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Rocky Mountain Research Station

New Publications

April-June 2019

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The Rocky Mountain Research Station

The Rocky Mountain Research Station is one of seven regional units that make up the U.S. Forest Service Research and Development organization.

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 percent of the nation's National Forest System lands (54 national forests and grasslands). In the lower 48 States, our territory also includes 55 percent of the nation's Bureau of Land Management lands; 48 percent of the designated wildernesses; 37 percent of National Park Service lands; numerous other public and tribal lands; and 41 percent 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.

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New RMRS Publication Series

Guidelines for aspen restoration in Utah with applicability to the Intermountain West

Print copies will be available

Guidelines for aspen restoration in Utah with applicability to the Intermountain West. Kitchen, Stanley G.; Behrens, Patrick N.; Goodrich, Sherel K.; Green, Ashley; Guyon, John; O'Brien, Mary; Tart, David. 2019. Gen. Tech. Rep. RMRS-GTR-390. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 55 p.

As highly productive and biologically diverse communities, healthy quaking aspen (*Populus tremuloides*; hereafter aspen) forests provide a wide range of ecosystem services across western North America. Western aspen decline during the last century has been attributed to several causes and their interactions, including altered fire regimes, drought, excessive use by domestic and wild ungulates, and conifer encroachment. In these guidelines, we detail a process for making step-by-step decisions about aspen restoration. The steps are: (1) assessment of aspen condition, (2) identification of problematic conditions, (3) determination of causal factors, (4) selection of appropriate response options, (5) monitoring for improvement, and (6) assessment and adaptation. We describe the need for reference areas in which the full range of natural environmental conditions and ecosystem processes associated with aspen can be observed and quantified, and provide a list of example sites for Utah. These guidelines provide a road map for decision makers to adaptively manage aspen in a time of increasing environmental stress and in anticipation of an uncertain future.

https://www.fs.usda.gov/treesearch/pubs/57976

FIRE-BIRD: A GIS-based toolset for applying habitat suitability models to inform land management planning

Online only

FIRE-BIRD: A GIS-based toolset for applying habitat suitability models to inform land management planning. Latif, Quresh S.; Saab, Victoria A.; Haas, Jessica R.; Dudley, Jonathan G. 2018. Gen. Tech. Rep. RMRS-GTR-391. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 74 p.

Habitat suitability models can inform forest management for species of conservation concern. Models quantify relationships between known species locations and environmental attributes, which are used to identify areas most likely to support species of concern. Managers can then limit negative human impacts in areas of high suitability or conduct habitat improvements in areas of marginal suitability. Model applications are computationally intensive, requiring time and resources not available to most managers. We developed FIRE-BIRD, an ArcGIS toolbox, to streamline preliminary data processing and application of habitat suitability models to forest management planning for disturbance-associated woodpeckers of conservation concern. Tools are currently developed for black-backed (*Picoides arcticus*) and white-headed woodpecker (*Dryobates albolvartus*) in Inland Northwest burned forests; black-backed, white-headed, and hairy woodpecker (*D. villosus*) in Northern Sierra burned forests; and white-headed woodpecker in Inland Northwest unburned forests. This manual provides tool operating instructions and guidelines to interpret resulting habitat suitability maps. Incorporating additional species and forest conditions in the future will broaden the scope of this toolset.

https://www.fs.usda.gov/treesearch/pubs/58166

Journals and Other Publications

Online links are provided if available. For the general public, some links may hit a pay wall. Please accept our apologies for any inconvenience.

