Rocky Mountain Research Station

New Publications

October to December 2013

Integrated Science Working for You


Air, Water, and Aquatic Environments


Aldo Leopold Wilderness Research Institute


Fire, Fuel, and Smoke


Forest and Woodland Ecosystems


Grasslands, Shrublands, and Desert Ecosystems


Human Dimensions


Inventory, Monitoring, and Analysis


Science Application and Integration


Wildlife and Terrestrial Habitats

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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.

To order a publication, please see the last page.

New RMRS Series Publications

Great Basin Region: Fire effects on vegetation and soils

Order 46

A review of fire effects on vegetation and soils in the Great Basin Region: response and ecological site characteristics. Miller, Richard F.; Chambers, Jeanne C.; Pyke, David A.; Pierson, Fred B.; Williams, C. Jason. 2013. Gen. Tech. Rep. RMRS-GTR-308. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 126 p.

This review synthesizes the state of knowledge on fire effects on vegetation and soils in semi-arid ecosystems in the Great Basin Region, including the central and northern Great Basin and Range, Columbia River Basin, and the Snake River Plain. We summarize available literature related to: (1) the effects of environmental gradients, ecological site, and vegetation characteristics on resilience to disturbance and resistance to invasive species; (2) the effects of fire on individual plant species and communities, biological soil crusts, seed banks, soil nutrients, and hydrology; and (3) the role of fire severity, fire versus fire surrogate treatments, and post-fire grazing in determining ecosystem response. From this, we identify knowledge gaps and present a framework for predicting plant successional trajectories following wild and prescribed fires and fire surrogate treatments. Possibly the three most important ecological site characteristics that influence a site's resilience (ability of the ecological site to recover from disturbance) and resistance to invasive species are soil temperature/moisture regimes and the composition and structure of vegetation on the ecological site just prior to the disturbance event.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr308.html.

Carbon stored in harvested wood products

Order 47

Regional and forest-level estimates of carbon stored in harvested wood products from the United States Forest Service Northern Region, 1906-2010. Anderson, N.; Young, J.; Stockmann, K.; Skog, K.; Healey, S.; Loeffler, D.; Jones, J.G.; Morrison, J. 2013. Gen. Tech. Rep. RMRS-GTR-311. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 114 p.

Global forests capture and store significant amounts of CO_2 through photosynthesis. When carbon is removed from forests through harvest, a portion of the harvested carbon is stored in wood products, often for many decades. The United States Forest Service (USFS) and other agencies are interested in accurately accounting for carbon flux associated with harvested wood products (HWP) to meet greenhouse gas monitoring commitments and climate change adaptation and mitigation objectives. National-level forest carbon accounting has been in place for over a decade, but there is an increasing need for accounting at the scale of smaller administrative units, including USFS Regions and individual national forests. This paper uses the Intergovernmental Panel on Climate Change (IPCC) production accounting approach and the California Forest Project Protocol (CFPP) to estimate HWP carbon storage from 1906 to 2010 for the USFS Northern Region and its eleven national forests, which span northern Idaho, Montana, South Dakota, and eastern Washington. Together with estimates of ecosystem carbon, Regional and Forest-level estimates of HWP carbon flux can be used to inform management decisions and guide climate change adaptation and mitigation efforts by the agency. Though our emphasis is on national forests in the Northern Region, we provide a framework by which these accounting methods can be applied more broadly at sub-national scales to other regions, land management units, and firms.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr311.html.

To order a publication, please see the last page.

Desert Experimental Range: Bibliography

Online only

Desert Experimental Range: Annotated bibliography. McArthur, E. Durant; Kitchen, Stanley G. 2013. Gen. Tech. Rep. RMRS-GTR-312WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 52 p.

Entries qualify for inclusion if they were conducted in whole or part at the Desert Experimental Range (DER, also known as the Desert Range Experiment Station) or were based on DER research in whole or part. They do not qualify merely by the author having worked at the DER when the research was performed or prepared. Entries were drawn from the original abstracts or summaries when those were included in the original document. The conclusions are those of the original authors. Likewise, (1) taxonomic treatments are those of the original authors with our occasional annotations for clarification and (2) tense is that of the original. However if the original was presented in first person point of view it was modified to third person point of view to provide internal homogeneity in the document.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr312.html.

BAER post-fire road treatments

Order 48

Effectiveness of post-fire Burned Area Emergency Response (BAER) road treatments: Results from three wildfires. Foltz, Randy B.; Robichaud, Peter, R. 2013. Gen. Tech. Rep. RMRS-GTR-313. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 40 p.

Wildland fires often cause extreme changes in the landscape that drastically influence surface runoff and soil erosion, which can impact forest resources, aquatic habitats, water supplies, public safety, and forest access infrastructure such as forest roads. Little information is available on the effectiveness of various post-fire road treatments, thus this study was designed to evaluate common treatments implemented after fire. The 2006 Tripod Complex, 2007 Cascade Complex, and the 2008 Klamath Theater Complex Fires were selected because of their large size and extensive use of road treatments. Two of the three locations had below average precipitation and all three had precipitation that did not achieve the post-fire road treatment design storms. With this amount of precipitation testing, all of the treatments we monitored met the design objectives. All three of the locations had large soil loss in the first year after the fire followed by a quick recovery of ground cover to 40 to 50 percent at the end of year one. Soil loss from roadside hydromulch was not statistically significant from control (no treatment) on the Tripod Complex sites. Soil loss at the Cascade Complex sites was a statistically significant difference on the straw mulch compared to the control (no treatment), but there were no different pairwise differences among straw mulch, Polyacrylamide (PAM), and Woodstraw™. This suggests that the amount of cover is more important than the type of cover. Three studies and 5 years after beginning the studies, we think the best approach to assessing the effectiveness of post-fire BAER road treatments is to gain a limited knowledge of many sites along a road system rather than a detailed knowledge of a few sites.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr313.html.

