USDA
United States Department of Agriculture

Rocky Mountain Research Station

New Publications

January–March 2017

CONTENTS

Publications are also available at https://www.fs.fed.us/rm/publications

Forest Service
Rocky Mountain Research Station

USDA is an equal opportunity provider and employer.

The Rocky Mountain Research Station

The Rocky Mountain Research Station is one of five regional units that make up the U.S. Forest Service Research and Development organization—the most extensive natural resources research organization in the world.

We maintain 14 research locations throughout a 12-state territory encompassing the Great Basin, Southwest, Rocky Mountains, and parts of the Great Plains. The station employs more than 400 permanent full-time employees, including about 100 research scientists.

Scientists conduct research that spans an area containing 52% of the nation's National Forest System lands (54 national forests and grasslands). In the lower 48 states, our territory also includes 55% of the nation's Bureau of Land Management lands; 48% of the designated wildernesses; 37% of National Park Service lands; numerous other public and tribal lands; and 41% of the non-urban/rural private lands.

We administer and conduct ecological research on 14 experimental forests, ranges, and watersheds over the long term, even centuries, enabling us to learn how forests change as climate and other factors change over time.

We also oversee activities on several hundred research natural areas, a network of ecosystems set aside to conserve biological diversity. These areas represent a wide variety of habitats and ecosystems from alpine ecosystems to lowlands and from coniferous forests of the Northern Rockies to semiarid deserts of the Southwest and prairie ecosystems of the Great Plains.

USDA

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

New RMRS Publication Series

Production rates for United States Forest Service brush disposal planning in the northern Rocky Mountains

Online only

Production rates for United States Forest Service brush disposal planning in the northern Rocky Mountains. Loeffler, Dan; Hoyt, Stu; Anderson, Nathaniel. 2017. Gen. Tech. Rep. RMRS-GTR-358. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 33 p.

Timber harvesting operations generate brush and other vegetative debris, which often has no marketable value. Production rates developed specifically for one Northern Region national forest over a decade ago are the basis for many brush disposal production and cost estimates. Evidence suggests that these rates are applied incorrectly in many circumstances. Through a survey of experienced fuels specialists we have developed a Northern Region brush disposal production guide to serve as a baseline from which the required components of brush disposal plans, fuels treatment contracts, and force account planning can be further refined and tailored for individual burn units. This new guide can be used to improve brush disposal planning for the region, and may serve as a model for other regions to collect and provide updated information that reflects current forest conditions, practices, and productivity.

https://www.treesearch.fs.fed.us/pubs/53738

Description of the General Equilibrium Model of Ecosystem Services (GEMES)

Online only

Description of the General Equilibrium Model of Ecosystem Services (GEMES). Warziniack, Travis; Finnoff, David; Apriesnig, Jenny. 2017. Gen. Tech. Rep. RMRS-GTR-359. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 14 p.

This paper serves as documentation for the General Equilibrium Model of Ecosystem Services (GEMES). GEMES is a regional computable general equilibrium model that is composed of values derived from natural capital and ecosystem services. It models households, producing sectors, and governments, linked to one another through commodity and factor markets. GEMES was designed to model the typical resource-dependent economy, and so it has several innovations not found in other general equilibrium models; for example, ecosystem services and natural capital are explicitly modeled, allowing for endogenous nonmarket values. Households gain utility from nonconsumptive use of natural resources, and the value of those resources depends on both the state of the resource and the costs of turning that resource into an enjoyable experience. We allow for environmental regulations such as quotas on harvest and taxes on environmental goods.

https://www.treesearch.fs.fed.us/pubs/53836

New RMRS Publication Series

Science framework for conservation and restoration of the sagebrush biome

Limited number of paper copies are available through RMRS Distribution

Science framework for conservation and restoration of the sagebrush biome: Linking the Department of the Interior's Integrated Rangeland Fire Management Strategy to Long-Term Strategic Conservation Actions. Part 1. Science basis and applications. Chambers, J.C.; Beck, J.L.; Bradford, J.B.; Bybee, J.; Campbell, S.; Carlson, J.; Christiansen, T.J.; Clause, K.J.; Crist, M.R.; Dinkins, J.B.; Doherty, K.E.; Edwards, F.; Espinosa, S.; Griffin, K.A.; Griffin, P.; Haas, J.R.; Hanser, S.E.; Havlina, D.W.; Henke, K.F.; Hennig, J.D.; Joyce, L.A.; Kilkenny, F.M.; Kulpa, S.M.; Kurth, L.L.; Maestas, J.D.; Manning, M.; Mayer, K.E.; Mealor, B.A.; McCarthy, C.; Pellant, M.; Perea, M.A.; Pyke, D.A.; Wiechman, L.A.; Wuenschel, A. 2017. RMRS-GTR-360. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 213 p.

