



Rocky Mountain Research Station

New Publications

October–December 2020

CONTENTS

ROCKY MOUNTAIN RESEARCH STATION 2

NEW SERIES PUBLICATIONS

RMRS-GTR-416: Creating photographic loading sequences in the field for the photoload sampling technique 3

RMRS-GTR-417: Experimental treatments for increasing perennial grass cover in a shrub-invaded grassland in the Southwestern Borderlands region of Arizona and New Mexico 3

RMRS-GTR-418: Riparian and groundwater-dependent ecosystems of the Dixie and Fishlake National Forests: An assessment of resources and current conditions 4

RMRS-GTR-419: Characterizing ecoregions and montane perennial watersheds of the Great Basin 4

RMRS-GTR-421: Soil sustainability and harvest operations: A review 5

RMRS-GTR-426: Wilderness character monitoring technical guide 5

RMRS-RN-88: Living with wildfire in Ashland, Oregon: 2020 data report 6

JOURNALS AND OTHER PUBLICATIONS 7

Air, Water and Aquatic Environments 7

Fire, Fuel and Smoke 7

Forest and Woodland Ecosystems 8

Human Dimensions 9

Inventory, Monitoring and Analysis 9

Maintaining Resilient Dryland Ecosystems 10

Wilderness (Aldo Leopold Wilderness Research Institute) 11

Wildlife and Terrestrial Ecosystems 12

PUBLICATION ORDERS AND CONTACT INFORMATION 14



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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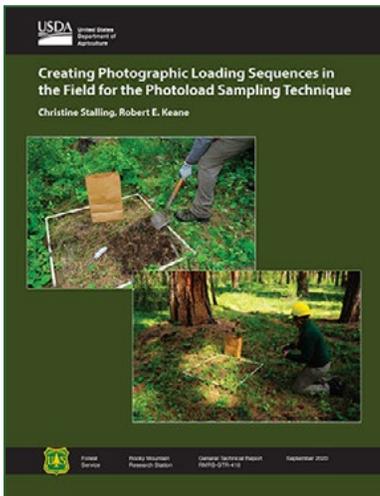
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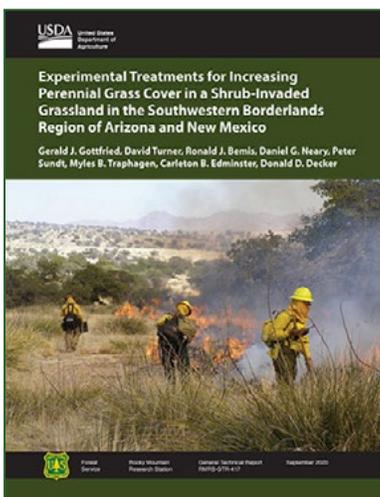


Stalling, Christine M.; Keane, Robert E. 2020. [Creating photographic loading sequences in the field for the photoload sampling technique](#). Gen. Tech. Rep. RMRS-GTR-416. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 41 p.

The photoload technique provides a quick and accurate means of estimating the loadings of six wildland fuel components including 1 hr, 10 hr, 100 hr, and 1,000 hr downed dead woody, shrub, and herbaceous fuels. It involves visually comparing fuel loading conditions observed in the field with a set of photographed sequences to estimate fuel loadings; the photo sequences are a series of downward-looking oblique photographs depicting a series of graduated fuel loadings of synthetic fuelbeds for each of the six fuel components. [MORE](#)

Keywords: fuel sampling; loading estimation; visual biomass estimation; fine woody fuel; herbaceous fuel; shrub fuel

