USDA
United States Department of Agriculture

Rocky Mountain Research Station

New Publications

October–December 2018

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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.

New RMRS Publication Series

Riparian research and management: Past, present, future: Volume 1

Online only

Riparian research and management: Past, present, future: Volume 1. Johnson, R. Roy; Carothers, Steven W.; Finch, Deborah M.; Kingsley, Kenneth J.; Stanley, John T., tech. eds. 2018. Gen. Tech. Rep. RMRS-GTR-377. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 226 p.

Fifty years ago, riparian habitats were not recognized for their extensive and critical contributions to wildlife and the ecosystem function of watersheds. This changed as riparian values were identified and documented, and the science of riparian ecology developed steadily. Papers in this volume range from the more mesic northwestern United States to the arid Southwest and Mexico. More than two dozen authors—most with decades of experience—review the origins of riparian science in the western United States, document what is currently known about riparian ecosystems, and project future needs. Topics are widespread and include: interactions with fire, climate change, and declining water; impacts from exotic species; unintended consequences of biological control; the role of small mammals; watershed response to beavers; watershed and riparian changes; changes below large dams; water birds of the Colorado River Delta; and terrestrial vertebrates of mesquite bosques. Appendices and references chronicle the field's literature, authors, "riparian pioneers," and conferences.

https://www.fs.usda.gov/treesearch/pubs/57341

To masticate or not: Useful tips for treating forest, woodland, and shrubland vegetation

Online only

To masticate or not: Useful tips for treating forest, woodland, and shrubland vegetation. Jain, Theresa; Sikkink, Pamela; Keefe, Robert; Byrne, John. 2018. Gen. Tech. Rep. RMRS-GTR-381. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 55 p.

This report synthesizes our current knowledge on mastication as a forest management tool. We found that excavators, skid steers, and tractors can all be carrier machines and different types of vertical and horizontal cutting heads exist that can be front-end mounted or boom mounted, each with its own advantages and disadvantages. We provide a summary on the ecological effects from mastication. We found that there were several studies on plant and soil impacts, but limited information on impacts to wildlife habitat. Although costs of mastication widely vary depending on machine size, the physical setting, size and configuration of pre-treatment biomass, and operator skill, mastication does have market and non-market benefits. Depending on the management objective, if mastication is an option, then a thorough site evaluation should consider slope, nonnative species invasions, vulnerability of soils to erode or compact, and treatment costs.

https://www.fs.usda.gov/treesearch/pubs/57328

New RMRS Publication Series

Biological assessment of oil and gas development on the Little Missouri National Grassland

Online only

Biological assessment of oil and gas development on the Little Missouri National Grassland. Butler, Jack L.; Ott, Jacqueline P.; Hartway, Cynthia R.; Dickerson, Brian E. 2018. Gen. Tech. Rep. RMRS-GTR-384. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 67 p.

The Little Missouri National Grassland is the largest designated National Grassland in the United States and represents one of the best examples of intact native mixed-grass prairie in the United States. The Little Missouri National Grasslands occurs entirely within the Williston Basin, which has been a leading source of conventional oil and gas production since the 1950s. Recent advances in horizontal drilling and hydraulic fracturing (since 2000) have greatly increased energy extraction activities on the Little Missouri National Grassland. The objective of this assessment is to synthesize existing knowledge from peer-reviewed literature and administrative studies that describe the actual and potential impacts of oil and gas development on the biological resources of the Little Missouri National Grassland. The assessment focuses on how energy extraction activities may impact soils, vegetation, and wildlife, with specific reference to threatened and endangered species.

https://www.fs.usda.gov/treesearch/pubs/57335

Multispecies mesocarnivore monitoring: USDA Forest Service multiregional monitoring approach

Limited paper copies are available from RMRS Distribution: rmrspubrequest@fs.fed.us

Multispecies mesocarnivore monitoring: USDA Forest Service multiregional monitoring approach. Golding, Jessie D.; Schwartz, Michael K.; McKelvey, Kevin S.; Squires, John R.; Jackson, Scott D.; Staab, Cara; Sadak, Rema B. 2018. Gen. Tech. Rep. RMRS-GTR-388. Fort Collins, CO: U.S, Department of Agriculture, Forest Service, Rocky Mountain Research Station. 68 p.

