United States Department of Agriculture

Rocky Mountain Research Station

New Publications

July to September 2014

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The Rocky Mountain Research Station

The Rocky Mountain Research Station is one of five regional units that make up the US 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 over 400 permanent full-time employees, including roughly 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 BLM 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. The 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.

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Sagebrush and piñon-juniper ecosystems: Field guide for treatment

Online only

A field guide for selecting the most appropriate treatment in sagebrush and piñon-juniper ecosystems in the Great Basin: Evaluating resilience to disturbance and resistance to invasive annual grasses, and predicting vegetation response. Miller, Richard F.; Chambers, Jeanne C.; Pellant, Mike. 2014. Gen. Tech. Rep. RMRS-GTR-322. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 66 p. NOTE: This report is available only online.

This field guide identifies seven primary components that largely determine resilience to disturbance, as well as resistance to invasive grasses and plant succession following treatment of areas of concern: (1) characteristics of the ecological site, (2) current vegetation prior to treatment, (3) disturbance history, (4) type, timing, and severity of the treatment, (5) post-treatment weather, (6) post-treatment management, especially grazing, and (7) monitoring and adaptive management. A series of key questions and a set of tools are provided to assess these primary components. This assessment is designed to allow field personnel to (1) evaluate resilience to disturbance and resistance to invasive annual grass for an area of concern, (2) predict the potential successional pathways, and (3) then select the most appropriate treatment, including the need for seeding.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr322.html.

Flow resistance coefficients: Photographic guide

Order 15

Photographic guidance for selecting flow resistance coefficients in high-gradient channels. Yochum, Steven E.; Comiti, Francesco; Wohl, Ellen; David, Gabrielle C. L.; Mao, Luca. 2014. Gen. Tech. Rep. RMRS-GTR-323. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 91 p.

Photographic guidance is presented to assist with the estimation of Manning's n and Darcy-Weisbach f in high-gradient plane-bed, step-pool, and cascade channels. Reaches both with and without instream wood are included. Using data collected in 19 stream channels located in the State of Colorado and the Eastern Italian Alps, on slopes ranging from 2.4 to 21 percent, guidance is provided for low through bankfull flows. Guidance for low flow resistance estimation is additionally provided using data collected in 29 channels in the State of Washington, New Zealand, Chile, and Argentina. Discussions of flow resistance mechanisms and quantitative prediction tools are also presented.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr323.html.

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Fire management practices

Online only

Historical and current fire management practices in two wilderness areas in the southwestern United States: The Saguaro Wilderness Area and the Gila-Aldo Leopold Wilderness Complex. Hunter, Molly E.; Iniguez, Jose M.; Farris, Calvin A. 2014. Gen. Tech. Rep. RMRS-GTR-325. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 38 p. NOTE: This report is available only online.

Fire suppression has been the dominant fire management strategy in the West over the last century. However, managers of the Gila and Aldo Leopold Wilderness Complex in New Mexico and the Saguaro Wilderness Area in Arizona have allowed fire to play a more natural role for decades. This report summarizes the effects of these fire management practices on key resources, and documents common challenges in implementing these practices and lessons for how to address them. By updating historical fire atlases, we show how fire patterns have changed with adoption of new policy and practices.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr325.html.

Sagebrush ecosystems and Greater Sage-Grouse habitat

Online only

Using resistance and resilience concepts to reduce impacts of invasive annual grasses and altered fire regimes on the sagebrush ecosystem and Greater Sage-Grouse: A strategic multi-scale approach. Chambers, Jeanne C.; Pyke, David A.; Maestas, Jeremy D.; Pellant, Mike; Boyd, Chad S.; Campbell, Steven B.; Espinosa, Shawn; Havlina, Douglas W.; Mayer, Kenneth E.; Wuenschel, Amarina. 2014. Gen. Tech. Rep. RMRS-GTR-326. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 73 p. NOTE: This publication is available only online.