To order a publication, please see the last page.

River/stream temperature monitoring protocol

Order 49

A simple protocol using underwater epoxy to install annual temperature monitoring sites in rivers and streams. Isaak, Daniel J.; Horan, Dona L.; and Wollrab, Sherry P. 2013. Gen. Tech. Rep. RMRS-GTR-314. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 21 p.

Thermal regimes in rivers and streams are fundamental determinants of biological processes and are often monitored for regulatory compliance. Here, we describe a simple technique for establishing annual monitoring sites that uses underwater epoxy to attach miniature sensors to large rocks and cement bridge supports, which then serve as protective anchors. More than 500 new monitoring sites were established using the technique from 2010 to 2012 in rivers and streams across the Rocky Mountains. Revisits to 179 sites indicate good sensor retention rates, with 88 - 100% of sensors retained after 1 year in low-gradient streams (<3%) and 70 - 78% retained in high-gradient streams (>3%). Establishing annual monitoring sites with underwater epoxy is inexpensive, can be done in a wide range of water temperatures, and improves data collection efficiency because few site visits are required and measurements are recorded throughout the year.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr314.html.

Wildfire risk assessment framework

Order 50

A wildfire risk assessment framework for land and resource management. Scott, Joe H.; Thompson, Matthew P.; Calkin, David E. 2013. Gen. Tech. Rep. RMRS-GTR-315. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 83 p.

Wildfires can result in significant, long-lasting impacts to ecological, social, and economic systems. It is necessary, therefore, to identify and understand the risks posed by wildland fire, and to develop cost-effective mitigation strategies accordingly. This report presents a general framework with which to assess wildfire risk and explore mitigation options, and illustrates a process for implementing the framework. Two key strengths of the framework are its flexibility - allowing for a multitude of data sources, modeling techniques, and approaches to measuring risk - and its scalability, with potential application for project, forest, regional, and national planning. The specific risk assessment process we introduce is premised on three modeling approaches to characterize wildfire likelihood and intensity, fire effects, and the relative importance of highly valued resources and assets that could be impacted by wildfire. The spatial scope of the process is landscape-scale, and the temporal scope is short-term (that is, the temporal dynamics of succession and disturbance are not simulated). We highlight key information needs, provide guidance for use of fire simulation models and risk geo-processing tools, and demonstrate recent applications of the framework across planning scales. The aim of this report is to provide fire and land managers with a helpful set of guiding principles and tools for assessing and mitigating wildfire risk.

Online: http://www.fs.fed.us/rm/pubs/rmrs_gtr315.html.

Montana's forest products industry and timber harvest

Order 51

Montana's forest products industry and timber harvest, 2009. McIver, Chelsea P.; Sorenson, Colin B.; Keegan, Charles E.; Morgan, Todd A.; Menlove, Jim. 2013. Resour. Bull. RMRS-RB-16. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 42 p.

This report traces the flow of Montana's 2009 timber harvest through the primary wood-using industries; provides a description of the structure, capacity, and condition of Montana's primary forest products industry; and quantifies volumes and uses of wood fiber. Historical wood products industry changes are discussed, as well as changes in harvest, production, employment, and sales.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rb016.html.

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Wildfire: Boulder County, Colorado

Online only

Understanding change: Wildfire in Boulder County, Colorado. Brenkert-Smith, Hannah; Champ, Patricia A.; Telligman, Amy L. 2013. Res. Note RMRS-RN-57. Fort Collins, CO: U.S. Department of Agriculture, Forest Service. 46 p.

Wildfire activity continues to plague communities in the American West. Three causes are often identified as key contributors to the wildfire problem: accumulated fuels on public lands due to a history of suppressing wildfires; climate change; and an influx of residents into fire prone areas referred to as the wildland-urban interface (WUI). The latter of these contributors is the focus of much attention. Encouraging homeowners to mitigate wildfire risk on private land has been identified as essential to reducing the devastating effects of wildfires. However, little is known about WUI residents' attitudes toward wildfire and what actions homeowners are taking to mitigate wildfire risk. This report presents the results of a unique homeowner survey administered twice over a three-year period. As such, we are able to provide some insight into changes in attitudes and beliefs about wildfire and concern about existing risk, as well as reported behavioral changes over time.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn057.html.

Wildfire: Larimer County, Colorado

Online only

Understanding change: Wildfire in Larimer County, Colorado. Brenkert-Smith, Hannah; Champ, Patricia A., Telligman, Amy L. 2013. Res. Note RMRS-RN-58. Fort Collins, CO: U.S. Department of Agriculture, Forest Service. 46 p.

Wildfire activity continues to plague communities in the American West. Three causes are often identified as key contributors to the wildfire problem: accumulated fuels on public lands due to a history of suppressing wildfires; climate change; and an influx of residents into fire prone areas referred to as the wildland-urban interface (WUI). The latter of these contributors is the focus of much attention. Encouraging homeowners to mitigate wildfire risk on private land has been identified as essential to reducing the devastating effects of wildfires. However, little is known about WUI residents' attitudes toward wildfire and what actions homeowners are taking to mitigate wildfire risk. This report presents the results of a unique homeowner survey administered twice over a three-year period. As such, we are able to provide some insight into changes in attitudes and beliefs about wildfire and concern about existing risk, as well as reported behavioral changes over time.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn058.html.