We propose an approach for monitoring fisher (*Pekania pennanti*), Canada lynx (*Lynx canadensis*), American marten (*Martes americana*), Pacific marten (*M. caurina*), montane red fox (*Vulpes vulpes* sspp.), and wolverine (*Gulo gulo*) across the western United States. This approach was developed with close collaboration between the Forest Service Rocky Mountain Research Station and the National Forest System (NFS), and focuses on answering three basic monitoring questions: (1) Is a species present? (2) Are multiple individuals of a single sex present? and (3) Are multiple individuals, including both sexes, present? To answer these questions we designed a goal efficient monitoring (GEM) framework with four occupancy states related to a rare species population. We developed a Bayesian multistate dynamic occupancy model to analyze this information over time and estimate the probability that a population is likely to remain in one of these four occupancy states or transition to a different state.

https://www.fs.usda.gov/treesearch/pubs/57465

New RMRS Publication Series

Wyoming's forest resources, 2011–2015

Online only

Wyoming's forest resources, 2011–2015. DeRose, R. Justin; Shaw, John D.; Goeking, Sara A.; Marcille, Kate; McIver, Chelsea P.; Menlove, Jim; Morgan, Todd A.; Witt, Chris. 2018. Resour. Bull. RMRS-RB-28. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132 p.

This report summarizes the most recent inventory of Wyoming's forests based on field data collected between 2011 and 2015. The report includes descriptive highlights and tables of area, numbers of trees, biomass, carbon, volume, growth, mortality, and removals. Most sections and tables are organized by forest type or forest-type group, species group, diameter class, or owner group. The report also describes the inventory design, inventory terminology, and data reliability. Results show that Wyoming's forest land covers 10.5 million acres. Fifty-five percent (5.8 million acres) of this forest land is administered by the USDA Forest Service, and another 26 percent (2.8 million acres) is administered by other Federal agencies. There are approximately 1.5 million acres (14 percent) of privately owned forest land in Wyoming. Wyoming's most abundant forest-type group is Fir/spruce/mountain hemlock, followed closely by the Lodgepole pine forest-type group. Lodgepole pine is the most abundant species by number of trees but is second to the Fir/spruce/mountain hemlock forest-type group in volume (and biomass. In total, Wyoming's forests contain more than 14.6 million cubic feet of net volume in trees 5.0 inches in diameter and larger.

https://www.fs.usda.gov/treesearch/pubs/57244

Idaho's forest resources, 2006–2015

Online only

Idaho's forest resources, 2006–2015. Witt, Chris; DeRose, R. Justin; Goeking, Sara A.; Shaw, John D. 2018. Resour. Bull. RMRS-RB-29. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 84 p.

This report presents a summary of the most recent Forest Inventory and Analysis data of Idaho's forests based on field data collected between 2006 and 2015. The report includes descriptive highlights and tables of area, numbers of trees, biomass, volume, growth, mortality, and removals. Most sections and tables are organized by forest type or forest-type group, tree species group, diameter class, or owner group. Results show that Idaho's forest land covers 21.6 million acres, of which 3 million acres (14 percent) are privately owned, and another 16.3 million acres (76 percent) are administered by the USDA Forest Service. The State's most abundant forest type is Douglas-fir, which covers more than 6 million acres. Subalpine fir is the most abundant tree species by number of trees 5.0 inches or greater in diameter, and Douglas-fir is the most abundant by volume and biomass. Idaho's forests contain 48 billion cubic feet of net volume in trees 5.0 inches diameter and larger. Annual net growth of all live trees 5.0 inches diameter and larger averaged 304.6 million cubic feet per year. Average annual mortality totaled 902 million cubic feet per year.

https://www.fs.usda.gov/treesearch/pubs/57460

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

Assessing water contamination risk from vegetation fires: Challenges, opportunities and a framework for progress. Nunes, Joao P.; Robichaud, Peter R.; Elliot, William J.; [et al.]. 2018. Hydrological Processes. 32(5): 687–694. https://www.fs.usda.gov/treesearch/pubs/57433

