USDA United States Department of Agriculture Agricultural Research Service

NM State University

USDA-ARS Range Management Research Unit, Jornada Experimental Range, Las Cruces, NM

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The Jornada

Science-based Knowledge for Sustainability of Drylands.

Our mission is to conduct long-term, collaborative research to sustain agriculture and other land uses in rangelands. Our research group is collaboration of the USDA Agricultural Research Service, New Mexico State University, and USDA Natural Resources Conservation Service in Las Cruces, New Mexico. We link site-based research on ecological processes, innovative livestock production systems, and ecosystem restoration with national and global research on land monitoring and decision support tools. We are a part of the USDA Long-Term Agroecosystem Research and Long-Term Ecological Research Networks. We host the USDA Southwest Climate Hub and collaborate with the Asombro Institute for Science Education. See our website

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Upcoming Workshops

Southwest Drought Learning Network Annual Workshop

Join the Southwest Drought Learning Network for an annual workshop on March 3-4, from 1:00 to 5:00 pm MST each day. The goal of the workshop is to convene drought management leaders and resource managers from the Southwest to continue Drought Learning Network (DLN) activities in peer-to-peer and community-to-community knowledge exchange. Register here for this interactive virtual meeting. Please contact viktorya@nmsu.edu for more information.

Habitat Webinar

Webinar Series: Accessing Rangeland Knowledge with LandPKS
March 2nd, 9th, and 16th from 1:00-2:00pm MT

The Land Potential Knowledge System, or LandPKS, supports ranchers, rangeland managers, and other land managers with open-source tools that allow them to easily access knowledge and information, and to collect, share, and interpret their own soil, vegetation cover, and management data. This webinar series targets rangeland managers and others who are interested in learning how to use LandPKS, and in exploring the app's new Habitat and Soil Health modules in a rangeland management context. LandPKS is free to download for iPhone or Android in the Apple App store/Google Play store. Learn more at LandPotential.org

Each of these three, 45-minute webinars will focus on a different aspect of using LandPKS on rangelands: identifying land potential, monitoring vegetation and understanding habitat, and monitoring soil health. You are welcome to attend one or all of the sessions; however, we recommend that new LandPKS users attend the first session.

Tuesday, March 2nd, 2021 at 1:00-2:00pm MT - General overview
Tuesday, March 9th, 2021 at 1:00-2:00pm MT - NEW Habitat module
Tuesday, March 16th, 2021 at 1:00-2:00pm MT - NEW SoilHealth module

Click here to learn more and register for the webinars.

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Research Results

Four recently published papers are highlighted below. We constantly update our papers and abstracts--over 3,300 of them-here.

Links to .pdfs are at the bottom of the pages linked below.

A Phenotypic Characterization of Rarámuri Criollo Cattle Introduced into the Southwestern United States.
We describe key phenotypic characteristics of a population of Rarámuri Criollo (RC) cattle introduced from the Copper Canyon of Chihuahua, México into the Southwestern United States almost two decades ago. See paper here

Foraging Behavior of Heritage versus Desert-Adapted Commercial Rangeland Beef Cows in Relation to Dam-Offspring Contact Patterns.
RC calves possibly impose fewer constraints on their dams' movement and activity patterns compared with commonly used British crossbreds when grazing the Chihuahuan Desert during summer. See the paper here.

The Hidden Costs of Land Degradation in US Maize Agriculture
One-third of current annual US. N fertilizer use in maize agriculture is used to
compensate for the long-term loss of soil fertility through erosion and organic matter loss. See the paper here.

Community Forests Prepare for Climate Change
Better soil moisture information with spatial and temporal resolutions relevant for assessing fuel bed conditions and wildfire probability offers promise for improving fire danger ratings. See the paper here.

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News

Linking Monitoring Programs and Models to Identify Wind Erosion Conservation Practices

by Nick Webb
Wind erosion and mineral dust emissions threaten agroecosystem productivity and sustainability, food security, and human health in New Mexico and across the United States. Air quality monitoring programs have revealed that dust particulate matter (PM) emissions are potentially increasing risks to human health, transportation networks, and agriculture across the dry western states.