This report provides a strategic approach for conservation of sagebrush ecosystems and Greater Sage-Grouse (sage-grouse) that focuses specifically on habitat threats caused by invasive annual grasses and altered fire regimes. It uses information on factors that influence (1) sagebrush ecosystem resilience to disturbance and resistance to invasive annual grasses and (2) distribution, relative abundance, and persistence of sage-grouse populations to develop management strategies at both landscape and site scales. A sage-grouse habitat matrix links relative resilience and resistance of sagebrush ecosystems with sage-grouse habitat requirements for landscape cover of sagebrush to help decision makers assess risks and determine appropriate management strategies at landscape scales.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr326.html

National FIA plot intensification procedure

Online only

National FIA plot intensification procedure report. Blackard, Jock A.; Patterson, Paul L. 2014. Gen. Tech. Rep. RMRS-GTR-329. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 63 p. NOTE: This publication is available only online.

The Forest Inventory and Analysis (FIA) program of the U.S. Forest Service (USFS) measures a spatially distributed base grid of forest inventory plots across the United States. The sampling intensity of plots may be increased in some regions when warranted by specific inventory objectives. Several intensification methods have been developed within FIA and USFS National Forest Systems regions; however, a national standard routine for plot intensification does not exist. This report examines eight candidate intensification methods by a developed set of evaluation criteria, and based on those results proposes that FIA adopt the GRID method as its national plot intensification procedure.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr329.html.

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Anthropocene: Forest conservation and management

Online only

Forest conservation and management in the Anthropocene: Conference proceedings. Sample, V. Alaric; Bixler, R. Patrick, eds. 2014. Proceedings. RMRS-P-71. Fort Collins, CO: US Department of Agriculture, Forest Service. Rocky Mountain Research Station. 494 p. NOTE: This publication is available only online.

In these collected papers, leading scientists, resource managers and policy specialists explore the implications of climate change and other manifestations of the Anthropocene on the management of wildlife habitat, biodiversity, water, and other resources, with particular attention to the effects of wildfire. Recommendations include the need for a supporting institutional, legal, and policy framework that is not just different but more dynamic, to facilitate resource management adaptation and preparedness in a period of accelerating environmental change.

Online: http://www.fs.fed.us/rm/pubs/rmrs_p071.html.

Proceedings papers by RMRS authors:

Planning the future's forests with assisted migration. Mary I. Williams; R. Kasten Dumroese.

Implementing climate change adaptation in forested regions of the United States. Jessica E. Halofsky; David L. Peterson; Linda A. Joyce; Constance I. Millar; Janine M. Rice; Christopher W. Swanston.

Improving the role of vulnerability assessments in decision support for effective climate adaptation. Linda A. Joyce; Constance I. Millar.

New Mexico's Forest Resources, 2008-2012

Online only

New Mexico's forest resources, 2008-2012. Goeking, Sara A.; Shaw, John D.; Witt, Chris; Thompson, Michael T.; Werstak, Charles E., Jr.; Amacher, Michael C.; Stuever, Mary; Morgan, Todd A.; Sorenson, Colin B.; Hayes, Steven W.; McIver, Chelsea P. 2014. Resour. Bull. RMRS-RB-18. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, 144 p. NOTE: This publication is available only online.

This report presents a summary of the most recent inventory of New Mexico's forests based on field data collected between 2008 and 2012, and includes descriptive highlights and tables of area, numbers of trees, biomass, volume, growth, mortality, and removals. The report also describes the inventory's design, inventory terminology, and data reliability. Results show that New Mexico's forest land covers 24.8 million acres. Forty-four percent (10.8 million acres) of this forest land is privately owned, and another 31 percent (7.8 million acres) is administered by the USDA Forest Service. The State's most abundant forest type is pinyon/juniper woodland, which covers more than 10 million acres. Pinyon/juniper woodlands, combined with pure juniper woodland, cover a total of 13.6 million acres, or more than half of New Mexico's forest land area. Gambel oak is the most abundant tree species by number of trees, and ponderosa pine is the most abundant by volume or biomass.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rb018.html.