Capture enrichment of aquatic environmental DNA: A first proof of concept. Wilcox, Taylor M.; Young, Michael K.; McKelvey, Kevin S.; Schwartz, Michael K.; [et al.]. 2018. Molecular Ecology Resources. 18: 1392-1401. https://www.fs.usda.gov/treesearch/pubs/56614

Crowd-sourced databases as essential elements for Forest Service partnerships and aquatic resource conservation. Isaak, Daniel J.; Young, Michael K.; McConnel, Callie; [et al.]. 2018. Fisheries. 43(9): 423–430. https://www.fs.usda.gov/treesearch/pubs/56629

Fine-scale environmental DNA sampling reveals climate-mediated interactions between native and invasive trout species. Wilcox, Taylor M.; Young, Michael K.; McKelvey, Kevin S.; Isaak, Daniel J.; Horan, Dona L.; Schwartz, Michael K. 2018. Ecosphere. 9: e02500. https://www.fs.usda.gov/treesearch/pubs/57395

From expensive to efficient: New eDNAtlas shares nationwide aquatic species information. Isaak, Daniel J.; Schwartz, Michael K. 2018. Science You Can Use (in 5 minutes). Fort Collins, CO: Rocky Mountain Research Station. 2 p. https://www.fs.usda.gov/treesearch/pubs/57397

Hierarchical multi-population viability analysis. Leasure, Douglas R.; Wenger, Seth J.; Luce, Charlie H.; Lute, Abby C.; Isaak, Daniel J.; [et al.]. 2018. Ecology. 16 p. https://www.fs.usda.gov/treesearch/pubs/57436

An improved environmental DNA assay for bull trout (*Salvelinus confluentus*) based on the ribosomal internal transcribed spacer I. Dysthe, Joseph C.; McKelvey, Kevin S.; Young, Michael K.; Schwartz, Michael K. 2018. PLoS One. 13: e0206851. https://www.fs.usda.gov/treesearch/pubs/57394

Principal components of thermal regimes in mountain river networks. Isaak, Daniel J.; Luce, Charles H.; Chandler, Gwynne L.; Horan, Dona L.; Wollrab, Sherry P. 2018. Hydrology and Earth System Sciences. 22: 6225–6240. https://www.fs.usda.gov/treesearch/pubs/57434

Fire, fuel and smoke

Cultivating a reluctance to simplify: Exploring the radio communication context in wildland firefighting. Fox, R.; Gabor, E.; Black, A.; [et al.]. 2017. International Journal of Wildland Fire. 26: 719–731. https://www.fs.usda.gov/treesearch/pubs/57427

Emotional and social intelligence competencies of incident team commanders fighting wildfires. Boyatzis, Richard E.; Thiel, Kiko; Black, Anne; [et al.]. 2017. The Journal of Applied Behavioral Science. 53(4): 498–516. https://www.fs.usda.gov/treesearch/pubs/57426

Fire and tree death: Understanding and improving modeling of fire induced tree mortality. Hood, Sharon M.; Varner, J. Morgan; van Mantgem, Phillip; [et al.]. 2018. Environmental Research Letters. 13: 113004. https://www.fs.usda.gov/treesearch/pubs/57413

Managing wildfire for whitebark pine ecosystem restoration in western North America. Keane, Robert E. 2018. Forests. 9: 648. https://www.fs.usda.gov/treesearch/pubs/57468

A project to measure and model pyrolysis to improve prediction of prescribed fire behavior [Chapter 3]. Weise, David R.; Hao, WeiMin; Butler, Bret; Hudak, Andrew; [et al.]. 2018. In: Viegas, D.X., ed. Advances in forest fire research 2018. Coimbra, Portugal: Imprensa da Universidade de Coimbra: 308–218. https://www.fs.usda.gov/treesearch/pubs/57393

Recovery of small-scale infiltration and erosion after wildfires. Larson-Nash, Sierra S.; Robichaud, Peter R.; Brown, Robert E.; [et al.]. 2018. Journal of Hydrology and Hydromechanics. 66(3): 261–270. https://www.fs.usda.gov/treesearch/pubs/57469

Forest and woodland ecosystems

Comparison of small- and large-footprint lidar characterization of tropical forest aboveground structure and biomass: A case study from Central Gabon. Silva, Carlos Alberto; Saatchi, Sassan; Hudak, Andrew T.; [et al.] 2018. IEEE Journal of Selected Topics in Applied

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.