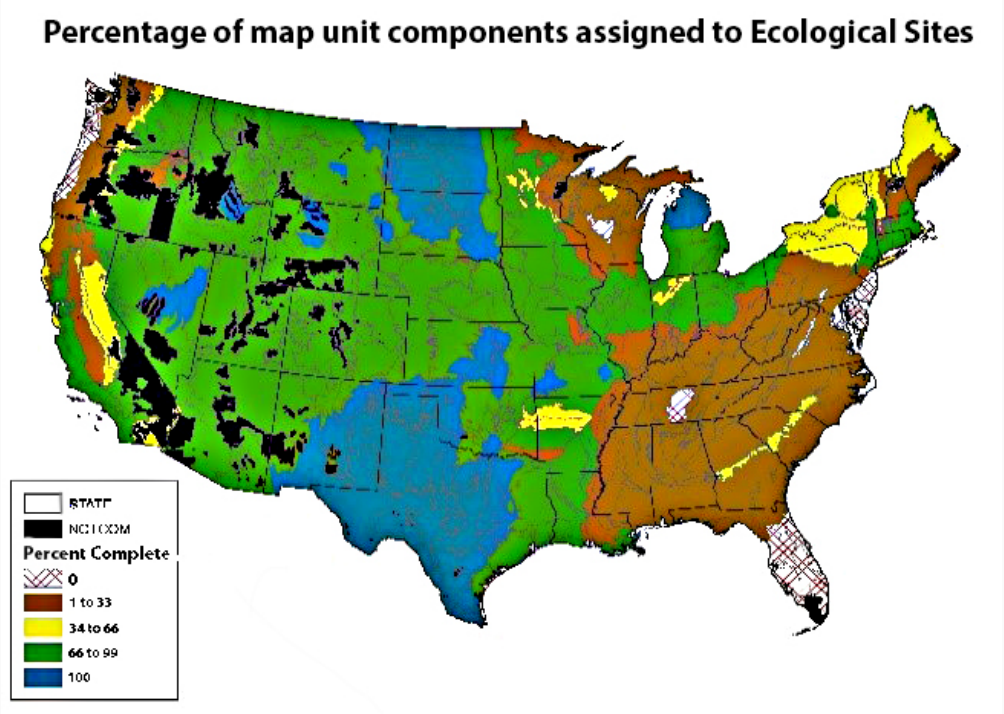
However, we still have a limited understanding of which landscapes are eroding, by how much, and when, and how land use and management are influencing wind erosion. The ability to connect PM emissions with land use and management drivers is critical for land managers to make informed selections of conservation practices. Jornada researchers are developing new tools to inform management of wind erosion and PM emissions.

Our approach uses measurements collected by the National Wind Erosion Research Network to develop an aeolian (wind driven) erosion model (AERO) that can be applied to large-scale standardized ecosystem monitoring datasets collected by federal agencies including the Natural Resources Conservation Service (NRCS) and Bureau of Land Management (BLM) on private and federally-owned grazing lands. Application of AERO to the monitoring datasets will enable estimates of wind erosion and PM emissions to be included in ecological site descriptions (ESDs) and provide interpretations to managers of how wind erosion is responding to changes in vegetation across rangeland ecosystems. The information will enable managers to identify the most appropriate soil conservation practices for their land to meet their management objectives. See more: http://winderosionnetwork.org

Ecological Site Update

By Joel Brown

Ecological Sites (ES) are interpretive groupings of soil survey map units. Each ES has a unique Ecological Site Description (ESD) that contains information that resource managers can use to verify the ES for their area of interest, conduct inventories of soil properties, vegetation dynamics and land use/management interpretations for conservation planning. All ESDs are stored and managed in a common platform, the Ecosystems Dynamics Interpretive Tool (EDIT).



To get ESDs to end users quickly, the Provisional Ecological Site (PES) initiative was established to organize all the existing soil survey map units across the continental United States into provisional ecological sites suitable to guide conservation planning decisions. At the end of fiscal year 2020, significant progress toward completing the Provisional Ecological Site Initiative has been accomplished (Major Land Resource Areas colored green or blue in the map). The western 2/3 of the U.S. is substantially complete, with the exception of some areas in CA and the PNW. Areas in black are not yet mapped. In the eastern 1/3 of the country, where there has not been a history of Ecological Site use, some areas are not yet completed, but most areas have made some progress (brown and yellow). This effort will continue in 2021.