Post-fire erosion control mulches

Online only

Post-fire erosion control mulches alter belowground processes and nitrate reductase activity of a perennial forb, heartleaf arnica (*Arnica cordifolia*). Berryman, Erin M.; Morgan, Penelope; Robichaud, Peter R.; Page-Dumroese, Deborah. 2014. Res. Note RMRS-RN-69. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 10 p. NOTE: This publication is available only online.

Four years post-wildfire, we measured soil and plant properties on hillslopes treated with two different mulches (agricultural wheat straw and wood strands) and a control (unmulched, but burned). Soil total N was about 40% higher and microbial respiration of a standard wood substrate was nearly twice as high in the mulched plots compared to the unmulched plots. Greater respiration was tied to increased substrate moisture underneath mulch compared to bare soil. Nitrate reductase activity of a common forb (*Arnica cordifolia*) was about 30% higher on the wood strand plots than either the wheat straw or the unmulched plots. Mulch applications after wildfire may enhance N availability by increasing soil moisture, promoting microbial N mineralization, or by increasing biological nitrogen fixation. Because inference is limited for this case study, we call for additional replicated experiments investigating effects of mulch treatments on soil carbon and nitrogen cycling with links to plant regeneration.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn069.html.

Journals and Other Publications

Obtain the following publications through university libraries, the publisher, or other outlets. Forest Service employees may request these items from the National Forest Service Library at FSLibrary-DocsFC@fs.fed.us or telephone: (970) 498-1205. We have also provided links to electronic copies when available.

Air, water, and aquatic environments

A 576-year Weber River streamflow reconstruction from tree rings for water resource risk assessment in the Wasatch Front, Utah. Bekker, Matthew F.; DeRose, R. Justin; Buckley, Brendan M.; Kjelgren, Roger K.; Gill, Nathan S. 2014. Journal of the American Water Resources Association. doi: 10.1111/jawr.12191. Online: http://www.treesearch.fs.fed.us/pubs/46446.

Best practices for continuous monitoring of temperature and flow in wadeable streams. Stamp, J.; Hamilton, A.; Craddock, M.; Parker, L.; Roy, A.H.; Isaak, D.J.; Holden, Z.; Passmore, M.; Bierwagen, B.G. 2014. EPA/600/R-13/170F. Washington, DC: Global Change Research Program, National Center for Environmental Assessment. 70 p. Online: http://www.treesearch.fs.fed.us/pubs/46926.

A blocking primer increases specificity in environmental DNA detection of bull trout (*Salvelinus confluentus*). Wilcox, Taylor M.; Schwartz, Michael K.; McKelvey, Kevin S.; Young, Michael K.; Lowe, Winsor H. 2014. Conservation Genetics Resources. 6: 283-284. Online: http://www.treesearch.fs.fed.us/pubs/46510.

Climate change and the future of freshwater fisheries. Isaak, D.J. 2014. In: Taylor, W.W.; Lynch, A.J.; Léonard, N.J., eds. Future of fisheries: Perspectives for emerging professionals. Bethesda, MD; American Fisheries Society. Online: http://www.treesearch.fs.fed.us/pubs/46785.

Climate records of the Priest River Experimental Forest 1911-2000. Jain, Theresa B.; Graham, Russell T. 2014. Reno, NV: Western Regional Climate Center. Online: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?id7386.

Estimates of carbon stored in harvested wood products from United States Forest Service Alaska Region, 1910-2012. Loeffler, Dan; Anderson, Nathaniel; Stockmann, Keith; Skog, Ken; Healey, Sean; Jones, J. Greg; Morrison, James; Young, Jesse. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 26 p. Online: http://www.treesearch.fs.fed.us/pubs/46643.

Estimates of carbon stored in harvested wood products from United States Forest Service Eastern Region, 1911-2012. Loeffler, Dan; Anderson, Nathaniel; Stockmann, Keith; Skog, Ken; Healey, Sean; Jones, J. Greg; Morrison, James; Young, Jesse. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46644.