Air, water and aquatic environments

Formation of post-fire water repellent layers on *Nothofagus glauca* (Hualo) forests, after the historical "Las Máquinas" wildfire in south-central Chile Garcia-Chevesich, Pablo A.; Martinez, Eduardo; Garcia, Alejandro; Castillo, Miguel; Garfias, Roberto; Neary, Daniel; Pizarro, Roberto; Valdes, Rodrigo; Gonzalez, Luis; Venegas-Quinones, Hector L.; Magni, Carlos. 2019. American Journal of Environmental Sciences. DOI: 10.3844/ajessp.201. https://www.fs.usda.gov/treesearch/pubs/58222

Identifying old trees to inform ecological restoration in montane forests of the central Rocky Mountains, USA. Brown, Peter M.; Gannon, Benjamin; Battaglia, Mike A.; Fornwalt, Paula J.; Huckaby, Laurie S.; Cheng, Antony S.; Baggett, L. Scott. 2019. Tree-Ring Research. 75(1): 34-48. https://www.fs.usda.gov/treesearch/pubs/57872

Impacts of bio-based energy generation fuels on water and soil resources. Neary, D.G. Chapter 7: In: Tsvetkov, P. (ed.) Energy systems and environment. DOI: 10.5772/intechopen.71167

Physical vulnerabilities from wildfires: Flames, floods and debris flows. Neary, Daniel G.; Leonard, Jackson M. 2019. Human Impact on the Environment. In: Nasar, H, Human Impact on the Environment. DOI: 10.5772/intechopen.87203. https://www.fs.usda.gov/treesearch/pubs/58223

Potential effects of climate change on riparian areas, wetlands, and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA. Dwire, Kathleen A.; Mellmann-Brown, Sabine; Gurrieri, Joseph T. 2018. Climate Services. 10: 44-52. https://www.fs.usda.gov/treesearch/pubs/57868

Wildfire contribution to desertification at local, regional, and global scales. Neary, D.G. 2019. In: Squires, V.R.; Ariapour, A. 2019. Desertification: Past, current, and future trends, Nova Science Publishers, New York. p. 199-222. https://www.fs.usda.gov/treesearch/pubs/58221

Fire, fuel and smoke

Artemisia tridentata subsp. wyomingensis. Innes, Robin J. 2019. Wyoming big sagebrush. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/shrub/arttriw/all.html [2019, May 31].

The California Tree Mortality Data Collection Network - Enhanced communication and collaboration among scientists and stakeholders. Axelson, Jodi; Battles, John; Bulaon, Beverly; Cluck, Danny; Cousins, Stella; Cox, Lauren; Estes, Becky; Fettig, Chris; Hefty, Andrea; Hishinuma, Stacy; Hood, et al. 2019. California Agriculture. 73(2): 55-62. https://www.fs.usda.gov/treesearch/pubs/58215

Conflicting functional effects of xylem pit structure relate to the growth-longevity trade-off in a conifer species. Roskilly, Beth; Keeling, Eric; Hood, Sharon; Giuggiola, Arnaud; Sala, Anna. 2019. PNAS. doi: /10.1073/pnas.1900734116. https://www.fs.usda.gov/treesearch/pubs/58200

Echinocereus triglochidiatus. Fryer, Janet L.; Matthews, Robin F. 2018. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: Available: https://www.fs.fed.us/database/feis/plants/cactus/echtri/all.html [2019, July 1].

Fire regimes of ponderosa pine (*Pinus ponderosa*) ecosystems in Colorado: A systematic review and meta-analysis. McKinney, Shawn T. 2019. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/fire_regimes/CO_ponderosa_pine/ all.pdf

Fire regimes of juniper communities in the Columbia and Great basins. Murphy, Shannon K.; Fryer, Janet L. 2019. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/fire_regimes/Columbia_GB_juniper /all.html

Juniperus occidentalis. Fryer, Janet L.; Tirmenstein, D. 2009 (revised from 1999). In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/tree/junocc/all.html [2019, June 26].

Soil carbon and nitrogen eroded after severe wildfire and erosion mitigation treatments. Pierson, Derek N.; Robichaud, Peter R.;

Journals and Other Publications

Online links are provided if available. For the general public, some links may hit a pay wall. Please accept our apologies for any inconvenience.