The Science Framework provides a multiscale approach for prioritizing areas for management and determining effective management strategies within the sagebrush biome with emphasis on sagebrush (*Artemisia* spp.) ecosystems and Greater sage-grouse (*Centrocercus urophasianus*). The approach provided in the Science Framework links sagebrush ecosystem resilience to disturbance and resistance to nonnative, invasive plant species to species habitat information based on the distribution and abundance of focal species. A resilience and resistance habitat matrix is developed that helps decisionmakers evaluate risks and determine appropriate management strategies.

https://www.treesearch.fs.fed.us/pubs/53983

Colorado's forest resources, 2004–2013

Contact John Shaw, jdshaw@fs.fed.us, for printed copy.

Colorado's forest resources, 2004–2013. Thompson, Michael T.; Shaw, John D.; Witt, Chris; Werstak, Charles E., Jr.; Amacher, Michael C.; Goeking, Sara A.; DeRose, R. Justin; Morgan, Todd A.; Sorenson, Colin B.; Hayes, Steven W.; Menlove, Jim. 2017. Resour. Bull. RMRS-RB-23. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 136 p.

This report presents a summary of the most recent inventory of Colorado's forests based on field data collected between 2004 and 2013. The report includes descriptive highlights and tables of area, numbers of trees, biomass, carbon, volume, growth, mortality, and removals. Most sections and tables are organized by forest type or forest-type group, species group, diameter class, or owner group. The State's most abundant forest type is pinyon/juniper, which covers more than 6 million acres. Engelmann spruce and other spruce species are the most abundant tree species by number of trees, and are also the most abundant by volume or biomass. Colorado's forests contain 35.2 billion cubic feet of net volume in trees 5.0 inches diameter and larger. Gross growth of all live trees 5.0 inches diameter and larger averaged 559.0 million cubic feet per year.

https://www.treesearch.fs.fed.us/pubs/53898

New RMRS Publication Series

Living with wildfire in Telluride Fire Protection District, Colorado

Online only

Living with wildfire in Telluride Fire Protection District, Colorado. Meldrum, James R.; Falk, Lilia C.; Gomez, Jamie; Barth, Christopher M.; Brenkert-Smith, Hannah; Warziniack, Travis; Champ, Patricia A. 2017. Res. Note RMRS-RN-75. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 30 p.

This report offers insight into the wildfire risk mitigation activities and related considerations such as attitudes, experiences, and concern about wildfire, for residents of the Telluride Fire Protection District of San Miguel County, Colorado. Data come from a social survey and parcel-level rapid wildfire risk assessments administered by the West Region Wildfire Council. Results are presented both in graphical form and as detailed summary statistics (in appendices). As we recognize that results from similar surveys and assessments in other communities might differ, these linked datasets contribute to a broader effort to understand decisions about wildfire risk mitigation on private property. Results can facilitate long-term monitoring, management, and educational practices concerning the mitigation of wildfire risk in wildland-urban interface communities.

https://www.treesearch.fs.fed.us/pubs/53729

Application of rangeland health indicators on forested plots on the Fishlake National Forest, Utah

Online only

Application of rangeland health indicators on forested plots on the Fishlake National Forest, Utah. Toone, Maggie G.; Goeking, Sara. 2017. Res. Note RMRS-RN-76. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 25 p.