During 2020, EDIT development was focused on connecting soil properties in the National Soils Information System (Web Soil Survey, SoilWeb) to the appropriate ESDs in EDIT to allow for analysis and exploration. Currently, NASIS x EDIT connections are awaiting security certification by USDA before being deployed. The NRCS planning process was introduced into EDIT in 2020 via the use of Resource Concerns dropdown menus, connections to the Conservation Practice Standards Handbook and an interactive tool to include Rangeland Health worksheets. Global EDIT was brought online in late 2020 as a platform for information outside the U.S. and to explore new applications. There is currently a trial to implement a state-transition model classifier to better categorize existing models and develop a more systematic approach to STM construction.

Surprisingly Rich Seed Banks on the Jornada Experimental Range

by Brandon Bestelmeyer

Rangeland restoration can be difficult in arid ecosystems like those of the Chihuahuan Desert. Many arid lands throughout the world have lost the blanket of perennial, long-lived grasses that provides forage, habitat, and soil protection. When considering how to restore a perennial grassland, a critical question is whether or not there are grass and forb seeds present in the soil. If the soil seed bank is empty, then a manager will need to add seeds at a minimum. If the seeds are there, then the question becomes why plant establishment is limited, requiring additional restoration practices such as soil stabilization, soil amendments, shrub removal, or herbivore management.

Kirsten Romig and her colleagues at the Jornada discovered previously undocumented richness of soil seed banks across the Jornada Experimental Range (JER). Romig collected 258 soil samples representing a variety of vegetation conditions across the JER and water those samples in the greenhouse. Those samples produced astonishing richness, including 12,802 seedlings from 151 species of vascular plants and 17 moss species. Even when vegetation appeared degraded and species poor aboveground, the seed banks often contained desirable species that were either transported into the soil from adjacent undegraded areas or were stored in the seed bank from an earlier time when vegetation was in better condition. These exciting results will help us plan for restoration activities in the future and suggest that the potential for grassland recovery may be greater than we thought.

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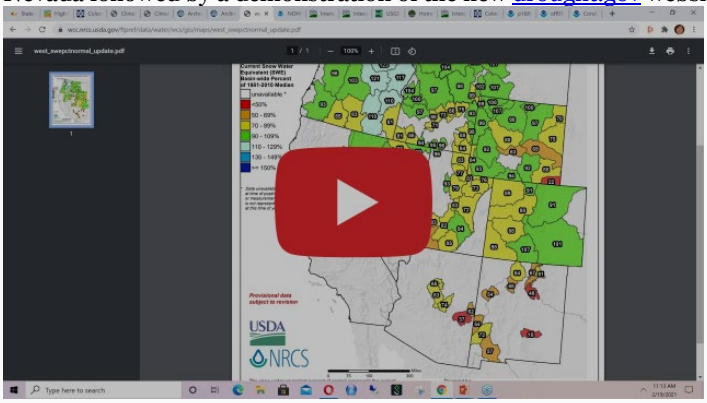
Media

Southwest Drought Briefing

This webinar provided an update of the February 2021 drought conditions and forecasts for Arizona, Colorado, New Mexico, Utah and Nevada followed by a demonstration of the new drought.gov website.



See video here.

2020 Jornada Virtual Symposium Wrap Up

A Jornada Virtual Symposium took place on November 12, 2020 with over 100 participants. The pre-recorded presentations and posters represented recent Jornada research and outreach activities organized around four themes: climate adaptation in the Southwest; strategies for sustainability of beef supply chains in the Southwest; dryland ecosystem dynamics and management; and big data science and tools. You can find the presentations here: https://jornada.nmsu.edu/symposium-2020. The event on the 12th featured break-out and large group discussions about the recorded presentations and posters. Several priorities emerged from these discussions that will inform our current and future research directions.

- Research and tools that clearly link to the decision schedules of land managers, including both short-term and longer-term decisions.
- Science products that provide a broader (and longer-term) context for land managers who tend to know their own lands deeply over certain timeframes but do not know what is going on in areas around them or over very long time periods.
- An understanding of "equitable adaptation" to climate change, that is, how to make adaptation strategies available to all stakeholders by expanding our inclusion of the diversity of agricultural enterprises and emphasizing co-production of information to ensure accessibility
- An understanding of the economics of alternative (and potential) agricultural supply chains, how producer and consumer perspectives of these supply chains vary, and how to improve risk management by integrating genetics and marketing.
- An understanding of how land managers and producers respond to uncertainty and error, how to counsel people on the use of data, and to identify what data products they need.
- Knowledge of how the public interacts with and reacts to science products, and how to ensure that our science is considered to be a trusted and valuable resource.

We thank all the participants for attending and engaging in productive discussions with us, and hope to see you all in 2021, one way or another.

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