Estimates of carbon stored in harvested wood products from United States Forest Service Intermountain Region, 1911-2012. Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Butler, Edward; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula,

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MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 28 p. Online: http://www.treesearch.fs.fed.us/pubs/46646.

Estimates of carbon stored in harvested wood products from United States Forest Service Northern Region, 1906-2012. Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Butler, Edward; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46647.

Estimates of carbon stored in harvested wood products from United States Forest Service Pacific Northwest Region, 1909-2012. Butler, Edward; Stockmann, Keith; Anderson, Nathaniel; Skog, Ken; Healey, Sean; Loeffler, Dan; Jones, J. Greg; Morrison, James; Young, Jesse. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 28 p. Online: http://www.treesearch.fs.fed.us/pubs/46641.

Estimates of carbon stored in harvested wood products from United States Forest Service Pacific Southwest Region, 1909-2012. Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Butler, Edward; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46648.

Estimates of carbon stored in harvested wood products from United States Forest Service Rocky Mountain Region, 1906-2012. Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Butler, Edward; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46649.

Estimates of carbon stored in harvested wood products from United States Forest Service's Sierra Nevada Bio-Regional Assessment Area of the Pacific Southwest Region, 1909-2012. Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Butler, Edward; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 28 p. Online: http://www.treesearch.fs.fed.us/pubs/46650.

Estimates of carbon stored in harvested wood products from United States Forest Service Southern Region, 1911-2012. Loeffler, Dan; Anderson, Nathaniel; Stockmann, Keith; Skog, Ken; Healey, Sean; Jones, J. Greg; Morrison, James; Young, Jesse. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46645.

Estimates of carbon stored in harvested wood products from United States Forest Service Southwestern Region, 1909-2012. Butler, Edward; Stockmann, Keith; Anderson, Nathaniel; Young, Jesse; Skog, Ken; Healey, Sean; Loeffler, Dan; Jones, J. Greg; Morrison, James. 2014. Unpublished report. Missoula, MT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. 27 p. Online: http://www.treesearch.fs.fed.us/pubs/46642.

Estimating climate change effects on net primary production of rangelands in the United States. Reeves, Matthew C.; Moreno, Adam L.; Bagne, Karen E.; Running, Steven W. 2014. Climatic Change. 126: 429-442. Online: http://www.treesearch.fs.fed.us/pubs/46824.

Evidence of climate-induced range contractions in bull trout *Salvelinus confluentus* in a Rocky Mountain watershed, U.S.A. Eby, Lisa A.; Helmy, Olga; Holsinger, Lisa M.; Young, Michael K. 2014.: PLoS ONE. 9(6): e98812. Online: http://www.treesearch.fs.fed.us/pubs/46507.

Facing climate change in forests and fields. Daniels, Amy; Shaw, Nancy; Peterson, Dave; Nislow, Keith; Tomosy, Monica; Rowland, Mary. 2014. The Wildlife Society News. Spring. 5 p. Online: http://www.treesearch.fs.fed.us/pubs/46945.

A general equilibrium model of ecosystem serices in a river basin. Warziniack, Travis. 2014. Journal of the American Water Resources Association. 50(3): 683-695. Online: http://www.treesearch.fs.fed.us/pubs/46429.

The importance of assessing climate change vulnerability to address species conservation. Bagne, Karen E.; Friggens, Megan M.; Coe, Sharon J.; Finch, Deborah M. 2014. Journal of Fish and Wildlife Management. doi: 10.3996/052013-JFWM-039. Online: http://www.treesearch.fs.fed.us/pubs/46993.

Influence of large wood on channel morphology and sediment storage in headwater mountain streams, Fraser Experimental Forest, Colorado. Ryan, Sandra E.; Bishop, Erica L.; Daniels, J. Michael. 2014. Geomorphology. 217: 73-88. Online: http://www.treesearch.fs.fed.us/pubs/46801.