Forest inventory: Stratifying to reduce bias

Online only

Stratifying to reduce bias caused by high nonresponse rates: A case study from New Mexico's forest inventory. Goeking, Sara A.; Patterson, Paul L. 2013. Res. Note RMRS-RN-59. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 22 p.

The USDA Forest Service's Forest Inventory and Analysis (FIA) Program applies specific sampling and analysis procedures to estimate a variety of forest attributes. FIA's Interior West region uses post-stratification, where strata consist of forest/nonforest polygons based on MODIS imagery, and assumes that nonresponse plots are distributed at random across each stratum. The sample of New Mexico's forests during 2005-2013 did not meet this assumption due to a large number of private landowners who denied permission to access plots on their properties. We developed a modified stratification scheme to minimize bias in our estimates of forest attributes. The purpose of this paper is twofold: first, to document the customized stratification methods used for the New Mexico forest inventory of 2005-2013, and second, to provide sufficient instructions for application of this method to other states or inventories where high nonresponse rates occur.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn059.html.

To order a publication, please see the last page.

Harvest trip model for non-timber forest products

Online only

Insights from a harvest trip model for non-timber forest products in the interior of Alaska. Maher, Kimberley; Little, Joseph; Champ, Patricia A. 2013. Res. Note RMRS-RN-60. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 11 p.

The harvest of non-timber forest products (NTFP) for personal uses such as hobbies and handicrafts, cooking and canning, and recreation is an important pursuit for many residents in Alaska (Pilz and others 2006). Five categories of NTFP have been designated by the United Nations Food and Agricultural Organization: (1) foods; (2) medicinal plants; (3) floral greenery and horticulture products; (4) fiber and dye plants, lichens, and fungi; and (5) oils, resins, and chemicals extracted from plants, lichens, and fungi (McLain and Jones 2002). As noted by Alexander and others (2002), interest in the harvest and use of NTFP has grown in the United States. Such products are harvested from forests throughout the United States (McLain and Jones 2002). While attention has been directed toward commercial aspects of NTFP use and harvest, cultural, religious, and social considerations are also important (Jones and Lynch 2002).

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn060.html.

Log Hill Mesa: Living with wildfire

Online only

Living with wildfire in Log Hill Mesa, Colorado. Meldrum, James R.; Barth, Christopher M.; Falk, Lilia Colter; Brenkert-Smith, Hannah; Warziniack, Travis; Champ, Patricia. 2013. Res. Note RMRS-RN-66. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 34 p.

Over the past 50 years, Colorado has experienced an increase in the number and size of wildfires on its public and private lands. Nationwide, expenditures on wildfire suppression have increased for decades and now are measured in the billions of tax dollars. Current trends in climate changes, fuel accumulation from past wildfire suppression, and expansion of the wildland-urban interface (WUI), which means more development within areas of heightened wildfire potential, all suggest that continued increases in the costs of wildfires are likely.

Online: http://www.fs.fed.us/rm/pubs/rmrs_rn066.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

The climate velocity of the contiguous United States during the 20th century. Dobrowski, Solomon Z.; Abatzoglou, John; Swanson, Alan K.; Greenberg, Jonathan A.; Mynsberge, Alison R.; Holden, Zachary A.; Schwartz, Michael K. 2013. Global Change Biology. 19: 241-251. Online: http://treesearch.fs.fed.us/pubs/45045.

Integrated carbon budget models for the Everglades terrestrial-coastal-oceanic gradient: Current status and needs for inter-site comparisons. Troxler, T.G.; Gaiser, E.; Barr, J.; Fuentes, J.D.; Jaffe, R.; Childers, D.L.; Collado-Vides, L.; Rivera-Monroy, V.H.; Castaneda-Moya, E.; Anderson, W.; Chambers, R.; Chen, M.; Coronado-Molina, C.; Davis, S.E.; Engel, V.; Fitz, C.; Fourqurean, J.; Frankovich, T.; Kominoski, J.; Madden, C.; Malone, S.L.; Oberbauer, S.F.; Olivas, P.; Richards, J.; Saunders, C.; Schedlbauer, J.; Scinto, L.J.; Sklar, F.; Smith, T.; Smoak, J.M.; Starr, G.; Twilley, R.R.; Whelan, K. 2013. Oceanography. 26(3): 98-107. Online: http://treesearch.fs.fed.us/pubs/44226.

Rapid increases and time-lagged declines in amphibian occupancy after wildfire. Hossack, Blake R.; Lowe, Winsor H.; Corn, P. Stephen. 2012. Conservation Biology. 27(1): 219-228. Online: http://www.treesearch.fs.fed.us/pubs/43879.

Slope-area thresholds of road-induced gully erosion and consequent hillslope-channel interactions. Katz, Harry Alexander; Daniels, J. Michael; Ryan, Sandra. 2013. Earth Surface Processes

and Landforms. doi: 10.1002/esp.3443. Online: http://www.treesearch.fs.fed.us/pubs/45078.

Three decades of research at Flakaliden advancing whole-tree physiology, forest ecosystem and global change research. Ryan, Michael G. 2013. Tree Physiology. 33: 1123-1131.

Fire, fuel, and smoke

Comparing three sampling techniques for estimating fine woody down dead biomass. Keane, Robert E.; Gray, Kathy. 2013. International Journal of Wildland Fire. 22: 1093-1107.

Impacts of fire on invasive species, part 4: The 2002 Hayman Fire – Ecological benefit or catastrophe? An understory plant community perspective. Fornwalt, Paula. 2013. Weed Watch. 29(3): 14-15.