Earth Observations and Remote Sensing. https://www.fs.usda.gov/treesearch/pubs/57344

Effect of forest thinning and wood quality on the short-term wood decomposition rate in a *Pinus tabuliformis* plantation. Wang, Weiwei; Page Dumroese, Deborah; Tirocke, Joanne; [et al.]. 2018. Journal of Plant Research. https://www.fs.usda.gov/treesearch/pubs/57432

Landscape applications of machine learning: Comparing random forests and logistic regression in multi-scale optimized predictive modeling of American marten occurrence in northern Idaho, USA [Chapter 9]. Cushman, Samuel A.; Wasserman, Tzeidle N. 2018. In: Humphries, G.; Magness, D.; Huettmann, F., eds. Machine Learning for Ecology and Sustainable Natural Resource Management. Springer, Cham: 185–203. https://www.fs.usda.gov/treesearch/pubs/57412

Modeling the interactive effects of spruce beetle infestation and climate on subalpine vegetation. Foster, A.C.; Shuman, J.K.; Shugart, H.H.; Negrón, J. 2018. Ecosphere. 9(10): e02437. 10.1002/ecs2.2437. https://www.fs.usda.gov/treesearch/pubs/57416

Mountain pine beetle in Colorado: A story of changing forests. Negrón, José F.; Cain, Bob. 2018. Journal of Forestry. fvy032. https://www.fs.usda.gov/treesearch/pubs/57417

A reconceptualization of open oak and pine ecosystems of eastern North America using a forest structure spectrum. Hanberry, B.B.; Bragg, D.C.; Hutchinson, T.F. 2018. Ecosphere. 9(10): e02431. 10.1002/ecs2.2431. https://www.fs.usda.gov/treesearch/pubs/57336

Southwestern white pine (*Pinus strobiformis*) species distribution models project a large range shift and contraction due to regional climatic changes. Shirk, Andrew J.; Cushman, Samuel A.; Toney, Chris; [et al.]. 2018. Forest Ecology and Management. 411: 176–186. https://www.fs.usda.gov/treesearch/pubs/57342

Subwatershed-level lodgepole pine attributes associated with a mountain pine beetle outbreak. Williams, Howard; Hood, Sharon M.; Negrón, José F.; [et al.]. 2018. Forests. 9: Article 552; doi:10.3390/f9090552. https://www.fs.usda.gov/treesearch/pubs/57134

Sycamore maple (*Acer pseudoplatanus* L.) stands on former agricultural land in the Sudetes—Evaluation of ecological value and production potential. Vacek, Stanislav; Vacek, Zdenek; Moser, W. Keith; [et al.]. 2018. Dendrobiology. 79: 61–76. https://www.fs.usda.gov/treesearch/pubs/57346

Toward sustainable cultivation of *Pinus occidentalis* Swartz in Haiti: Effects of alternative growing media and containers on seedling growth and foliar chemistry. Hubbel, Kyrstan L.; Ross-Davis, Amy L.; Pinto, Jeremiah R.; [et al.]. 2018. Forests. 9: 422. https://www.fs.usda.gov/treesearch/pubs/57483

Grasslands, shrublands and desert ecosystems

Aerobiology and passive restoration of biological soil crusts. Warren, Steven D.; St. Clair, Larry L.; Leavitt, Steven D. 2018. Aerobiologia. https://www.fs.usda.gov/treesearch/pubs/57423