Online: <https://www.fs.usda.gov/treesearch/pubs/61417>

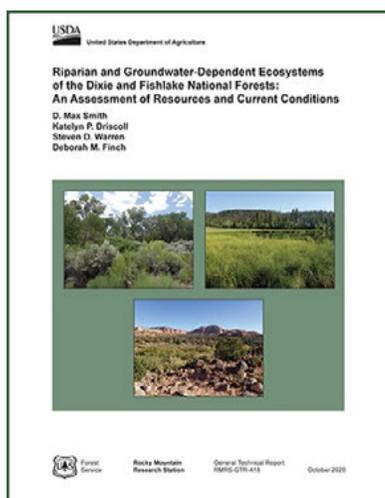


Gottfried, Gerald J.; Turner, David; Bemis, Ronald J.; Neary, Daniel G.; Sundt, Peter; Traphagen, Myles B.; Edminster, Carleton B.; Decker, Donald D. 2020. [Experimental treatments for increasing perennial grass cover in a shrub-invaded grassland in the Southwestern Borderlands region of Arizona and New Mexico](#). Gen. Tech. Rep. RMRS-GTR-417. Fort Collins, CO: U.S. Department of Agriculture, Forest Service. 35 p.

The density of mesquite (*Prosopis* spp.) and other woody species has increased on desert and semidesert grasslands in the southwestern United States. This increase in woody species has been associated with the decline of native herbaceous plants and a loss of biological diversity and productivity. There have been numerous attempts to reverse this situation. The effort reported here employed crushing the woody species with heavy equipment, with and without seeding native perennial grasses, and the use of prescribed fire. [MORE](#)

Keywords: semidesert grasslands; mechanical treatments; woody species; seeding native perennial grasses; prescribed burning; climate; southeastern Arizona; southwestern New Mexico

Online: <https://www.fs.usda.gov/treesearch/pubs/61419>

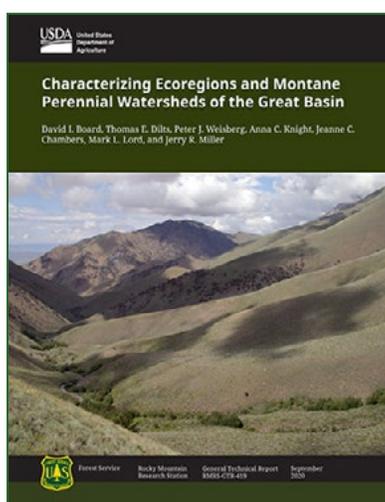


Smith, D. Max; Driscoll, Katelyn P.; Warren, Steven D.; Finch, Deborah M. 2020. [Riparian and groundwater-dependent ecosystems of the Dixie and Fishlake National Forests: An assessment of resources and current conditions](#). Gen. Tech. Rep. RMRS-GTR-418. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 264 p.

This assessment provides information on the current conditions of riparian and groundwater-dependent ecosystems on the Dixie and Fishlake National Forests. We summarized dominant riparian community types and described riparian fish and wildlife habitat. We used peer-reviewed literature, data from the Forests and other partners, and site visits to inventory and map the distribution of riparian and groundwater-dependent ecosystems, as well as to evaluate the status of four key ecosystem characteristics: (1) surface water and groundwater fluctuations, (2) water quality, (3) channel and floodplain dynamics including the condition of spring runout channels, and (4) composition and structure of riparian and groundwater-dependent ecosystems. [MORE](#)

Keywords: forest plan; key ecosystem characteristic; riparian vegetation; flow regime; channel morphology; floodplain; natural range of variation

Online: <https://www.fs.usda.gov/treearch/pubs/61421>



Board, David I.; Dilts, Thomas E.; Weisberg, Peter J.; Knight, Anna C.; Chambers, Jeanne C.; Lord, Mark L.; Miller, Jerry R. 2020. [Characterizing ecoregions and montane perennial watersheds of the Great Basin](#). Gen. Tech. Rep. RMRS-GTR-419. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 51 p. <https://doi.org/10.2737/RDS-2020-0059>.

Multiple research and management partners collaboratively developed a multiscale approach for assessing the geomorphic sensitivity of streams and ecological resilience of riparian and meadow ecosystems in upland watersheds of the Great Basin to disturbances and management actions. The approach builds on long-term work by the partners on the responses of these systems to disturbances and management actions. [MORE](#)

Keywords: Great Basin; mountain range delineation; watershed delineation; watershed characteristics; watershed database; topography; climate; geology; hydrology; vegetation; disturbances; species at risk