Laboratory characterization of PM emissions from combustion of wildland biomass fuels. Hosseini, Seyedehsan; Urbanski, Shawn; Dixit, P.; Li, Qi; Burling, Ian; Yokelson, Robert; Johnson, Timothy E.; Sharivastava, Manish; Jung, Heejung; Weise, David R.; Miller, Wayne; Cocker, David, III. 2013. Journal of Geophysical Research: Atmospheres. 118(17): 9914-9929. Online: http://www.treesearch.fs.fed.us/pubs/45243.

A new forest fire paradigm: The need for high-severity fires. Bond, Monica L.; Siegel, Rodney B.; Hutto, Richard L.; Saab, Victoria A.; Shunk, Stephen A. 2012. The Wildlife Professional. Winter 2012: 46-49. Online: http://treesearch.fs.fed.us/pubs/45042.

Understorey plant community dynamics following a large, mixed severity wildfire in a *Pinus ponderosa-Pseudotsuga menziesii* forest, Colorado, USA. Fornwalt, Paula J.; Kaufmann, Merrill R. 2013. Journal of Vegetation Science. doi:10.1111/jvs.12128.

Wildfire-migration dynamics: Lessons from Colorado's Four-mile Canyon Fire. Nawrotzki, Raphael J.; Brenkert-Smith, Hannah; Hunter, Lori M.; Champ, Patricia A. 2013. Society and Natural Resources. doi: 10.1080/08941920.2013.842275. Online: http://treesearch.fs.fed.us/pubs/45244.

Forest and woodland ecosystems

Armillaria phylogeny based on tef-1α sequences suggests ongoing divergent speciation within the boreal floristic kingdom. Klopfenstein, Ned B.; Hanna, John W.; Ross-Davis, Amy L.; Stewart, Jane E.; Ota, Yuko; Medel-Ortiz, Rosario; Lopez-Ramirez, Miguel Armando; Elias-Roman, Ruben Damian; Alvarado-Rosales, Dionicio; Kim, Mee-Sook. 2013. In: Browning, John; Palacios, Patsy, comps. Proceedings of the 60th Annual Western International Forest Disease Work Conference; October 8-12 October 2012; Tahoe City, CA. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Health Technology and Enterprise Team: 141-144. Online: http://www.treesearch.fs.fed.us/pubs/45085.

Commentary: Climate-driven tree mortality: Insights from the pinon pine die-off in the United States. Hicke, Jeffrey A.; Zeppel, Melanie J.B. 2013. New Phytologist. 200:301-303.

Contenedores: Aspectos técnicos, biológicos y económicos [Containers: Technical, biological, and economical aspects]. Luna, T.; Landis, T.D.; Dumroese, R.K. 2012. In: Contardi, L.; Gonda, H., cords. Producción de plantas en viveros forestales. Consejo Federal de Inversiones, Centro de Investigación y Estensión Forestal Andino Patagónico, y Universidad Nacional de la Patagonia San Juan Bosco. Colección nexos: 78-85.

Coram Experimental Forest at 80. Franz, Justin. 2013. Flathead Beacon. November 5 2013.

DNA-based approaches to identify forest fungi in Pacific Islands: A pilot study. Case, Anna E.; Ashiglar, Sara M.; Cannon, Phil G.; Militante, Ernesto P.; Tadiosa, Edwin R.; Quintos-Manalo, Mutya; Pampolina, Nelson M.; Hanna, John W.; Brooks, Fred E.; Ross-Davis, Amy L.; Kim, Mee-Sook; Klopfenstein, Ned B. 2013. In: Browning, John; Palacios, Patsy, comps. Proceedings of the 60th Annual Western International Forest Disease Work Conference; October 8-12 October 2012; Tahoe City, CA. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Health Technology and Enterprise Team: 149-151. Online: http://www.treesearch.fs.fed.us/pubs/45090.

DNA-based identification of *Armillaria* isolates from peach [*Prunus persica* (l.) batsch] orchards in México State, Mexico. Elias-Roman, Ruben D.; Klopfenstein, Ned B.; Kim, Mee-Sook; Alvarado-Rosales, Dionicio; Hanna, John W.; Ross-Davis, Amy L.; Guzman-Plazola, Remigio Anastacio; Calderon-Zavala, Guillermo; Mora-Aguilera, Antonio. 2013. In: Browning, John; Palacios, Patsy, comps. Proceedings of the 60th Annual Western International Forest Disease Work Conference; October 8-12 October 2012; Tahoe City, CA. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Health Technology and Enterprise Team: 145-147. Online: http://www.treesearch.fs.fed.us/pubs/45089.

Effect of increasing temperatures on the distribution of spruce beetle in Engelmann spruce forests of the Interior West, USA. DeRose, R. Justin; Bentz, Barbara J.; Long, James N.; Shaw, John D. 2013. Forest Ecology and Management. 308: 198-206. Online: http://treesearch.fs.fed.us/pubs/45076.

Effects of climatic gradients on genetic differentiation of *Caragana* on the Ordos Plateau, China. Yang, Jiuyan; Cushman, Samuel A.; Yang, Jie; Yang, Mingbo; Bao, Tiejun. 2013. Landscape Ecology. doi: 10.1007/s10980-013-9913-x. Online: http://www.treesearch.fs.fed.us/pubs/45077.

Fall fertilization enhanced nitrogen storage and translocation in *Larix olgensis* seedlings. Zhu, Y.; Dumroese, R.K.; Pinto, J.R.; Li, G.L.; Liu, Y. 2013. New Forests. 44: 849-861.

Effect of strain and cultural conditions on the production of cytochalasin B by the potential mycoherbicide *Pyrenophora semeniperda* (Pleosporacee, Pleosporales). Masi, Marco; Evidente, Antonio; Meyer, Susan; Nicholson, Joshua; Munoz, Ashley. 2013. Biocontrol Science and Technology. 24(1): 53-64.