Landscape genetic connectivity in a riparian foundation tree is jointly driven by climatic gradients and river networks. Cushman, Samuel A.; Max, Tamara; Meneses, Nashelly; Evans, Luke M.; Ferrier, Sharon; Honchak, Barbara; Whitham, Thomas G.; Allan, Gerard J. 2014. Journal of Applied Ecology. 51(5): 1169-1178. Online: http://www.esajournals.org/doi/pdf/10.1890/13-1612.1.

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Patch size but not short-term isolation influences occurrence of westslope cutthroat trout above human-made barriers. Peterson, Douglas P.; Rieman, Bruce E.; Horan, Dona L.; Young,

Michael K. 2014. Ecology of Freshwater Fish. 23: 556-571. Online: http://www.treesearch.fs.fed.us/pubs/46509.

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Pronounced differences in genetic structure despite overall ecological similarity for two Ambystoma salamanders in the same landscape. Whiteley, Andrew R.; McGarigal, Kevin; Schwartz, Michael K. 2014. Conservation Genetics. 15(3): 573-591. Online: http://www.treesearch.fs.fed.us/pubs/46504.

Respiratory disease and particulate air pollution in Santiago Chile: Contribution of erosion particles from fine sediments. Garcia-Chevesich, Pablo A.; Alvarado, Sergio; Neary, Daniel G.; Valdes, Rodrigo; Valdes, Juan; Aguirre, Juan Jose; Mena, Marcelo; Pizarro, Roberto; Jofre, Paolo; Vera, Mauricio; Olivares, Claudio. 2014. Environmental Pollution. 187: 202-205. Online: http://www.treesearch.fs.fed.us/pubs/46798.

Response surfaces of vulnerability to climate change: The Colorado River Basin, the High Plains, and California. Foti, Romano; Ramirez, Jorge A.; Brown, Thomas C. 2014. Climatic Change. 125: 429-444.
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Seasonal patterns in energy partitioning of two freshwater marsh ecosystems in the Florida Everglades. Malone, Sparkle L.; Staudhammer, Christina L.; Loescher, Henry W.; Olivas, Paulo; Oberbauer, Steven F.; Ryan, Michael G.; Schedlbauer, Jessica; Starr, Gregory. 2014. Journal of Geophysical Research: Biogeosciences. 119(8): 1487-1505.
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Using climate-FVS to project landscape-level forest carbon stores for 100 years from field and LiDAR measures of initial conditions. Galvez, Fabian B.; Hudak, Andrew T.; Byrne, John C.; Crookston, Nicholas L.; Keefe, Robert F. 2014. Carbon Balance and Management. 9:1.
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Fire, fuel, and smoke

Analyzing spatiotemporal changes in wildfire regime and exposure across a Mediterranean fire-prone area. Salis, Michele; Ager, Alan A.; Finney, Mark A.; Arca, Bachisio; Spano, Donatella. 2014. Natural Hazards. 71(3): 1389-1418.

An analysis of controls on fire activity in boreal Canada: Comparing models built with different temporal resolutions. Parisien, Marc-Andre; Parks, Sean A.; Krawchuk, Meg A.; Little, John M.; Flannigan, Mike D.; Gowman, Lynn M.; Moritz, Max A. 2014. Ecological Applications. 24(6): 1341-1356. Online: http://www.treesearch.fs.fed.us/pubs/46608.

Bark beetle-induced changes to crown fuel flammability and crown fire potential. Page, W.G. 2014. Logan, UT: Utah State University. 252 p. Dissertation.

Bulgarian fuel models developed for implementation in FARSITE simulations for test cases in Zlatograd area. Dobrinkova, Nina; Hollingsworth, LaWen; Heinsch, Faith Ann; Dillon, Greg; Dobrinkov, Georgi. 2014. In: Wade, Dale D.; Fox, Rebekah L., eds; Robinson, Mikel L., comps. Proceedings of 4th Fire Behavior and Fuels Conference; 18-22 February 2013, Raleigh, NC; and 1-4 July 2013, St. Petersburg, Russia. Missoula, MT: International Association of Wildland Fire: 513-521. Online: http://www.treesearch.fs.fed.us/pubs/46778.