Rhoades, Charles C.; Brown, Robert E. 2019. International Journal of Wildland Fire. doi: 10.1071/WF18193. https://www.fs.usda.gov/treesearch/pubs/58220

Forest and woodland ecosystems

An assessment of fire refugia importance criteria ranked by land managers. Barros, Tania; Carvalho, Joao; Fonseca, Carlos; Cushman, Samuel A. 2019. European Journal of Wildlife Research. 65: 44. https://www.fs.usda.gov/treesearch/pubs/58138

An assessment of fire refugia importance criteria ranked by land managers. Martinez, Anthony; Meddens, Arjan; Kolden, Crystal; Hudak, Andrew. 2019. Fire. 2: 27. https://www.fs.usda.gov/treesearch/pubs/58072

Armillaria altimontana* is associated with healthy western white pine (*Pinus monticola*): Potential in situ biological control of the Armillaria root disease pathogen, A. *solidipes. Warwell, Marcus V.; McDonald, Geral I.; Hanna, John W.; Kim, Mee-Sook; Lalande, Bradley M.; Stewart, Jane E.; Hudak, Andrew T.; Klopfenstein, Ned B. 2019. Forests. 10: 294. https://www.fs.usda.gov/treesearch/pubs/58046

Characterizing persistent unburned islands within the Inland Northwest USA. Martinez, Anthony J.; Meddens, Arjan J. H.; Kolden, Crystal A.; Strand, Eva K.; Hudak, Andrew T. 2019. Characterizing persistent unburned islands within the Inland Northwest USA. Fire Ecology. 15: 20. https://www.fs.usda.gov/treesearch/pubs/58199

Contrasting use of habitat, landscape elements, and corridors by grey wolf and golden jackal in central Iran. Shahnaseri, Gilda; Hemami, Mahmoud-Reza; Khosravi, Rasoul; Malakoutikhah, Shima; Omidi, Maryam; Cushman, Samuel A. 2019. Landscape Ecology. doi:10.1007/s10980-019-00831-w. https://www.fs.usda.gov/treesearch/pubs/58141

Developmental parameters of a southern mountain pine beetle (*Coleoptera: Curculionidae)* population reveal potential source of latitudinal differences in generation time. McManis, Anne E.; Powell, James A.; Bentz, Barbara J. 2019. The Canadian Entomologist. 151: 1-15.https://www.fs.usda.gov/treesearch/pubs/58217

Estimation of changes of forest structural attributes at three different spatial aggregation levels in Northern California using multitemporal LiDAR. Mauro, Francisco; Ritchie, Martin; Wing, Brian; Frank, Bryce; Monleon, Vicente; Temesgen, Hailemariam; Hudak, Andrew. 2019. Remote Sensing.11: 923. https://www.fs.usda.gov/treesearch/pubs/58073

Evaluation of the FVS-CR diameter growth model in structural-lyheterogeneous ponderosa pine (*Pinus ponderosa* Douglas ex C. Dickinson, Yvette L.; Battaglia, Michael A.; Asherin, Lance A. 2019. . Forest Ecology and Management. 448: 1-10. https://www.fs.usda.gov/treesearch/pubs/58187

Examining post-fire vegetation recovery with Landsat time series analysis in three western North American forest types. Bright, Benjamin C.; Hudak, Andrew T.; Kennedy, Robert E.; Braaten, Justin D.; Khalyani, Azad Henareh. 2019. Fire Ecology. 15: 8. https://www.fs.usda.gov/treesearch/pubs/58070

Genomic comparisons of the laurel wilt pathogen, *Raffaelea lauricola*, and related tree pathogens highlight an arsenal of pathogenicity related genes. Caballero, Jorge R. Ibarra; Jeon, Jongbum; Lee, Yong-Hwan; Fraedrich, Stephen; Klopfenstein, Ned B.; Kim, Mee-Sook; Stewart, Jane E. 2019. Fungal Genetics and Biology. 125: 84-92. https://www.fs.usda.gov/treesearch/pubs/58065