Fases de cultivo: Establecimiento y crecimiento rápido [Phases of culture: Establishment and rapid growth]. Dumroese, R.K.; Jacobs, D.F.; Wilkinson, K.M. 2012. In: Contardi, L.;

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Gonda, H., cords. Producción de plantas en viveros forestales. Consejo Federal de Inversiones, Centro de Investigación y Estensión Forestal Andino Patagónico, y Universidad Nacional de la Patagonia San Juan Bosco. Colección nexos: 132-142.

From diagnostics to metagenomics: Applications of DNA-based tools in forest pathology. Ross-Davis, Amy L.; Kim, Mee-Sook; Stewart, Jane E.; Hanna, John W.; Shaw, John D.; Klopfenstein, Ned B. 2013. In: Browning, John; Palacios, Patsy, comps. Proceedings of the 60th Annual Western International Forest Disease Work Conference; October 8-12 October 2012; Tahoe City, CA. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Forest Health Technology and Enterprise Team: 91-99. Online: http://www.treesearch.fs.fed.us/pubs/45082.

Morphology, gas exchange, and chlorophyll content of long-leaf pine seedlings in response to rooting volume, copper root pruning, and nitrogen supply in a container nursery. Dumroese, R. Kasten; Sung, Shi-Jean Susana; Pinto, Jeremiah R.; Ross-Davis, Amy; Scott, D. Andrew. 2013. New Forests. 44: 881-897.

Plantificación y registros [Planning and records]. Dumroese, R.K.; Jacobs, D.F.; Wilkinson, K.M. 2012. In: Contardi, L.; Gonda, H., cords. Producción de plantas en viveros forestales. Consejo Federal de Inversiones, Centro de Investigación y Estensión Forestal Andino Patagónico, y Universidad Nacional de la Patagonia San Juan Bosco. Colección nexos: 126-130.

Precipitation thresholds and drought-induced tree die-off: Insights from patterns of *Pinus edulis* mortality along an environmental stress gradient. Clifford, Michael J.; Royer, Patrick D.; Cobb, Neil S.; Breshears, David D.; Ford, Paulette L. 2013. New Phytologist. 200: 413-421. Online: http://www.treesearch.fs.fed.us/pubs/43777.

Producción de plantas grandes usando minicontenedores [Production of large plants using mini-plugs]. Dumroese, R.K.; Landis, T.D. 2012. In: Contardi, L.; Gonda, H., cords. Producción de plantas en viveros forestales. Consejo Federal de Inversiones, Centro de Investigación y Estensión Forestal Andino Patagónico, y Universidad Nacional de la Patagonia San Juan Bosco. Colección nexos: 164-169.

Productivity and soil properties 45 years after timber harvest and mechanical site preparation in western Montana. Cerise, Luke M.; Page-Dumroese, Deborah S.; McDaniel, Paul; Mayn, Cole; Heinse, Robert. 2013. Western Journal of Applied Forestry. 28(4): 158-165.

Riego y fertirriego. [Irrigation and fertigation]. Dumroese, R.K.; Landis, T.D.; Wilkinson, K.M. 2012. In: Contardi, L.; Gonda, H., cords. Producción de plantas en viveros forestales. Consejo Federal de Inversiones, Centro de Investigación y Estensión Forestal Andino Patagónico, y Universidad Nacional de la Patagonia San Juan Bosco. Colección nexos: 115-125.

The role of temperature variability in stabilizing the mountain pine beetle-fungus mutualism. Addison, A.L.; Powell, J.A.; Six, D.L.; Moore, M.; Bentz, B.J. 2013. Journal of Theoretical Biology. 335: 40-50. Online: http://www.treesearch.fs.fed.us/pubs/45081.

Rust disease of eucalypts, caused by *Puccinia psidii*, did not originate via host jump from guava in Brazil. Graca, Rodrigo N.; Ross-Davis, Amy L.; Klopfenstein, Ned B.; Kim, Mee-Sook; Peever, Tobin L.; Cannon, Phil G.; Aun, Cristina P.; Mizubuti, Eduardo G.; Alfenas, Acelino C. 2013. Molecular Ecology. doi: 10.1111/mec.12545. Online: http://www.treesearch.fs.fed.us/pubs/45171.

Grasslands, shrublands, and desert ecosystems

Biotic resistance: Exclusion of native rodent consumers releases populations of a weak invader. Pearson, Dean E.; Potter, Teal; Maron, John L. 2012. Journal of Ecology. 100: 1383-1390. Online: http://treesearch.fs.fed.us/pubs/44810.

First report of *Puccinia psidii* caused rust disease epiphytotic on the invasive shrub *Rhodomyrtus tomentosa* in Florida. Rayamajhi, M.B.; Pratt, P.D.; Klopfenstein, N.B.; Ross-Davis, A.L.; Rodgers, L. 2013. Plant Disease. 97(10): 1379. Online: http://www.treesearch.fs.fed.us/pubs/45084.

GSD Update: Strategies for understanding and controlling species invasions. Finch, Deborah M. 2013. October 2013. Albuquerque, NM: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 9 p. Online: http://treesearch.fs.fed.us/pubs/45019.

In this issue:

- Long-term experimental areas add value for studying species invasions
- Biological control: Preference, performance and confounding influences
- Is all cheatgrass created equal, or are some cheatgrass ecotypes more equal than others?
- Mountain pine beetle outbreaks affect invasive plants
- Nonnative plants: A pro or con for riparian-nesting birds

Resilience to stress and disturbance, and resistance to *Bromus tectorum* L. invasion in cold desert shrublands of western North America. Chambers, Jeanne C.; Bradley, Bethany A.; Brown, Cynthia S.; D'Antonio, Carla; Germino, Matthew J.; Grace, James B.; Hardegree, Stuart P.; Miller, Richard F.; Pyke, David A. 2013. Ecosystems. doi:10.1007/s10021-013-9725-5.