Chihuahuan desert grassland respond similarly to fall, spring, and summer fires during prolonged drought. Ladwig, Laura M.; Collins, Scott L.; Ford, Paulette L.; White, Laura B. 2014. Rangeland Ecology and Management.
Online: http://dx.doi.org/10.2111/REM-D-13-00133.1.

A comparison of the CONSUME and FOFEM fuel consumption models using field data collected in the southeastern United States. Prichard, Susan J.; Karau, Eva C.; Ottmar, Roger D.; Kennedy, Maureen C.; Cronan, James B.; Wright, Clinton S.; Keane, Robert E. 2014 Canadian Journal of Forest Research. 44(7): 784-795.
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A comparison of three approaches for simulating fine-scale surface winds in support of wildland fire management: Part I. Model formulation and comparison against measurement. Forthofer, Jason M.; Butler, Bret W.; Wagenbrenner, Natalie S. 2014. International Journal of Wildland Fire. doi: http://dx.doi.org/10.1071/WF12089.
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Effects of climate change and wildfire on soil loss in the Southern Rockies Ecoregion. Litschert, S.E.; Theobald, D.M.; Brown, T.C. 2014. Catena. 118: 206-210.
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Evaluating wildfire hazard and risk for fire management applications. Keane, R.E.; Menakis, J.; Hessburg, P.F.; Reynolds, K.M.; Dickinson, J.D. 2014. In: Reynolds, K.; Hessburg, P.F.; Bourgeron, P.S., eds. Making transparent environmental management decisions. New York: Springer: 111-135.

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An exploratory data analysis of the temperature fluctuations in a spreading fire. Brillinger, David R.; Finney, Mark A. 2014. Environmetrics. doi. 10.1002/env.2279.

Fire activity and severity in the western US vary along proxy gradients representing fuel amount and fuel moisture. Parks, Sean A.; Parisien, Marc-Andre; Miller, Carol; Dobrowski, Solomon Z. 2014. PLoS ONE 9(6): e99699.
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Fire behavior simulation in Mediterranean forests using the minimum travel time algorithm. Kalabokidis, Kostyas; Palaiologou, Palaiologos; Finney, Mark. 2014. In: Proceedings of 4th Fire Behavior and Fuels Conference; July 1-4 2013; St. Petersburg, Russia. Missoula, MT: International Association of Wildland Fire. Online: http://www.treesearch.fs.fed.us/pubs/47012.