Got shrubs? Precipitation mediates long-term shrub and introduced grass dynamics in chaparral communities after fire. Smith, April G.; Newingham, Beth A.; Hudak, Andrew T.; Bright, Benjamin C. 2019. Fire Ecology. 15: 12. https://www.fs.usda.gov/treesearch/pubs/58075

***Ips typographus* and *Dendroctonus ponderosae* models project thermal suitability for intra- and inter-continental establishment in a changing climate.** Bentz, Barbara J.; Jonsson, Anna Maria; Schroeder, Martin; Weed, Aaron; Wilcke, Renate Anna Irma; Larsson, Karin. 2019. Frontiers in Forests and Global Change. 2: 1. https://www.fs.usda.gov/treesearch/pubs/58216

Limber pine (*Pinus flexilis James*) genetic map constructed by exome-seq provides insight into the evolution of disease resistance and a genomic resource for genomics-based breeding, Liu, Jun-Jun; Schoettle, Anna W.; Sniezko, Richard A.; Yao, Fupan; Zamany, Arezoo; Williams, Holly; Rancourt, Benjamin. 2019. The Plant Journal. 98: 745-758. https://www.fs.usda.gov/treesearch/pubs/58031

Insects visiting drippy blight diseased red oak leaves are contaminated with the pathogenic bacterium *Lonsdalea quercina*. Sitz, Rachael

Journals and Other Publications

Online links are provided if available. For the general public, some links may hit a pay wall. Please accept our apologies for any inconvenience.

A.; Aquino, M. Vincent; Tisserat, A. Ned; Cranshaw, S. Whitney; Stewart, Jane E. 2019. Plant Disease. https://doi.org/10.1094/PDIS-12-18-2248-RE.

Integrating Sunda clouded leopard (*Neofelis diardi*) conservation into development and restoration planning in Sabah (Borneo) Kaszta, Zaneta; Cushman, Samuel A.; Hearn, Andrew J.; Burnham, Dawn; Macdonald, Ewan A.; Goossens, Benoit; Nathan, Senthilvel K. S. S.; Macdonald, David W. 2019. Biological Conservation. 235: 63-76. https://www.fs.usda.gov/treesearch/pubs/58029

Modeling mountain pine beetle (*Dendroctonus ponderosae*) oviposition. McManis, Anne E.; Powell, James A.; Bentz, Barbara J. 2019. Entomologia Experimentalis et Applicata. doi: 10.1111/eea.12783. https://www.fs.usda.gov/treesearch/pubs/58218

'Mondragon': A clonal plum rootstock to enhance management of Armillaria root disease in peach orchards of Mexico. Elias-Roman, Ruben Damian; Calderon-Zavala, Guillermo; Guzman-Mendoza, Rafael; Vallejo-Perez, Moises Roberto; Klopfenstein, Ned B.; Mora-Aguilera, Jose Antonio. 2019. Crop Protection. 121: 89-95. https://www.fs.usda.gov/treesearch/pubs/57963

Neotropical cloud forests and páramo to contract and dry from declines in cloud immersion and frost. Helmer, E. H.; Gerson, E. A.; Baggett, L. Scott; Bird, Benjamin J.; Ruzycki, Thomas S.; Voggesser, Shannon M. 2019. PLOS ONE. 14(4): e0213155-. https://doi.org/10.1371/journal.pone.0213155. https://www.fs.usda.gov/treesearch/pubs/57936

Phenotypic selection on growth rhythm in whitebark pine under climatic conditions warmer than seed origins. Warwell, Marcus V.; Shaw, Ruth G. 2018. Journal of Evolutionary Biology. 31: 1284-1299. https://www.fs.usda.gov/treesearch/pubs/58045

Phenotypic selection on ponderosa pine seed and seedling traits in the field under three experimentally manipulated drought treatments. Warwell, Marcus V.; Shaw, Ruth G. 2019. Evolutionary Applications. 12: 159-174. https://www.fs.usda.gov/treesearch/pubs/58049

Relationships between satellite-based spectral burned ratios and terrestrial laser scanning. Kato, Akira; Moskal, L. Monika; Batchelor, Jonathan L.; Thau, David; Hudak, Andrew T. 2019. R Forests. 10: 444 https://www.fs.usda.gov/treesearch/pubs/58071.