Seed size and provenance mediate the joint effects of disturbance and seed predation on community assembly. Maron, John L.; Pearson, Dean E.; Potter, Teal; Ortega, Yvette K. 2012. Journal of Ecology. 100: 1492-1500. Online: http://treesearch.fs.fed.us/pubs/44811.

Spotted knapweed: Effects of climate change on the invasiveness and biological control. Ortega, Yvette; Pearson, Dean. 2013. In: Fornwalt, Paula. Invasive Species Science Update (No. 6). Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 4. Online: http://treesearch.fs.fed.us/pubs/45073.

Human dimensions

EXPLORE: Upland Young Forest Trail. Franz, Justin. Flathead Beacon. November 10, 2013.

Inventory, monitoring, and analysis

Comparison of standard maximum likelihood classification and polytomous logistic regression used in remote sensing. Hogland, John; Billor, Nedret; Anderson, Nathaniel. 2013. European Journal of Remote Sensing. 46: 623-640. Online: http://www.treesearch.fs.fed.us/pubs/45175.

Properties of endogenous post-stratified estimation using remote sensing data. Tipton, John; Opsomer, Jean; Moisen, Gretchen. 2013. Remote Sensing of Environment. 139: 130-137.

Science application and integration

Biogeography of plant invasions. Pearson, Dean; Ortega, Yvette. 2013. In: Fornwalt, Paula. Invasive Species Science Update (No. 6). Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 2-3. Online: http://treesearch.fs.fed.us/pubs/45072.

Ensemble modeling to predict habitat suitability for a large-scale disturbance specialist. Latif, Quresh S.; Saab, Victoria A.; Dudley, Jonathan G.; Hollenbeck, Jeff P. 2013. Ecology and Evolution. 3(13):4348-4364. Online: http://www.treesearch.fs.fed.us/pubs/45064.

Evidence supporting the need for a common soil monitoring protocol. Reeves, Derrick A.; Coleman, Mark D.; Page-Dumroese, Deborah S. 2013. Journal of Ecosystems & Management. 14(1): 1-16.

Incidence and phylogenetic analyses of Armillaria spp. associated with root disease in peach orchards in the State of Mexico, Mexico. Elias-RA.; Kim, M.-S.; Garcia-Espinosa, R. 2013. Forest Pathology. 43: 390-401. Online: http://www.treesearch.fs.fed.us/pubs/45086.

Large landscape conservation-synthetic and real-world datasets. Dilkina, Bistra; Lai, Katherine; Le Bras, Ronan; Xue, Yexiang; Gomes, Carla P.; Sabharwal, Ashish; Suter, Jordan; McKelvey, Kevin S.; Schwartz, Michael K.; Montgomery, Claire. 2013. In: Proceedings of the Twenty-Seventh AAAI Conference on Artificial Intelligence. 27: 1369-1372. Online: http://treesearch.fs.fed.us/pubs/45053.

Modeling the effects of dispersal and patch size on predicted fisher (*Pekania [Martes] pennanti*) distribution in the U.S. Rocky Mountains. Olson, Lucretia E.; Sauder, Joel D.; Albrecht, Nathan M.; Vinkey, Ray S.; Cushman, Samuel A.; Schwartz, Michael K. 2014. Biological Conservation. 169: 89-98. Online: http://treesearch.fs.fed.us/pubs/45266.

A national approach for integrating wildfire simulation modeling into Wildland Urban Interface risk assessments within the United States. Haas, Jessica R.; Calkin, David E.; Thompson, Matthew P. 2013. Landscape and Urban Planning. 119: 44-53. Online: http://www.treesearch.fs.fed.us/pubs/44720.

Observation of trends in biomass loss as a result of disturbance in the conterminous U.S.: 1986-2004. Powell, Scott L.; Cohen, Warren B.; Kennedy, Robert E.; Healey, Sean P.; Huang, Chengquan. 2013. Ecosystems. doi: 10.1007/s10021-013-9713-9. Online: http://treesearch.fs.fed.us/pubs/45174.

A polygon-based modeling approach to assess exposure of resources and assets to wildfire. Thompson, Matthew P.; Scott, Joe; Kaiden, Jeffrey D.; Gilbertson-Day, Julie W. 2013. Natural Hazards. 67: 627-644. Online: http://www.treesearch.fs.fed.us/pubs/45018.

Putting science into action on Forest Service Lands [Chapter 5]. Block, William M.; Saab, Victoria A.; Ruggiero, Leonard. 2012. In: Sands, J. P.; DeMaso, S. J.; Schnupp, M. J.; Brennan, L. A., eds. Wildlife science: Connecting research with management. Boca Raton, FL: CRC Press: 49-62. Online: http://treesearch.fs.fed.us/pubs/44812.

Robust network design for multispecies conservation. Le Bras, Ronan; Dilkina, Bistra; Xue, Yexiang; Gomes, Carla P.; McKelvey, Kevin S.; Schwartz, Michael K.; Montgomery, Claire A. 2013. In: Proceedings of the Twenty-Seventh AAAI Conference on Artificial Intelligence. 27: 1305-1312. Online: http://treesearch.fs.fed.us/pubs/45062.