Fire regimes of Alaskan black spruce communities. Fryer, Janet L. 2014. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).
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Fire severity, size, and climate associations diverge from historical precedent along an ecological gradient in the Pinaleño Mountains, Arizona, USA. O'Connor, Christopher D.; Falk, Donald A.; Lynch, Ann M.; Swetnam, Thomas W. 2014. Forest Ecology and Management. 329: 264-278.
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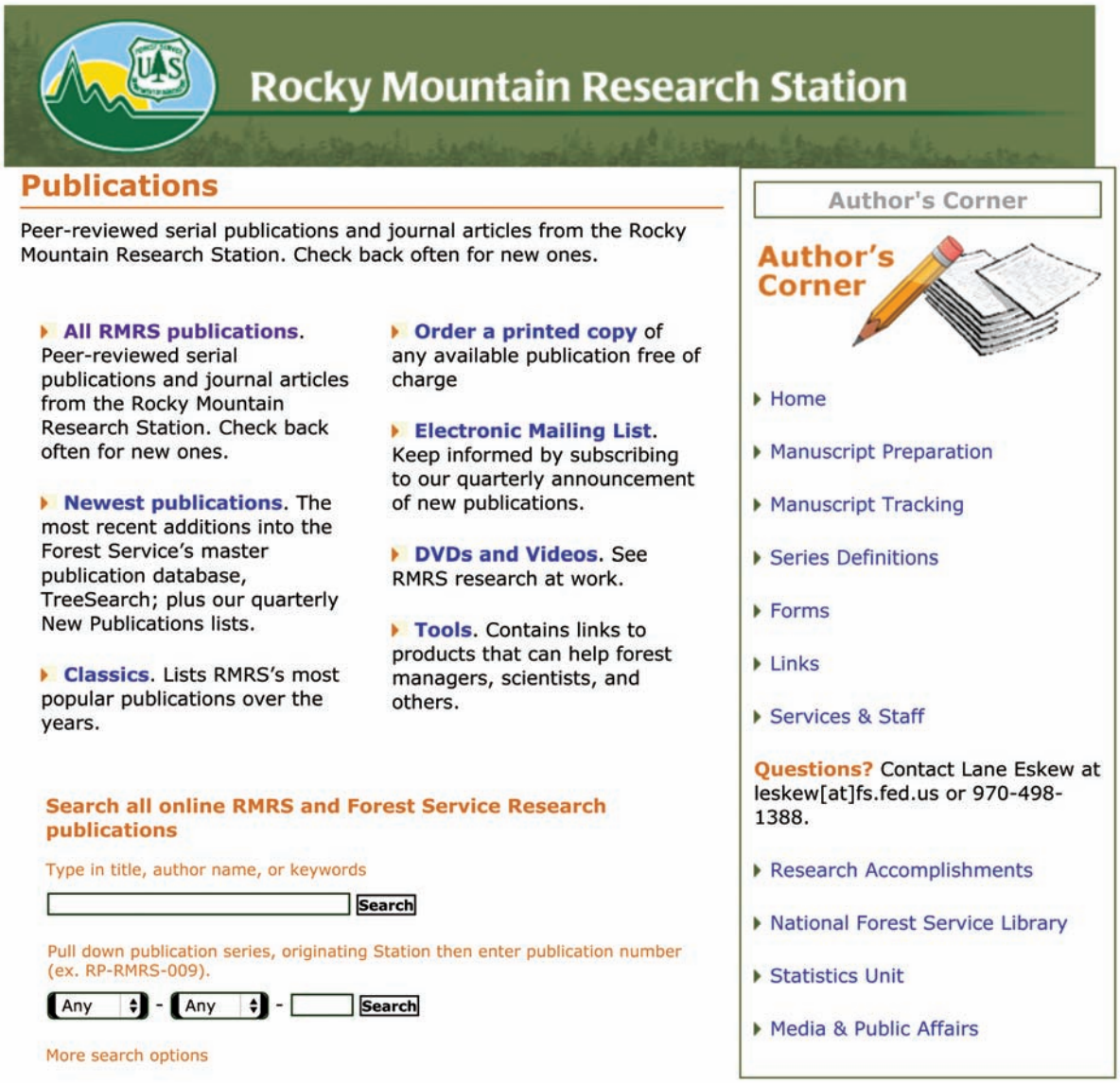

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Science Program Areas

The Rocky Mountain Research Station is evolving from a Station with 30 research work units (including ecosystem management units and national programs) to a comprehensive programmatic structure consisting of eight Science Program areas and several Research, Development and Applications programs. Descriptions of the Science Program areas follow below.

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. Website: http://www.fs.fed.us/rm/boise/awae_home.shtml. Contack Frank McCormick, Program Manager, for more information: 208-373-4351.

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.

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. Website: http://www.firelab.org. 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. Website: http://www.fs.fed.us/rmrs/research/programs/forest-woodlands-ecosystem/. Contact Tom Crow, Program Manager, for more information: 970-498-1378.

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. Website: http://www.fs.fed.us/rmrs/research/programs/grassland-shrubland-desert/. 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. Website: http://www.fs.fed.us/rmrs/research/programs/social-economics-decision/. contact Cindy Swanson, Program Manager for more information: 406-329-3388.

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. Website: http://www.fs.fed.us/rm/ogden/. Contact Michael Wilson 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.

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. Website: http://www.rmrs.nau.edu/wildlife/. Contact William Block, Program Manager, for more information: 928-556-2161.

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