Four rangeland health indicators were adapted and applied to data compiled by the U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station's Forest Inventory and Analysis (FIA) program for research locations on the Fishlake National Forest in central Utah. These data can be used by local forest managers to determine the health status of the local forest and to identify the proportion of sites that may be functioning at risk. We found the noxious weed and bare ground indicators can be readily used to determine sites at risk. Clear thresholds need to be further defined for application of the species composition and shrub indicators to describe health and functionality of forested sites. With clearly defined thresholds, ecosystem health of forests and rangelands could be monitored with the application of these and other indicators using FIA data.

https://www.treesearch.fs.fed.us/pubs/53801

Journals and Other Publications

Air, water, and aquatic environments

Avoiding an uncertain catastrophe: Climate change mitigation under risk and wealth heterogeneity. Brown, Thomas C.; Kroll, Stephan. 2017. Climate Change. 141: 155–166. https://www.treesearch.fs.fed.us/pubs/54042.

Big biology meets microclimatology: Defining thermal niches of ectotherms at landscape scales for conservation planning. Isaak, Daniel J.; Wenger, Seth J.; Young, Michael K. 2017. Ecological Applications. doi: 10.1002/eap.1501. https://www.treesearch.fs.fed.us/pubs/53478.

Climate change and hydrology in the Blue Mountains [Chapter 3]. Clifton, C.F.; Halofsky, J.E.; Isaak, D.J.; Luce, C.H.; [et al.] 2017. In: Halofsky, J.E.; Peterson, D.L., eds. Climate change vulnerability and adaptation in the Blue Mountains. Gen. Tech. Rep. PNW-GTR-939. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 25–52. https://www.treesearch.fs.fed.us/pubs/54016.

Climate change and special habitats in the Blue Mountains: Riparian areas, wetlands, and groundwater-dependent ecosystems [Chapter 7]. Dwire, K.A.; Mellmann-Brown, S. 2017. In: Halofsky, J.E.; Peterson, D.L., eds. Climate change vulnerability and adaptation in the Blue Mountains. Gen. Tech. Rep. PNW-GTR-939. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 251–323. https://www.treesearch.fs.fed.us/pubs/54020.

Climate change, water resources, and roads in the Blue Mountains [Chapter 4]. Clifton, C.F.; Halofsky, J.E.; Luce, C.H. [et al.]. 2017. In: Halofsky, J.E.; Peterson, D.L., eds. Climate change vulnerability and adaptation in the Blue Mountains. Gen. Tech. Rep. PNW-GTR-939. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station: 53–90. https://www.treesearch.fs.fed.us/pubs/54019.

Redistribution of pyrogenic carbon from hillslopes to stream corridors following a large montane wildfire. Cotrufo, M. Francesca; Boot, Claudia M.; Ryan-Burkett, Sandra; [et al.]. 2016. Global Biogeochemical Cycles. 30: 1348–1355. https://www.treesearch.fs.fed.us/pubs/53481.

Fire, fuel, and smoke

Bridging the divide between fire safety research and fighting fire safely: How do we convey research innovation to contribute more effectively to wildland firefighter safety? Adams, Theodore 'Ted'; Butler, Bret W.; Brown, Sara; Wright, Vita; Black, Anne. 2017. International Journal of Wildland Fire. doi: 10.1071/WF16147. https://www.treesearch.fs.fed.us/pubs/53675.

Disturbance regimes and the historical range and variation in terrestrial ecosystems. Keane, R. 2017. Reference Module in Life Sciences. doi: 10.1016/B978-0-12-809633-8.02397-9. https://www.treesearch.fs.fed.us/pubs/53500.

Fires, ecological effects of. Bond, W.J.; Keane, R.E. 2017. Reference Module in Life Sciences. doi: 10.1016/B978-0-12-809633-8.02098-7. https://www.treesearch.fs.fed.us/pubs/53499.

Mapping severe fire potential across the contiguous United States. Davis, Brett H. 2016. In: Proceedings of the 5th International Fire Behavior and Fuels Conference; 2016 April 11–15; Portland, OR. Missoula, MT: International Association of Wildland Fire. 6 p. https://www.treesearch.fs.fed.us/pubs/53493.

Measurement of inter-and intra-annual variability of landscape fire activity at a continental scale: The Australian case. Williamson, Grant J.; Prior, Lynda D.; Jolly, W. Matt; [et al.]. 2016. Environmental Research Letters. 11(3): 035003. https://www.treesearch.fs.fed.us/pubs/53498.

Modeling fuels and fire effects in 3D: Model description and applications. Pimont, Francois; Parsons, Russell; Rigolot, Eric; [et al.]. 2016. Environmental Modelling and Software. 80: 225–244. https://www.treesearch.fs.fed.us/pubs/53495.