Using habitat models for habitat mapping and monitoring. Cushman, Samuel A.; Mersmann, Timothy J.; Moisen, Gretchen G.; McKelvey, Kevin S.; Vojta, Christina D. 2013. In: Rowland, M.M.; Vojta, C.D.; tech. eds. 2013. A technical guide for monitoring wildlife habitat. Gen. Tech. Rep. WO-89. Washington, DC: U.S. Department of Agriculture, Forest Service. 14 p. Online: http://treesearch.fs.fed.us/pubs/45218.

Wildlife and terrestrial habitats

Breed locally, disperse globally: Fine-scale genetic structure despite landscape-scale panmixia in a fire-specialist. Pierson, Jennifer C.; Allendorf, Fred W.; Drapeau, Pierre; Schwartz, Michael K. 2013. PLoS One 8(6): e67248. Online: http://treesearch.fs.fed.us/pubs/45071.

Combined use of mark-recapture and genetic analyses reveals response of a black bear population to changes in food productivity. McCall, Barbara S.; Mitchell, Michael S.; Schwartz, Michael K.; Hayden, Jim; Cushman, Samuel A.; Zager, Pete; Kasworm, Wayne F. 2013. Journal of Wildlife Management. doi: 10.1002/jwmg.617. Online: http://treesearch.fs.fed.us/pubs/45075.

Combining resource selection and movement behavior to predict corridors for Canada lynx at their southern range periphery. Squires, John R.; DeCesare, Nicholas J.; Olson, Lucretia E.; Kolbe, Jay A.; Hebblewhite, Mark; Parks, Sean A. 2013. Biological Conservation. 157: 187-195. Online: http://treesearch.fs.fed.us/pubs/43874.

Conservation genetics of the genus Martes: Assessing within-species movements, units to conserve, and connectivity across ecological and evolutionary time [Chapter 17]. Schwartz, Michael K.; Ruiz-Gonzalez, Aritz; Masuda, Ryuchi; Pertoldi, Cino. 2012. In: Aubry, Keith B.; Zielinski, William J.; Raphael, Martin G.; Proulx, Gilbert; Buskirk, Steven W., eds. Biology and Conservation of Martens, Sables, and Fishers. Ithaca, NY: Cornell University Press: 398-428. Online: http://treesearch.fs.fed.us/pubs/45044.

To order a publication, please see the last page

Den use and activity patterns in female Canada lynx (*Lynx Canadensis*) in the northern Rocky Mountains. Olson, Lucretia E.; Squires, John R.; DeCesare, Nicholas J.; Kolbe, Jay A. 2011. Northwest Science. 85(3): 455-462. Online: http://treesearch.fs.fed.us/pubs/44989.

Evaluating population connectivity for species of conservation concern in the American Great Plains. Cushman, Samuel A.; Landguth, Erin L.; Flather, Curtis H. 2013. Biodiversity and Conservation. doi: 10.1007/s10531-013-0541-1. Online: http://www.treesearch.fs.fed.us/pubs/45080.

Genetic sampling of Palmer's chipmunks in the Spring Mountains, Nevada. McKelvey, Kevin S.; Ramirez, Jennifer E.; Pilgrim, Kristine L.; Cushman, Samuel A.; Schwartz, Michael K. 2013. The Western North American Naturalist. 73(2): 198-210. Online: http://treesearch.fs.fed.us/pubs/45074.

Keep trophy records honest: Identifying whitetail/mule deer hybrids. Heffelfinger, Jim; Prive, Renee; Paetkau, David; Alcalá-Galván, Carlos; Lopez, Roy; Kornfield, Irv; Buckner, Eldon "Buck." 2012. Fair Chase. 27(4): 66-70.

Meta-analyses of habitat selection by fishers at resting sites in the Pacific coastal region. Aubry, Keith B.; Raley, Catherine M.; Buskirk, Steven W.; Zielinski, William J.; Schwartz, Michael K.; Golightly, Richard T.; Purcell, Kathryn L.; Weir, Richard D.; Yaeger, J. Scott. 2013. The Journal of Wildlife Management. 77(5): 965-974.

Mexican Spotted Owl Recovery Plan, First Revision (*Strix occidentalis lucida*). U.S. Fish and Wildlife Service, Mexican Spotted Owl Recovery Team. 2012. Albuquerque, NM: U.S. Fish and Wildlife Service, Southwest Region. Online: http://treesearch.fs.fed.us/pubs/45043.

Missing lynx and trophic cascades in food webs: A reply to Ripple et al. Squires, John R.; DeCesare, Nicholas J.; Hebblewhite, Mark; Berger, Joel. 2012. Wildlife Society Bulletin. 36(3): 567-571. Online: http://treesearch.fs.fed.us/pubs/44809.

Non-native plants and wildlife in the Intermountain West. Litt, Andrea R.; Pearson, Dean E. 2013. Wildlife Society Bulletin. doi: 10.1002/wsb.306. Online: http://treesearch.fs.fed.us/pubs/45061.

Response of nesting northern goshawks to logging truck noise in northern Arizona. Grubb, Teryl G.; Pater, Larry L.; Gatto, Angela E.; Delaney, David K. 2013. Journal of Wildlife Management. 77(8): 1618-1625. Online: http://treesearch.fs.fed.us/pubs/45066.

A risk-based approach to evaluating wildlife demographics for management in a changing climate: A case study of the Lewis's Woodpecker. Towler, Erin; Saab, Victoria A.; Sojda, Richard S.; Dickinson, Katherine; Bruyere, Cindy L.; Newlon, Karen R. 2012. Environmental Management. 50: 1152-1163. Online: http://treesearch.fs.fed.us/pubs/44808.

Snag distributions in relation to human access in ponderosa pine forests. Hollenbeck, Jeff P.; Bate, Lisa J.; Saab, Victoria A.; Lehmkuhl, John F. 2013. Wildlife Society Bulletin. 37(2): 256-266. Online: http://treesearch.fs.fed.us/pubs/45065.