Reply to Cruz and Alexander: Comments on "Evaluating Crown Fire Rate of Spread Predictions from Physics-Based Models." Hoffman, C. M.; Ziegler, J.; Linn, R. R.; Canfield, J.; Mell, W.; Sieg, C. H.; Pimont, F. 2019. Fire Technology. doi: 10.1007/s10694-019-00857-1. https://www.fs.usda.gov/treesearch/pubs/58140

Supervised spatial classification of multispectral LiDAR data in urban areas. Huo, Lian-Zhi; Silva, Carlos Alberto; Klauberg, Carine; Mohan, Midhun; Zhao, Li-Jun; Tang, Ping; Hudak, Andrew Thomas. 2018. PLoS ONE. 13(10): e0206185. https://www.fs.usda.gov/treesearch/pubs/58069

The survival of *Pinus ponderosa* saplings subjected to increasing levels of fire behavior and impacts on post-fire growth. Steady, Wade D.; Feltrin, Raquel Partelli; Johnson, Daniel M.; Sparks, Aaron M.; Kolden, Crystal. A.; Talhelm, Alan F.; Lutz, James A.; Boschetti, Luigi; Hudak, Andrew T.; Nelson, Andrew S.; Smith, Alistair M. S. 2019. Fire. 2: 23. https://www.fs.usda.gov/treesearch/pubs/58076

A test of lethal trap trees for control of spruce beetles. Negrón, José F.; Cain, Robert; Cadenhead, Andy; Waugh, Brian. 2019. Res. Note RMRS-RN-83. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 9 p.

Transcriptome analysis of a powdery mildew pathogen (*Podosphaera pannosa*) infecting *Eucalyptus urophylla*: De novo assembly, expression profiling and secretome prediction. Fonseca, Natalia R.; Caballero, Jorge Ibarra; Kim, Mee-Sook; Stewart, Jane E.; Guimaraes, Lucio M. S.; Alfenas, Acelino C.; Klopfenstein, Ned B. 2019. TForest Pathology. 49: e12508.

The tropical forest and fire emissions experiment: Trace gases emitted by smoldering logs and dung from deforestation and pasture fires in Brazil. Christian, Ted J.; Yokelson, Robert J.; Carvalho, João A.; Griffith, David W. T.; Alvarado, Ernesto C.; Santos, José C.; Neto, Turibio Gomes Soares; Veras, Carlos A. Gurgel; Hao, Wei Min. 2007. Journal of Geophysical Research. 112(D18): 955. https://www.fs.usda.gov/treesearch/pubs/58030

Western forbs: Biology, ecology, and use in restoration. Gucker, Corey L.; Shaw, Nancy L. 2019. Reno, NV: Great Basin Fire Science Exchange. Online: http://greatbasinfirescience.org/western-forbs-restoration. https://www.fs.usda.gov/treesearch/pubs/58082

Journals and Other Publications

Online links are provided if available. For the general public, some links may hit a pay wall. Please accept our apologies for any inconvenience.

Wildfire alters belowground and surface wood decomposition on two national forests in Montana, USA. Page-Dumroese, Deborah S.; Jurgensen, Martin F.; Miller, Chris A.; Pickens, James B.; Tirocke, Joanne M. 2019. International Journal of Wildland Fire. 28: 456-469. https://www.fs.usda.gov/treesearch/pubs/58192

Trajectory from beech and oak forests to eastern broadleaf forests in Indiana, USA. Hanberry, Brice B. 2019. Ecological Processes. 8: 3. https://www.fs.usda.gov/treesearch/pubs/57870

Grasslands, shrublands and desert ecosystems

Application of UAV-based methodology for census of an endangered plant species in a fragile habitat. Rominger, Kody; Meyer, Susan E. 2019. Remote Sensing. 11: 719. https://www.fs.usda.gov/treesearch/pubs/58137