The science of firescapes: Achieving fire-resilient communities. Smith, Alistair M.S.; Kolden, Crystal A.; Hudak, Andrew

Journals and Other Publications

T.; [et al.]. 2016. BioScience. 66(2): 130–146. https://www.treesearch.fs.fed.us/pubs/53656.

Seasonal relationships between foliar moisture content, heat content and biochemistry of lodgepole pine and big sagebrush foliage. Qu, Yi; Jolly, W. Matt; Dennison, Philip E.; [et al.]. 2016. International Journal of Wildland Fire. 25: 574–578. https://www.treesearch.fs.fed.us/pubs/53496.

Seasonal variation in red pine (*Pinus resinosa*) and Jack pine (*Pinus banksiana*) foliar physio-chemistry and their potential influence on stand-scale wildland fire behavior. Jolly, W. Matt; Hintz, John; Parsons, Russell A.; [et al.]. 2016. Forest Ecology and Management. 373: 167–278. https://www.treesearch.fs.fed.us/pubs/53494.

Spatial variability of surface fuels in treated and untreated ponderosa pine forests of the southern Rocky Mountains. Vakili, Emma; Hoffman, Chad M.; Keane, Robert E.; [et al.]. 2016. International Journal of Wildland Fire. 25: 1156–1168. https://www.treesearch.fs.fed.us/pubs/53497.

Forest and woodland ecosystems

Are high elevation pines equally vulnerable to climate change-induced mountain pine beetle attack? Bentz, B.J.; Eidson, E.L. 2016. Nutcracker Notes: Journal of the Whitebark Pine Ecosystem Foundation. 31: 20–23. https://www.treesearch.fs.fed.us/pubs/53395.

Climate drivers of bark beetle outbreak dynamics in Norway spruce forests. Marini, L.; Økland, B.; Bentz, B.; [et al.]. 2017. Ecography. 40: 001–010. doi: 10.1111/ecog.02769. https://www.treesearch.fs.fed.us/pubs/53676.

Defense traits in the long-lived Great Basin bristlecone pine and resistance to the native herbivore mountain pine beetle. Bentz, B.J.; Hansen, E.M.; Vandygriff, J.C.; [et al.]. 2016. New Phytologist. doi: 10.1111/nph.14191. https://www.treesearch.fs.fed.us/pubs/52768.

Disturbance and productivity interactions mediate stability of forest composition and structure. O'Connor, C.D.; Falk, D.A.; Lynch, A.M.; [et al.]. 2017. Ecological Applications. 27(3): 900–915. https://www.treesearch.fs.fed.us/pubs/54021.

The effect of salvage logging on surface fuel loads and fuel moisture in beetle-infested lodgepole pine forests. Hood, Paul R.; Nelson, Kellen N.; Rhoades, Charles C.; [et al.]. 2017. Forest Ecology and Management. 390: 80–88. https://www.treesearch.fs.fed.us/pubs/53513.

The growing knowledge base for limber pine—Recent advances. Schoettle, A.W. 2016. Nutcracker Notes: Journal of the Whitebark Pine Ecosystem Foundation. 31: 1,4–6. https://www.treesearch.fs.fed.us/pubs/53396.

An improved canopy wind model for predicting wind adjustment factors and wildland fire behavior. Massman, W. J.; Forthofer, J. M.; Finney, M. A. 2017. Canadian Journal of Forest Research. 47: 594–603. https://www.treesearch.fs.fed.us/pubs/54040.

Landscape-scale quantification of fire-induced change in canopy cover following mountain pine beetle outbreak and timber harvest. McCarley, T.R.; Kolden, C.A.; Hudak, A.T.; [et al.]. 2017. Forest Ecology and Management. 391: 164–175. https://www.treesearch.fs.fed.us/pubs/54038.

Long-term regeneration responses to overstory retention and understory vegetation treatments in the northern Rocky Mountains. Jang, Woongsoon; Keyes, Christopher R.; Page-Dumroese, Deborah S. 2017. Forest Science. 63(1): 136–146. https://www.treesearch.fs.fed.us/pubs/53657.