Online: <https://www.fs.usda.gov/treearch/pubs/61573>

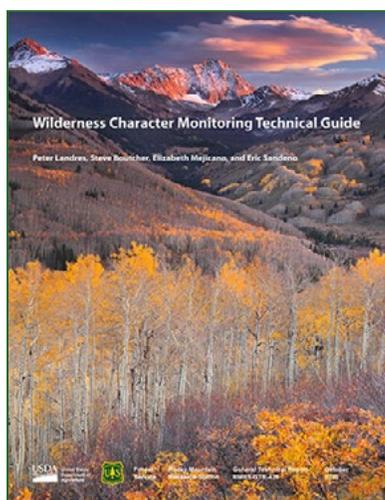


Crawford, Leslee J.; Heinse, Robert; Kimsey, Mark J.; Page-Dumroese, Deborah S. 2021. [Soil sustainability and harvest operations: A review](#). Gen. Tech. Rep. RMRS-GTR-421. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 39 p. <https://doi.org/10.2737/RMRS-GTR-421>.

Soil productivity is essential to the sustained production of forest ecosystem goods and services. Timber harvests may lead to negative ecological impacts to the soil environment, thus reducing both soil and forest long-term productivity. Impacts caused by timber harvests are site-specific, and soil monitoring at various times post-harvest is critical to understanding both short- and long-term damage. [MORE](#)

Keywords: soil disturbance; timber harvest; soil management; soil recovery

Online: <https://www.fs.usda.gov/treesearch/pubs/61810>



Landres, Peter; Boutcher, Steve; Mejicano, Elizabeth; Sandeno, Eric .tech. eds. 2020. [Wilderness character monitoring technical guide](#). Gen. Tech. Rep. RMRS-GTR-426. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 364 p.

This Wilderness Character Monitoring Technical Guide provides a national framework and detailed protocols to monitor trends in wilderness character within the Forest Service. This document updates and completely replaces the former technical guide that was published in 2009. The approach described in this document is consistent with the interagency wilderness character monitoring strategy used by the other wilderness managing agencies and was endorsed in 2015 by the Federal Interagency Wilderness Policy Council. This technical guide incorporates a wide variety of the best available scientific information to yield a coherent understanding of how wilderness character is changing over time. [MORE](#)

Keywords: Wilderness Act; wilderness character; monitoring; wilderness stewardship; untrammeled; natural; undeveloped; solitude; primitive recreation; unconfined recreation; other features of value

Online: <https://www.fs.usda.gov/treesearch/pubs/61747>



Brenkert-Smith, Hannah; Chambers, Chris; Gibble, Katie; Barth, Christopher M.; Donovan, Colleen; Wagner, Carolyn; Lerch, Alison; Meldrum, James R.; Champ, Patricia A. 2021. [Living with wildfire in Ashland, Oregon: 2020 data report](#). Res. Note RMRS-RN-88. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 54 p.

Wildfire affects many types of communities. Improved understandings of urban conflagrations are leading some fire-prone communities, such as Ashland, Oregon, to expand their attention from focusing solely on the intermix fringe to managing wildfire threats across more urbanized wildland-urban interface (WUI) communities. The core intent of this project was to build a partnership between the Wildfire Research (WiRē) Team and Ashland Fire and Rescue (AFR) by leveraging existing wildfire risk data collected in March 2018 and pairing it with newly collected social data to better understand Ashland, Oregon residents’ knowledge, experiences, and perceptions about wildfire risk. This greater understanding will help AFR focus its programs and outreach and ultimately promote increased mitigation and reduced wildfire risk in Ashland. [MORE](#)

Keywords: wildfire; wildland-urban interface (WUI) communities; urban conflagrations; Wildfire Research (WiRē)

Online: <https://www.fs.usda.gov/treearch/pubs/61748>

Journals and Other Publications

External publications written by our scientists and cooperators and grouped by our Science Program Areas. For more information on our Science Program Areas, please visit our web site: www.fs.usda.gov/rmrs/science-program-areas/.