A reconceptualization of open oak and pine ecosystems of eastern North America using a forest structure spectrum. Hanberry, Brice B.; Dey, Don C.; Hutchinson, Todd F. 2018. Ecosphere. 9(10): e02431.185: 437-452. https://www.fs.usda.gov/treesearch/pubs/57336

Climate variability affects the germination strategies exhibited by arid land plants. Barga, Sarah; Dilts, Thomas E.; Leger, Elizabeth A. 2017. Climate variability affects the germination strategies exhibited by arid land plants. Oecologia. 185: 437-452. https://www.fs.usda.gov/treesearch/pubs/57873

Contrasting climate niches among co-occurring subdominant forbs of the sagebrush steppe. Barga, Sarah C.; Dilts, Thomas E.; Leger, Elizabeth A. 2018. Diversity and Distributions. 24: 1291-1307. https://www.fs.usda.gov/treesearch/pubs/57874f

Great Basin bristlecone pine volatiles as a climate change signal across environmental gradients. Gray, Curtis A.; Runyon, Justin B.; Jenkins, Michael J. 2019. Frontiers in Forests and Global Change. 2: 10. DOI: 10.3389/ffgc.2019.00010 https://www.fs.usda.gov/treesearch/pubs/58142

Great Basin Native Plant Project: 2016 Progress Report. Kilkenny, Francis; Edwards, Fred; Irwin, Jessica; Barga, Sarah. 2017. Boise, ID: U.S. Department of Agriculture, Rocky Mountain Research Station. 211 p. https://www.fs.usda.gov/treesearch/pubs/58185

Great Basin Native Plant Project: 2017 Progress Report. Kilkenny, Francis; Edwards, Fred; Irwin, Jessica; Barga, Sarah. 2018. Boise, ID: U.S. Department of Agriculture, Rocky Mountain Research Station. 211 p. https://www.fs.usda.gov/treesearch/pubs/58186

Historical range of variability for restoration and management in Wisconsin. Hanberry, Brice B.; Dey, Daniel C. 2019. Biodiversity and Conservation. doi: 10.1007/s10531-019-01806-8. https://www.fs.usda.gov/treesearch/pubs/58189

Landscape and organismal factors affecting sagebrush-seedling transplant survival after megafire restoration. Davidson, Bill E.; Germino, J. Matthew; Richardson, Bryce; Barnard, David M. 2019. Restoration Ecology. doi: 10.1111/rec.12940

Long-term vegetation recovery and invasive annual suppression in native and introduced postfire seeding treatments. Ott, Jeffrey E.; Kilkenny, Francis F.; Summers, Daniel D.; Thompson, Tyler W. 2019. Rangeland Ecology and Management. doi: 10.1016/j.rama.2019.02.001. 640-653. https://www.fs.usda.gov/treesearch/pubs/58028

Operationalizing resilience and resistance concepts to address invasive grass-fire cycles. Chambers, Jeanne C.; Brooks, Matthew L.; Germino, Matthew J.; Maestas, Jeremy D.; Board, David I.; Jones, Matthew O.; Allred, Brady W. 2019. Frontiers in Ecology and Evolution. 7: 185. https://www.fs.usda.gov/treesearch/pubs/58188

Strong patterns of intraspecific variation and local adaptation in Great Basin plants revealed through a review of 75 years of experiments. Baughman, Owen W.; Agneray, Alison C.; Forister, Matthew L.; Kilkenny, Francis F.; Espeland, Erin K.; Fiegener, Rob; Horning, Matthew E.; Johnson, Richard C.; Kaye, Thomas N.; Ott, Jeff; St. Clair, John Bradley; Leger, Elizabeth A. 2019. Ecology and Evolution. 9: 6259-6275.