Methods to reduce forest residue volume after timber harvesting and produce black carbon. Page-Dumroese, Deborah S.; Busse, Matt D.; Archuleta, James G.; [et al.]. 2017. Scientifica. 2017: Article ID 2745764. https://www.treesearch.fs.fed.us/pubs/53830.

Mountain pine beetle dynamics and reproductive success in post-fire lodgepole and ponderosa pine forests in northeastern Utah. Lerch, A.P.; Pfammatter, J.A.; Bentz, B.J.; [et al.]. 2016. PLoS ONE 11(10): e0164738. doi: 10.1371/

Journals and Other Publications

journal.pone.0164738. https://www.treesearch.fs.fed.us/pubs/53477.

Multi-temporal LiDAR and Landsat quantification of fire-induced changes to forest structure. McCarley, T.R.; Kolden, C.A.; Hudak, A.T.; [et al.]. 2017. Remote Sensing of Environment. 191: 419–432. https://www.treesearch.fs.fed.us/pubs/54039.

Sensitivity to low-temperature events: Implications for CO_2 dynamics in subtropical coastal ecosystems. Malone, Sparkle L.; Barr, Jordan; Fuentes, Jose D.; [et al.]. 2016. Wetlands. 26: 957–967. https://www.treesearch.fs.fed.us/pubs/53487.

Use of real-time GNSS-RF data to characterize the swing movements of forestry equipment. Becker, Ryer M.; Keefe, Robert F.; Anderson, Nathaniel M. 2017. Forests. 8(2): 44. https://www.treesearch.fs.fed.us/pubs/53655.

Using landscape genetics simulations for planting blister rust resistant whitebark pine in the US northern Rocky Mountains. Landguth, Erin L.; Holden, Zachary A.; Mahalovich, Mary F.; Cushman, Samuel A. 2017. Frontiers in Genetics. doi: 10.3389/fgene.2017.00009. https://www.treesearch.fs.fed.us/pubs/53654.

Validation and application of a forest gap model to the southern Rocky Mountains. Foster, Adrianna C.; Dwire, Kathleen A.; Fornwalt, Paula J.; Negron, Jose; [et al.]. 2017. Ecological Modelling. 351: 109–128. https://www.treesearch.fs.fed.us/pubs/53832.

Grasslands, shrublands, and desert ecosystems

Breaking primary seed dormancy in Gibbens' beardtongue (*Penstemon gibbensii*) and blowout penstemon (*Penstemon haydenii*). Tilini, Kassie L.; Meyer, Susan E.; Allen, Phil S. 2016. Native Plants Journal. 17(3): 256–265. https://www.treesearch.fs.fed.us/pubs/53671.

Climate adaption and post-fire restoration of a foundational perennial in cold desert: Insights from intraspecific variation in response to weather. Brabec, Martha M.; Germino, Matthew J.; Richardson, Bryce A. 2017. Journnal of Applied Ecology. 54: 293–302. https://www.treesearch.fs.fed.us/pubs/52208.

Climate drives adaptive genetic responses associated with survival in big sagebrush (*Artemisia tridentata*). Chaney, Lindsay; Richardson, Bryce A.; Germino, Matthew J. 2016. Evolutionary Applications. doi: 10.1111/eva.12440. https://www.treesearch.fs.fed.us/pubs/53744.

Genera and a new evolutionary system of world Chenopodiaceae. Zhu, Ge-lin; Sanderson, S.C. 2017. Beijing, China: Science Press. 361 p.

Impact of straw and rock-fragment mulches on soil moisture and early growth of holm oaks in a semiarid area. Jimenez, M.N.; Pinto, J.R.; Ripoll, M.A.; [et al.]. 2017. Catena. 152: 198-206. https://www.treesearch.fs.fed.us/pubs/53835.

Invasive species science update. Runyon, Justin, ed. 2017. Number 9. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 14 p. https://www.treesearch.fs.fed.us/pubs/53961.