Spatially explicit power analysis for occupancy-based monitoring of wolverine populations in the U.S. Ellis, Martha M.; Ivan, Jacob S.; Schwartz, Michael K. 2013. Conservation Biology. doi: 10.1111/cobi.12139. Online: http://treesearch.fs.fed.us/pubs/45052.

Stand- and landscape-scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Schwartz, Michael K.; DeCesare, Nicholas J.; Jimenez, Benjamin S.; Copeland, Jeffrey P.; Melquist, Wayne E. 2013. Forest Ecology and Management. 305: 103-111. Online: http://treesearch.fs.fed.us/pubs/45068.

Space-use and habitat associations of Black-backed Woodpeckers (*Picoides arcticus*) occupying recently disturbed forests in the Black Hills, South Dakota. Rota, Christopher T.; Rumble, Mark A.; Millspaugh, Joshua J.; Lehman, Chadwick P.; Kesler, Dylan C. 2014. Forest Ecology and Management. 313: 161-168.

Stand- and landscape-scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Schwartz, Michael K.; DeCesare, Nicholas J.; Jimenez, Benjamin S.; Copeland, Jeffrey P.; Melquist, Wayne E. 2013. Forest Ecology and Management. 305: 103-111. Online: http://treesearch.fs.fed.us/pubs/45068.

Translocation as a conservation tool for Agassiz's desert tortoises: Survivorship, reproduction, and movements. Nussear, K.E.; Tracy, C.R.; Medica, P.A.; Wilson, D.S.; Marlow, R.W.; Corn, P.S. 2012. The Journal of Wildlife Management. 76: 1341-1353. doi:10.1002/jwmg.390.

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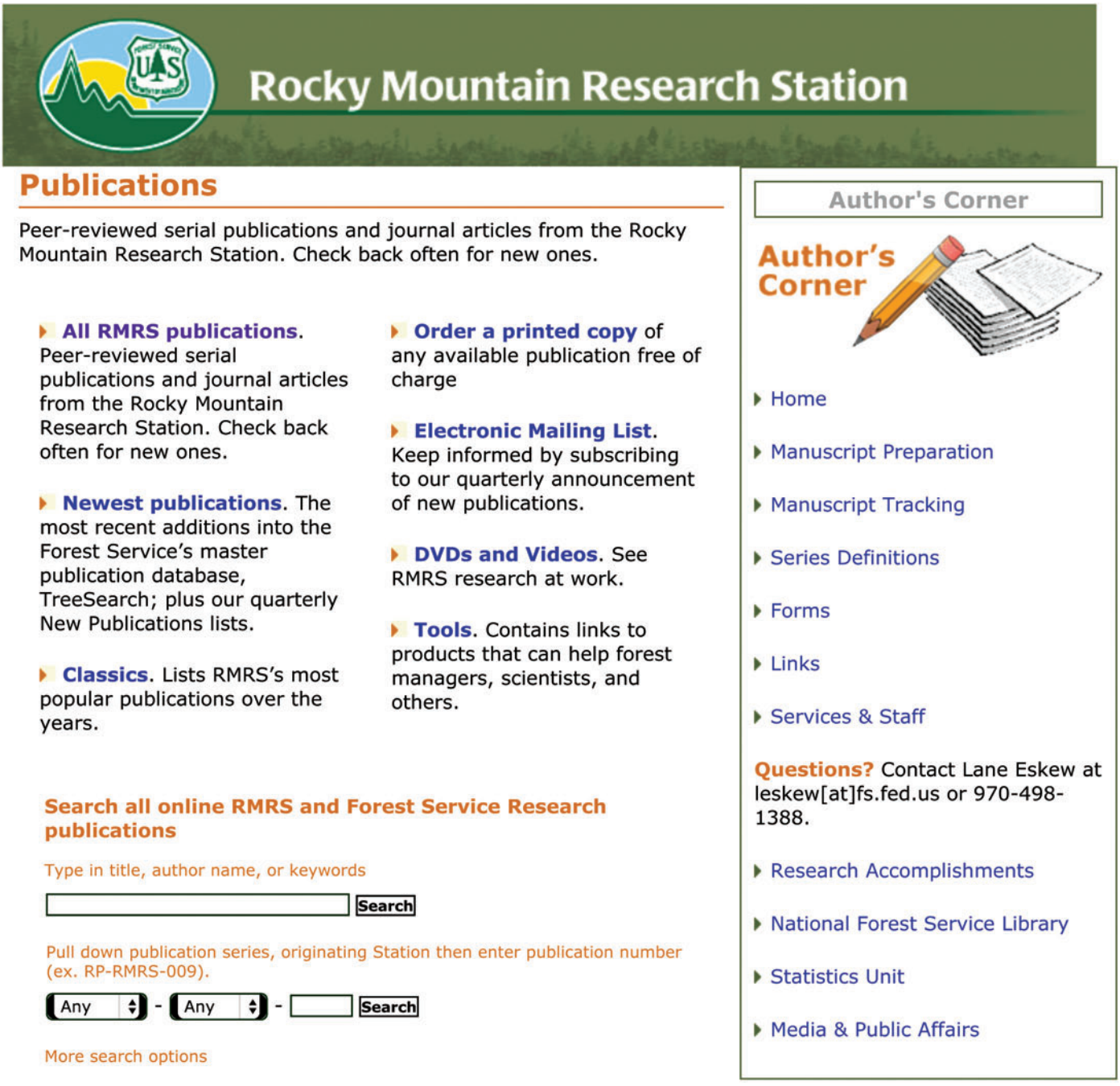

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Science Program Areas

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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