Air, Water and Aquatic Environments

- Jacobs, Gregory R.; Thurow, Russell F.; Buffington, John M.; Isaak, Dan; Wenger, Seth J. 2020. [Climate, fire regime, geomorphology, and conspecifics influence the spatial distribution of chinook salmon redds](#). Transactions of the American Fisheries Society. doi: 10.1002/TAFS.10270.
- LeMoine, Michael T.; Eby, Lisa A.; Clancy, Chris G.; Nyce, Leslie G.; Jakober, Michael J.; Isaak, Dan J. 2020. [Landscape resistance mediates native fish species distribution shifts and vulnerability to climate change in riverscapes](#). Global Change Biology. doi: 10.1111/gcb.15281.
- Robichaud, Peter R.; Lewis, Sarah A.; Brown, Robert E.; Bone, Edwin D.; Brooks, Erin S. 2020. [Evaluating post-wildfire logging-slash cover treatment to reduce hillslope erosion after salvage logging using ground measurements and remote sensing](#). Hydrological Processes. doi: 10.1002/hyp.13882.
- Sankey, Temuulen; Belmonte, Adam; Massey, Richard; Leonard, Jackson. 2020. [Regional-scale forest restoration effects on ecosystem resiliency to drought: A synthesis of vegetation and moisture trends on Google Earth Engine](#). Remote Sensing in Ecology and Conservation. doi: 10.1002/rse2.186.
- Thurow, Russell F.; Peterson, James T.; Chandler, Gwynne L.; Moffitt, Christine M.; Bjornn, Theodore C. 2020. [Concealment of juvenile bull trout in response to temperature, light, and substrate: Implications for detection](#). PLoS ONE. 15(9): e0237716.
- Wilson, Codie; Kampf, Stephanie K.; Ryan, Sandra; Covino, Tim; MacDonald, Lee H.; Gleason, Hunter. 2020. [Connectivity of post-fire runoff and sediment from nested hillslopes and watersheds](#). Hydrological Processes. doi: 10.1002/hyp.13975.

Fire, Fuel and Smoke

- Cansler, C. Alina; Hood, Sharon M.; van Mantgem, Phillip J.; Varner, J. Morgan. 2020. [A large database supports the use of simple models of post-fire tree mortality for thick-barked conifers, with less support for other species](#). Fire Ecology. 16: 25.
- Forthofer, Jason M. 2007. [Modeling wind in complex terrain for use in fire spread prediction](#). Thesis. Fort Collins, CO: Colorado State University. 123 p.
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- Palaiologou, Palaiologos; Kalabokidis, Kostas; Day, Michelle A.; Kopsachilis, Vasilis. 2020. [Evaluating socioecological wildfire effects in Greece with a novel numerical index](#). Fire. 3: 63.
- Riley, Karin L.; Grenfell, Isaac C.; Finney, Mark A.; Wiener, Jason M. 2021. [TreeMap, a tree-level model of conterminous US forests circa 2014 produced by imputation of FIA plot data](#). Scientific Data. 8: 11.

- Tepley, Alan J.; Hood, Sharon M.; Keyes, Christopher R.; Sala, Anna. 2020. [Forest restoration treatments in a ponderosa pine forest enhance physiological activity and growth under climatic stress \[ESA\]](#). The Bulletin of the Ecological Society of America. 101(4): e01772.
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- Jang, Woongsoon; Crotteau, Justin S.; Ortega, Yvette K.; Hood, Sharon M.; Keyes, Christopher R.; Pearson, Dean E.; Lutes, Duncan C.; Sala, Anna. 2021. [Native and non-native understory vegetation responses to restoration treatments in a dry conifer forest over 23 years](#). Forest Ecology and Management. 481: 118684.
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Human Dimensions

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- Kuentzel, Walter F.; Heberlein, Thomas A.; McCollum, Daniel W. 2020. [Why do normative encounter standards change? The social evolution of recreational crowding](#). *Journal of Leisure Research*. doi: 10.1080/00222216.2020.1811178.
- O'Connor, Christopher D.; Falk, Donald A.; Garfin, Gregg M. 2020. [Projected climate-fire interactions drive forest to shrubland transition on an Arizona Sky Island](#). *Frontiers in Environmental Science*. 8: Article 137.
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Inventory, Monitoring and Analysis

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Maintaining Resilient Dryland Ecosystems

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VA: U.S. Geological Survey, Northwest Climate Adaptation Science Center. p. 196-206. Online: <https://doi.org/10.5066/P92L1H70>.

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