***Enlinia* Aldrich, 1933 of Mitaraka, French Guiana (Diptera: Dolichopodidae)**. Runyon, Justin B.; Pollet, Marc. 2018. In: Touroult, J. "Our Planet Reviewed" 2015 large-scale biotic survey in Mitaraka, French Guiana. Zoosystema. 40(19): 453–468. https://www.fs.usda.gov/treesearch/pubs/57415

Niche specialization in *Bromus tectorum* seed bank pathogens. Meyer, Susan E.; Beckstead, Julie; Allen, Phil S. 2018. Seed Science Research. https://www.fs.usda.gov/treesearch/pubs/57422

Phytotoxic activity of metabolites isolated from *Rutstroemia sp.n.*, the causal agent of bleach blonde syndrome on cheatgrass (*Bromus tectorum*). Masi, Marco; Meyer, Susan; Clement, Suzette; [et al.]. 2018. Molecules. 23: 1734. https://www.fs.usda.gov/treesearch/pubs/57419

Population history provides foundational knowledge for utilizing and developing native plant restoration materials. Massatti, Rob; Richardson, Bryce A.; Kilkenny, Francis F.; [et al.]. 2018. Evolutionary Applications. 11: 2025–2039. https://www.fs.usda.gov/treesearch/pubs/57420

The Rangeland Vegetation Simulator: A decision support tool for monitoring and projecting grassland conditions. Ford, Paulette L.; Reeves, Matt C. 2018. In: Knuffman, L., ed. America's grasslands

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.

conference: United for grassland conservation; Proceedings of the 4th biennial conference on the Conservation of America's Grasslands; 2017 November 15–17; Fort Worth, TX. Washington, DC: National Wildlife Federation: 14–17. https://www.fs.usda.gov/treesearch/pubs/57418

Human dimensions

Cultivating a reluctance to simplify: Exploring the radio communication context in wildland firefighting. Fox, R.; Gabor, E; Thomas, D.; Black, A.; [et al.]. 2017. International Journal of Wildland Fire. 26: 719-731. https://www.fs.usda.gov/treesearch/pubs/57427

Does oil and gas development impact recreation visits to public lands? A cross-sectional analysis of overnight recreation site use at 27 national forests with oil and gas development. Rasch, Rebecca; Reeves, Matt; Sorenson, Colin. 2018. Journal of Outdoor Recreation and Tourism. 24: 45–51. https://www.fs.usda.gov/treesearch/pubs/57343

Emotional and social intelligence of incident team commanders fighting wildfires. Boyatzis, Richard E.; Thiel, Kiko; Black, Anne.; [et al.] 2017. The Journal of Applied Behavioral Science. 53(4): 498–516. https://www.fs.usda.gov/treesearch/pubs/57426

Examining dispatching practices for Interagency Hotshot Crews to reduce seasonal travel distance and manage fatigue. Belval, Erin J.; Calkin, David E.; Stonesifer, Crystal S.; Thompson, Matthew P.; [et al.]. 2018. International Journal of Wildland Fire. 27: 569–580. https://www.fs.usda.gov/treesearch/pubs/57354

Impacts of the mountain pine beetle on sawmill operations, costs, and product values in Montana. Loeffler, Dan; Anderson, Nathaniel. 2018. Forest Products Journal. 68(1): 15–24. https://www.fs.usda.gov/treesearch/pubs/57350

Influence of policy, air quality, and local attitudes toward renewable energy on the adoption of woody biomass heating systems. Young, Jesse D.; Anderson, Nathaniel M.; Naughton, Helen T. 2018. Energies. 11(11): 2873. https://www.fs.usda.gov/treesearch/pubs/57356

Linking phenological indices from digital cameras in Idaho and Montana to MODIS NDVI. St. Peter, Joseph; Hogland, John; Hebblewhite, Mark; [et al.]. 2018. Remote Sensing. 10: 1612. https://www.fs.usda.gov/treesearch/pubs/57424

Recovering from the mountain pine beetle. Loeffler, Dan; Anderson, Nathaniel. 2018. Montana Business Quarterly. April 12, 2018: 22–26. https://www.fs.usda.gov/treesearch/pubs/57351