In this issue:

- Secondary invasion: The bane of weed management
- Upddated toadflax biology and biocontrol manual
- Genetic resistance to white pine blister rust confirmed
- Genetic diversity and population structure of the invasive fungus associated with oak mortality in South Korea
- Screening black walnut families for resistance to *Geosmithia morbida*, the fungal causal agent of thousand cankers disease
- Drought effects on pollinator attraction: Do native plants have a leg up?
- Temperature and soil moisture affect stem recruitment of a native and invasive perennial grass in the northern Great Plains

Journals and Other Publications

Evaluating ecological impacts of common buckthorn in Montana

New literature review on ventenata (*Ventenata dubia*) in the Fire Effects Information System (FEIS)

Irrigation requirements for seed production of five *Lomatium* species in a semiarid environment. Shock, Clinton C.; Shaw, Nancy; Kilkenny, Francis F.; [et al.]. 2016. HortScience. 51(10): 1270-1277. https://www.treesearch.fs.fed.us/pubs/53745.

The tortoise and the hare: Reducing resource availability shifts competitive balance between plant species. Pearson, Dean E.; Orgega, Yvette K.; Maron, John L. 2017. Journal of Ecology. doi:10.1111/1365-2745.12736. https://www.treesearch.fs.fed.us/pubs/54023.

Human dimensions

Avoiding an uncertain catastrophe: Climate change mitigation under risk and wealth heterogeneity. Brown, Thomas C.; Kroll, Stephan. 2017. Climate Change. 141: 155–166. https://www.treesearch.fs.fed.us/pubs/54042.

Bridging the divide between fire safety research and fighting fire safely: How do we convey research innovation to contribute more effectively to wildland firefighter safety? Adams, Theodore 'Ted'; Butler, Bret W.; Brown, Sara; Wright, Vita; Black, Anne. 2017. International Journal of Wildland Fire. doi: 10.1071/WF16147. https://www.treesearch.fs.fed.us/pubs/53675.

Does size matter? Animal units and animal unit months. Smith, Lamar; Mitchell, John; Reeves, Matt; [et al.]. 2017. Rangelands. 39(1): 17-19. https://www.treesearch.fs.fed.us/pubs/54043.

A model of communicative and hierarchical foundations of high reliability organizing in wildland firefighting teams. Jahn, Jody L.S.; Black, Anne E. 2017. Management Communication Quarterly. doi:10.1177/0893318917691358.

Use of real-time GNSS-RF data to characterize the swing movements of forestry equipment. Becker, Ryer M.; Keefe, Robert F.; Anderson, Nathaniel M. 2017. Forests. 8(2): 44. https://www.treesearch.fs.fed.us/pubs/53655.

Wilderness research

Potential relocation of climatic environments suggests high rates of climate displacement within the North American protection network. Batllori, Enric; Parks, Sean A.; Miller, Carol; [et al.]. 2017. Global Change Biology. 2017: 1–12. https://www.treesearch.fs.fed.us/pubs/53829.

Wildlife and terrestrial habitats

Characteristics of successful puma kill sites of elk in the Black Hills, South Dakota. Lehman, Chadwick P.; Rota, Christopher T.; Rumble, Mark A.; [et al.]. 2017. Wildlife Biology. wlb.00248. doi: 10.2981/wlb.00248. https://www.treesearch.fs.fed.us/pubs/53674.

Genetic recapture identifies long-distance breeding dispersal in Greater sage-grouse (*Centrocercus urophasianus*). Cross, Todd B.; Naugle, David E.; Carlson, John C.; Schwartz, Michael K. 2017. The Condor. 119(1): 155–166. https://www.treesearch.fs.fed.us/pubs/53960.

Predicting landscape connectivity for the Asian elephant in its largest remaining subpopulation. Puyravaud, J.-P.; Cushman, S.A.; Davidar, P.; [et al.]. 2016. Animal Conservation. doi: 10.1111/acv.12314. https://www.treesearch.fs.fed.us/pubs/53653.

Science Program Areas

Air, Water and Aquatic Environments

Air quality, water availability, water quality, and aquatic habitats are critical issues within the rapidly changing Western United States. The Air, Water and Aquatic Environments program is committed to the development of knowledge and science applications related to air and water quality, as well as the habitat quality, distribution, diversity, and persistence of fish and other aquatic species. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/air-water-and-aquatic-environments. Contact Frank McCormick, Program Manager, for more information: 970-498-1175.