The genus *Enlinia aldrich* in Chile (Diptera: Dolichopodidae), with the description of four new species. Runyon, J. B.; Pollet, M. 2019. Neotropical Entomology. 48: 604-613. https://www.fs.usda.gov/treesearch/pubs/58144

A tool for projecting rangeland vegetation response to management and climate. Ford, Paulette L.; Reeves, Matthew C.; Fird, Leonardo. 2019. Rangelands. 49-60. https://www.fs.usda.gov/treesearch/pubs/58198

Journals and Other Publications

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Two new species of *Hurleyella runyon* and Robinson (*Diptera: Dolichopodidae*), with the first record from the Neotropics. Runyon, Justin B. 2019. T. Zootaxa. 4568: 548-560.https://www.fs.usda.gov/treesearch/pubs/58143

Wildlife contribution to desertification at local, regional, and global scales [Chapter 8]. Neary, Daniel. 2018. In Squires: V.R.; Ariapour, A. (eds.). Desertification: Past, current and future trends. Hauppauge, NY: Nova Science Publishers, Inc. p. 113-125. https://www.fs.usda.gov/treesearch/pubs/58221

Human dimensions

A comparison of standard modeling techniques using digital aerial imagery with national elevation datasets and airborne LiDAR to predict size and density forest metrics in the Sapphire Mountains MT, USA. Ahl, Robert; Hogland, John; Brown, Steve. 2019. ISPRS International Journal of Geo-Information. 8: 24. Earth's Future: 7. https://www.fs.usda.gov/treesearch/pubs/57921

Adaptation to future water shortages in the United States caused by population growth and climate change. Brown, Thomas C.; Mahat, Vinod; Ramirez, Jorge A. 2019. Earth's Future: 7. https://www.fs.usda.gov/treesearch/pubs/58041

Bark beetle infestation of western US forests: A context for assessing and evaluating impacts. McCollum, Daniel W.; Lundquist, John E. 2019. Journal of Forestry. 117(2): 171-177. https://www.fs.usda.gov/treesearch/pubs/58136

Mitigating the impact of field and image registration errors through spatial aggregation. Hogland, John; Affleck, David L. R. 2019. Mitigating the impact of field and image registration errors through spatial aggregation. Remote Sensing. 11: 222. https://www.fs.usda.gov/treesearch/pubs/57922

Quantifying ecological integrity of terrestrial systems to inform management of multiple-use public lands in the United States. Carter, Sarah K.; Fleishman, Erica; Leinwand, Ian I. F.; Flather, Curtis H.; Carr, Natasha B.; Fogarty, Frank A.; Leu, Matthias; Noon, Barry R.; Wohlfeil, Martha E.; Wood, David J. A. 2019. Environmental Management. doi: 10.1007/s00267-019-01163-w. https://www.fs.usda.gov/treesearch/pubs/57924

Spatial and temporal assessment of responder exposure to snag hazards in post-fire environments. Dunn, Christopher J.; O'Connor, Christopher D.; Reilly, Matthew J.; Calkin, Dave E.; Thompson, Matthew P. 2019. Spatial and temporal assessment of responder exposure to snag hazards in post-fire environments. Forest Ecology and Management. 44: 202-214. https://www.fs.usda.gov/treesearch/pubs/58032

Wilderness research

Climate change likely to reshape vegetation in North America's largest protected areas. Holsinger, Lisa; Parks, Sean A.; Parisien, Marc-Andre; Miller, Carol; Batllori, Enric; Moritz, Max A. 2019. Conservation Science and Practice. doi: 10.1111/csp2.5F0. https://www.fs.usda.gov/treesearch/pubs/5804 **Mitigating the impact of field and image registration errors through spatial aggregation.** Hogland, John; Affleck, David L. R. 2019. Mitigating the impact of field and image registration errors through spatial aggregation. Remote Sensing. 11: 222. https://www.fs.usda.gov/treesearch/pubs/57922

