations between scientists and others," Jeanne says, "are valuable to the Forest Service because they increase our ability to address priority management issues, conduct cross-disciplinary and multi-partner research and management studies, and leverage funds and resources."

An Ecosystem in Need of Attention and Respect

The agency's name might not convey a full picture of all the resources it covers. Say "U.S. Forest Service," and people picture trees. The station's name might contribute to the problem, too. Examine the words Rocky Mountain Research Station, and it's easy to pick up the land feature that pops out at you. But Jack Butler, research ecologist with the Station's Rapid City Lab, wants people to know that roughly 96% of the 3.8 million acres of National Grasslands are unique public lands managed by the U.S. Forest Service that are within the geographic boundary of RMRS. Through workshops with his National Grassland cooperators; specialists from the Natural Resource Conservation Service and land grant universities; members of nongovernmental organizations, such as The Nature Conservancy, World Wildlife Fund, Audubon Society, Prairie Dog Coalition, and the South Dakota Grassland Coalition; and also with livestock producers, Jack shares science-based solutions to a variety of management problems unique to the National Grasslands. With few scientists within the Forest Service who provide this kind of expertise, Jack is a valuable resource and a go-to person on issues that help shape management practices for public grasslands in the Great Plains.

One such high profile issue involves managing prairie dog colonies. At the landscape level, prairie dog colonies contribute substantially to the diversity of grassland ecosystems. While that sounds straightforward, efforts to manage for prairie dogs generate considerable concern by stakeholders who often have widely disparate views of the same issue. An example from Jack illustrates the conundrum: The Buffalo Gap National Grassland in western South Dakota was the most successful reintroduction site of the most endangered mammal in North America, the black footed ferret. Ferrets are nocturnal animals that spend most of their time in vacant prairie dog burrows, and prairie dogs constitute about 90% of the ferret's diet.

Cooperators from the Reno Lab and the Winnemucca Bureau of Land Management collaborate in studying the effects of repeated fire on the invasive annual grass, cheatgrass.

Photo: Jeanne Chambers

The 2010 Intertribal Nursery Council meeting and training workshop was held in Arlington, Washington and hosted by the Stillaguamish Tribe of Indians.

Photo: Jeffery Wooten, Stillaguamish Tribe

Consequently, he adds, management activities often include considerations for developing and maintaining habitat for the black footed ferret. However, this is often viewed as being at odds with livestock production, a very important part of the economy of the region and an important component of grassland ecology and management. Simultaneously managing for prairie dogs, a keystone species of the grasslands, and livestock production, an important economic driver in the region, is a challenge for National Grassland managers, and not just for the managers on the Buffalo Gap National Grassland. But that's where collaborative efforts are needed. Livestock grazing is also an effective tool for managing prairie dog colonies on the Grasslands, and many issues addressed in the workshops cross land ownership boundaries—private and public—and ranchers and members of the nongovernmental organizations can bring up tough issues which have no easy answers, Jack explains. And, he adds, it is important to recognize the diversity of workshop participants, anticipate questions and concerns, and be objective throughout the science delivery process. A sense of humor, he says, is also a must.

First Stewards, Familiar Scientists: Intertribal Nursery Council Exchanges Ideas to Preserve Native Plants

Who were the first stewards of the land in our fifty states? Indigenous people, aboriginal people, first nations—these are the names used to identify the earliest inhabitants of North America and the islands of Hawai'i. Much has changed since the earliest migrations brought humans into new lands, but what hasn't changed is our capacity as a species to affect landscapes. Today, more people realize the urgency of restoring and preserving the plants and animals that make up healthy ecosystems. The Intertribal Nursery Council is an organization managed by the Forest Service and guided by tribal leaders to advance the interests of indigenous people who work to propagate plants in nurseries. Research Plant Physiologist Jeremy Pinto from the RMRS Moscow Lab works as Intertribal Nursery Council Coordinator for the National Reforestation, Nurseries, and Genetics Resources Team to share knowledge with participants and cooperators about how to propagate and plant native plants for conservation programs. A member of the Navajo

Students, instructors, and AmeriCorps volunteers plant native Hawaiian trees as part of the Native Hawaiian Culture and Ecology class and Kanakalea Nui Bird Corridor restoration project.

Photo: Jeremiah R. Pinto, USDA Forest Service

Receiving WATA award. From left to right, Team Leader Deborah Finch; Associate Deputy Chief Mary Wagner; Technician David Hawksworth; Wildlife Biologist June Galloway; Director, Southwest Region, US Fish and Wildlife Service Benjamin Tuggle; Regional Forester, Southwest Region, Corbin Newman.

Photo: USDA Forest Service

Nation, Jeremy ensures that indigenous people have the scientific and cultural information they need to accomplish restoration goals. Facilitating meetings, training workshops, and providing personal consultation among tribes and other agencies, Jeremy sees to it that traditional ecological knowledge is preserved while participants also learn about reforestation and restoration efforts using the most up-to-date science available. Recently, Jeremy was invited to co-teach an eight-day class offered by the University of Idaho on Hawai'ian culture and ecology on the Big Island because of his expertise in native plant production. The experience of working together on restoration and conservation issues is invaluable to all, Jeremy explains. "For us as scientists and professionals, collaborative work is of high value because it helps us leverage expertise and resources to achieve quality meaningful outcomes."