Aldo Leopold Wilderness Research Institute

The Aldo Leopold Wilderness Research Institute aims to provide scientific leadership by bringing diverse groups of scientists and managers together to develop and use the knowledge needed to assure wilderness ecosystems and values endure for generations to come. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/aldo-leopold-wilderness-research-institute. Contact Susan Fox, Program Director, for more information: 406-542-4193.

Fire, Fuel and Smoke

The Fire, Fuel and Smoke program works to improve the safety and effectiveness of fire management through the creation and dissemination of basic fire science knowledge. The program investigates the impacts of fires on the environment by means of fundamental and applied research for understanding and predicting fire behavior, its effects on ecosystems, and its emissions into the atmosphere. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/fire-fuel-and-smoke. Contact Colin Hardy, Program Manager, for more information: 406-329-4978.

Forest and Woodland Ecosystems

Forests and woodlands are increasingly being impacted by large scale urbanization and human developments, uncharacteristically large and severe wildfires, insect and disease outbreaks, exotic species invasions, and drought, and interactions of multiple stressors at local, landscape, and regional scales. The Forest and Woodland Ecosystems program acquires, develops, and delivers the scientific knowledge for sustaining and restoring forests and woodlands landscape health, biodiversity, productivity, and ecosystem processes. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/forest-and-woodland-ecosystems. Contact Alison Hill, Program Manager, for more information: 928-556-2105.

Grassland, Shrubland and Desert Ecosystems

Disruptions by large-scale clearing for agriculture, water diversions, extensive grazing, changes in the native fauna, the advent of alien weeds, altered fire regimes, and increases in human-caused insect and disease epidemics have contributed to produce areas that are in unsuitable condition. The Grassland, Shrubland and Desert Ecosystems program addresses the biology, use, management, and restoration of these grass and shrublands. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/grassland-shrubland-and-desert-ecosystems. Contact Debbie Finch, Program Manager, for more information: 505-724-3671.

Human Dimensions

The Human Dimensions program provides social and economic science based innovation to human societies as they develop a sustainable relationship with their environment. Major issues confronting societies across the globe such as global climate change, energy, fire, water, and ecosystem services all have important social-economic dimensions that will be explored and addressed by this program. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/human-dimensions. Contact David Chapman, Program Manager, for more information: 970-498-1378.

Inventory, Monitoring and Analysis

The Inventory, Monitoring and Analysis program provides the resource data, analysis, and tools needed to effectively identify current status and trends, management options and impacts, and threats and impacts of fire, insects, disease, and other natural processes. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/inventory-and-monitoring. Contact Michael Wilson, Program Manager, for more information: 801-625-5407.

Science Application and Integration

The Science Application and Integration program is a knowledge transfer unit that provides leadership for the integration and use of scientific information in natural resource planning and management across the Interior West. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/science-application-and-communication. Contact Jan Engert, Assistant Station Director, for more information: 970-498-1377.

Wildlife and Terrestrial Ecosystems

The Wildlife and Terrestrial Ecosystems program is engaged in sustaining species and ecosystems of concern through studies of ecological interactions within and between plant, aquatic, and terrestrial animal communities; understanding public use effects through studies elucidating social and economic values associated with consumptive and non-consumptive uses of fish and wildlife; managing terrestrial and aquatic habitats; and evaluating outcomes of land and water uses and natural disturbances. Webpage: https://www.fs.fed.us/rmrs/science-program-areas/wildlife-and-terrestrial-ecosystems. Contact William Block, Program Manager, for more information: 928-556-2161.

RMRS Is Going Green

To minimize our environmental footprint as well as eliminate unnecessary printing, most of our research publications are now being published online only. If paper copies are available, they will be available in a limited supply. All of our publications, old and new, can be downloaded from our website. If you are unable to download a copy of one of our research publications, please let us know so that we can help you obtain a copy.

To obtain a copy of RMRS series publications:

Download a copy from our website *at* **http://www.fs.fed.us/rm/publications**

OR

Contact our distribution center:

MAIL Publications Distribution
Rocky Mountain Research Station
240 W. Prospect Road
Fort Collins, CO 80526 U.S.A.

PHONE (970) 498-1393

FAX (970) 498-1122

EMAIL rmrspubrequest@fs.fed.us

NOTE: You have received this RMRS New Publications List because your name is on our mailing list. We will continue to notify you of new RMRS publications unless you ask us to remove your name by contacting our distribution center.