Integrating subjective and objective dimensions of resilience in fire-prone landscapes. Higuera, Philip E.; Metcalf, Alexander L.; Miller, Carol; Buma, Brian; McWethy, David B.; Metcalf, Elizabeth C.; Ratajczak, Zak; Nelson, Cara R.; Chaffin, Brian C.; Stedman, Richard C.; McCaffrey, Sarah; Schoennagel, Tania; Harvey, Brian J.; Hood, Sharon M.; Schultz, Courtney A.; Black, Anne E.; Campbell, David; Haggerty, Julia H.; Keane, Robert E.; Krawchuk, Meg A.; Kulig, Judith C.; Rafferty, Rebekah; Virapongse, Arika. 2019. BioScience. 69(5): 379-388. https://www.fs.usda.gov/treesearch/pubs/58043

Wildlife and terrestrial habitats

Factors affecting lifetime reproduction, long-term territory-specific reproduction, and estimation of habitat quality in northern goshawks. Reynolds, Richard T.; Lambert, Jeffrey S.; Kay, Shannon L.; Sanderlin, Jamie S.; Bird, Benjamin J. 2019. PLoS ONE. 14(5): e0215841. https://www.fs.usda.gov/treesearch/pubs/58059

Precision gain versus effort with joint models using detection/non-detection and banding data. Sanderlin, Jamie S.; Block, William M.; Strohmeyer, Brenda E.; Saab, Victoria A.; Ganey, Joseph L. 2019. Ecology and Evolution. 9: 804-817. https://www.fs.usda.gov/treesearch/pubs/58068

Journals and Other Publications

Online links are provided if available. For the general public, some links may hit a pay wall. Please accept our apologies for any inconvenience.

qPCR detection of Sturgeon chub (*Macrhybopsis gelida*) DNA in environmental samples. Mason, Daniel H.; Dysthe, Joseph C.; Franklin, Thomas W.; Skorupski, Joseph A.; Young, Michael K.; McKelvey, Kevin S.; Schwartz, Michael K. 2018. PLoS One. 13(12): e0209601. https://www.fs.usda.gov/treesearch/pubs/57875

Repurposing environmental DNA samples to verify the distribution of Rocky Mountain tailed frogs in the Warm Springs Creek Basin, Montana. Franklin, Thomas W.; Wilcox, Taylor M.; McKelvey, Kevin S.; Greaves, Samuel E.; Dysthe, Joseph C.; Young, Michael K.; Schwartz, Michael K. 2019. Northwest Science. 93(1)

Spicing up restoration: Can chili peppers improve restoration seeding by reducing seed predation? Pearson, Dean E.; Valliant, Morgan; Carlson, Chris; Thelen, Giles C.; Ortega, Yvette K.; Orrock, John L.; Madsen, Matthew D. 2019. Restoration Ecology. 27(2): 254-260. https://www.fs.usda.gov/treesearch/pubs/58219

Species-specific differences in detection and occupancy probabilities help drive ability to detect trends in occupancy. Steenweg, Robin; Hebblewhite, Mark; Whittington, Jesse; McKelvey, Kevin. 2019. Ecosphere. 10(4): e02639. https://www.fs.usda.gov/treesearch/pubs/57871

The recent past and promising future for data integration methods to estimate species' distributions. Miller, David A. W.; Pacifici, Krishna; Sanderlin, Jamie S.; Reich, Brian J. 2019. Methods in Ecology and Evolution. 10: 22-37. https://www.fs.usda.gov/treesearch/pubs/58066

Wolverines in winter: Indirect habitat loss and functional responses to backcountry recreation. Howard, Christine; Flather, Curtis H.; Stephens, Philip A. 2018. Conservation Letters. 2018: e12624. Heinemeyer, Kimberly; Squires, John; Hebblewhite, Mark; O'Keefe, Julia J.; Holbrook, Joseph D.; Copeland, Jeffrey. 2019. Ecosphere. 10(2): e02611. https://www.fs.usda.gov/treesearch/

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 Communication

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 Michael Schwartz, Program Manager, for more information: 406-542-4161.

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