Use of lidar-derived landscape parameters to characterize alternative harvest system options in the Inland Northwest. Becker, Ryer M.; Keefe, Robert F.; Anderson, Nathaniel M.; [et al.]. 2018. International Journal of Forest Engineering. 29(3): 179–191. https://www.fs.usda.gov/treesearch/pubs/57355

Wildland-urban interface residents' relationships with wildfire: Variation within and across communities. Meldrum, James R.; Brenkert-Smith, Hannah; Champ, Patricia A.; [et al.]. 2018. Society & Natural Resources. 31(10): 1132–1148. https://www.fs.usda.gov/treesearch/pubs/57404

Workplace incivility and employee sleep: The role of rumination and recovery experiences. Demsky, C.A.; Fritz, C.; Black, A.E.; [et al.]. 2018. Journal of Occupational Health Psychology. Advance online publication. https://www.fs.usda.gov/treesearch/pubs/57428

Inventory and monitoring

Applications of the United States Forest Inventory and Analysis dataset: A review and future directions. Tinkham, Wade T.; Mahoney, Patrick R.; Hudak, Andrew T.; [et al.]. 2018. Canadian Journal of Forest Research. 48: 1251–1268. https://www.fs.usda.gov/treesearch/pubs/57345

Building resistance and resilience: Regeneration should not be left to chance. Long, James N.; Windmuller-Campione, Marcella; DeRose, R. Justin. 2018. Forests. 9: 270. https://www.fs.usda.gov/treesearch/pubs/57410

Climatic drivers of ponderosa pine growth in central Idaho. Pettit, Joseph L.; Derose, R. Justin; Long, James N. 2018. Tree-Ring Research. 74(2): 172–184. https://www.fs.usda.gov/treesearch/pubs/57411

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.

When tree rings go global: Challenges and opportunities for retro- and prospective insight. Babst, Flurin; Bodesheim, Paul; DeRose, R. Justin; [et al.]. 2018. Quaternary Science Reviews. 197: 1–20. https://www.fs.usda.gov/treesearch/pubs/57409

Science application and communication

Predicting vegetation phenology in response to climate change using bioclimatic indices in Iraq. Daham, Afrah; Han, Dawei; Jolly, W. Matt; [et al.]. 2018. Journal of Water and Climate Change. doi: 10.2166/wcc.2018.142. https://www.fs.usda.gov/treesearch/pubs/57199

Wildlife and terrestrial habitats

Abundance of black-backed woodpeckers and other birds in relation to disturbance and forest structure in the Black Hills and Bear Lodge Mountains of South Dakota and Wyoming. Matseur, Elizabeth A. 2018. Thesis. Columbia, MO: University of Missouri. 85 p. https://www.fs.usda.gov/treesearch/pubs/54347

Black-backed woodpecker abundance in the Black Hills. Matseur, Elizabeth A.; Dickerson, Brian E.; Rumble, Mark A.; [et al.]. 2018. The Journal of Wildlife Management. https://www.fs.usda.gov/treesearch/pubs/57421

A feather in their cap: Using citizen monitoring to track post-wildfire bird communities in the Arizona Sky Islands. Miller, Sue; Sanderlin, Jamie; Ganey, Joe. 2018. Science You Can Use Bulletin, Issue 31. Fort Collins, CO: Rocky Mountain Research Station. 11 p. https://www.fs.usda.gov/treesearch/pubs/57398

Using environmental DNA methods to improve winter surveys for rare carnivores: DNA from snow and improved noninvasive techniques. Franklin, Thomas W.; McKelvey, Kevin S.; Golding, Jessie D.; Mason, Daniel H.; Dysthe, Joseph C.; Pilgrim, Kristine L.; Squires, John R.; Greaves, Samuel E.; Schwartz, Michael K.; [et al.]. 2019. Biological Conservation. 229: 50–58. https://www.fs.usda.gov/treesearch/pubs/57396

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 Thomas Dzomba, Deputy Program Manager, for more information: 406-829-6977.

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 Jennifer Hayes, Assistant Station Director (acting) 970-498-1365.

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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