Award-winning Collaborations

Research Botanist Nancy Shaw, Provo, along with BLM's Great Basin Research Initiative Coordinator Mike Pellant, received the 2012 FS BLM Conservation Project Award for The Great Basin Native Plant Selection and Increase Project (GBNPSIP). Initiated in 2001, the GBNPSIP developed as a collaborative effort of the USDI BLM National Native Plant Materials Development Program, BLM's Great Basin Restoration Initiative and the Rocky Mountain Research Station. Participants in the program include land managers, the private sector native seed industry, and more than 20 scientists and professionals at federal and state agencies, universities, and seed regulatory organizations. Accomplishments include increasing understanding of genetic variability in restoration species, establishing species-specific and provisional seed zones for the Great Basin, increasing native seed supplies, and conserving key populations of restoration species.

A collaborative team in New Mexico—with participants from RMRS, the Middle Rio Grande Conservancy District, U.S. Fish & Wildlife Service, Bosque del Apache National Wildlife Refuge, City of Albuquerque Open Space, Joint Fire Science Program—recently received the National Research and Partnership Award from the Wings of The Americas program for the project "Invasive Species, Fire and Fuel Removal in Vulnerable Southwestern Ecosystems." Riparian communities along the Middle Rio Grande in New Mexico have become increasingly stressed due to fires, exotic plants, increased fuel biomass, long-term drought conditions, and water shortages. This partnership has provided valuable information on fuel reduction methods that reduce fire danger while conserving bird populations—yet another example of the power of collaboration.

National forests and grasslands offer a multitude of wildflower viewing areas. Find out where at the Celebrating Wildflowers website (http://www.fs.fed.us/wildflowers/viewing/).

Photo: Theresa Prendusi
USDA Forest Service

A message from the Program Manager

Ecosystem Sustainability is one of five focal areas of the Grassland, Shrubland and Desert Ecosystems Science Program. Our program mission is to develop and deliver knowledge and tools that will help to sustain and restore grasslands, shrublands and deserts threatened by invasive species, disturbances, urban pressures and climate change. Scientists in our program study the driving factors that produce changes in ecosystems, species and populations and identify methods and tools for sustaining ecosystem productivity, community structure, plant and animal populations, and biological diversity. Studies in this focal area emphasize the development of knowledge to sustain populations of rare and endemic species, to avoid overuse of natural resources, and to sustain the productivity and genetic resilience of plant species important for ecosystem function and habitat structure. Our research evaluates the capacity for species and communities to adapt to environmental changes. We provide decision support to land managers through collaborations, consultations and science delivery avenues such as publications, workshops, demonstrations, field trips, and training.

—Dr. Deborah Finch,
Science Program Manager

Meet Some of the GSD Scientists

Dr. Jeanne Chambers is a plant ecologist stationed at the RMRS Great Basin Ecology Lab in Reno, Nevada who works with physical scientists to study vegetation dynamics at a variety of scales. Her research focuses on global change processes with an emphasis on climate change, disturbance ecology and invasive species ecology. Her primary expertise is in alpine ecosystems, riparian and wetland ecosystems, and cold desert ecosystems including salt desert, sagebrush, and piñon and juniper.

Dr. Sharlene Sing is a research entomologist with the Rocky Mountain Research Station Bozeman Forestry Sciences Laboratory. Sharlene is involved in a range of collaborative studies with the overall objective of improving the efficacy and safety of classical weed biological control.

Dr. Burton Pendleton is a research ecologist for the Rocky Mountain Research Station Albuquerque Forestry Sciences Laboratory. He has conducted status reviews of endemic and rare plant species, orchestrated the analysis and evaluation of species covered in conservation agreements, and served as primary author of annual and final inventory and monitoring reports and synthesis reports.

Scott Jensen is a biologist with the Provo Shrub Sciences Laboratory. Responsible for plant material development, he works to increase the availability of native forbs and grasses for restoration efforts.

Matt Fisk is a biological technician for plants with the Boise Aquatic Sciences Laboratory. He assists with the development of native plant materials, particularly forbs, for the Great Basin.

Dr. Nancy Shaw is a research botanist with the Boise Aquatic Sciences Laboratory. She was recently one of the recipients of the Forest Service/Bureau of Land Management Conservation Project Award for The Great Basin Native Plant Selection and Increase Project (GBNPSIP).

Dr. Jack Butler is a research ecologist with the Rapid City Forest and Grassland Research Laboratory. He works with many different stakeholders and cooperators to expand knowledge of our National Grasslands.

Dr. Jeremy Pinto is a research plant physiologist/tribal nursery coordinator with the Rocky Mountain Research Station Moscow Forestry Sciences Laboratory. His current research includes examining and improving native plant nursery cultural practices, investigating subsequent consequences of cultural practices on seedling physiology, and studying the biophysical site limitations of outplanting.

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Recent GSD Publications

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