

Rangelands West/Global Rangelands, eXtension Rangelands, and the Range Science Information System: A Suite of New Web Resources

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If you are conducting research or looking for reliable answers to specific questions about rangeland ecology and management, there are several new Web resources available to meet your needs.

Throughout the world, rangelands are important to the livelihoods and quality of life of many people. Extending over one-third of the earth's surface, rangelands are often at the center of changing values and controversies over land use and management practices, making it essential for people everywhere to have knowledge of and quick access to the information and tools they need to apply innovative and practical rangeland stewardship strategies.

Similarly, rangeland managers recognize that their work needs to be based on the most current research available, no matter the source or location. Because of this, it is necessary to have ready access to science, education, and outreach materials that address these needs. Currently, no one resource provides this level of accessibility to the world's authoritative rangeland literature, educational resources, and practical tools. However, several related initiatives are now working to fill this gap. Here we describe a complementary set of three resources: Rangelands West/Global Rangelands, eXtension Rangelands, and the Range Science Information System (RSIS). Together, they provide a comprehensive set of tools covering all aspects of rangeland science and practice.

The purpose of the newly redesigned Rangelands West/Global Rangelands portals is to offer a growing repository of readily available full-text and multimedia materials (e.g., journal articles, reports, conference proceedings, learning modules, etc.) that form the basic foundation for understanding rangelands. Partners in this effort include not only land-grant

universities but also the Food and Agriculture Organization of the United Nations and the Australian Rangeland Society, among others. Next, eXtension Rangelands, with its focus on practical, how-to fact sheets and frequently asked questions (FAQs), provides a complementary tool to Rangelands West. Though eXtension Rangelands is still under development, once these two resources are fully functional, direct links will connect the citations in the eXtension Rangelands fact sheets and the full-text materials in Rangelands West/Global Rangelands. In addition, the RSIS database, which provides added value through extensive summaries of key grazing management articles, will soon be searchable through the Rangelands West/Global Rangelands database as well as a stand-alone resource. This dynamic combination of linked tools promises to be a breakthrough resource for anyone interested in learning more about the world's rangelands.

Rangelands West/Global Rangelands

For more than a decade an interdisciplinary team at the University of Arizona (UA), made up of rangeland scientists, extension specialists, librarians and/or information specialists, and IT experts, has been developing a Web portal of rangeland management resources.¹⁻³ At first largely focused on Arizona and the southwestern United States, the UA team expanded the initiative in 2001 to include partners from 18 other western land-grant universities.^{4,5} This led to the formation of the Western Rangelands Partnership (WRP) and the development of the Rangelands West portal and its 19 state-specific affiliated sitesⁱ (Fig. 1). The purpose of Rangelands West is to serve as a central access point for

ⁱThe Rangelands West portal, available at: <http://rangelandswest.org>.

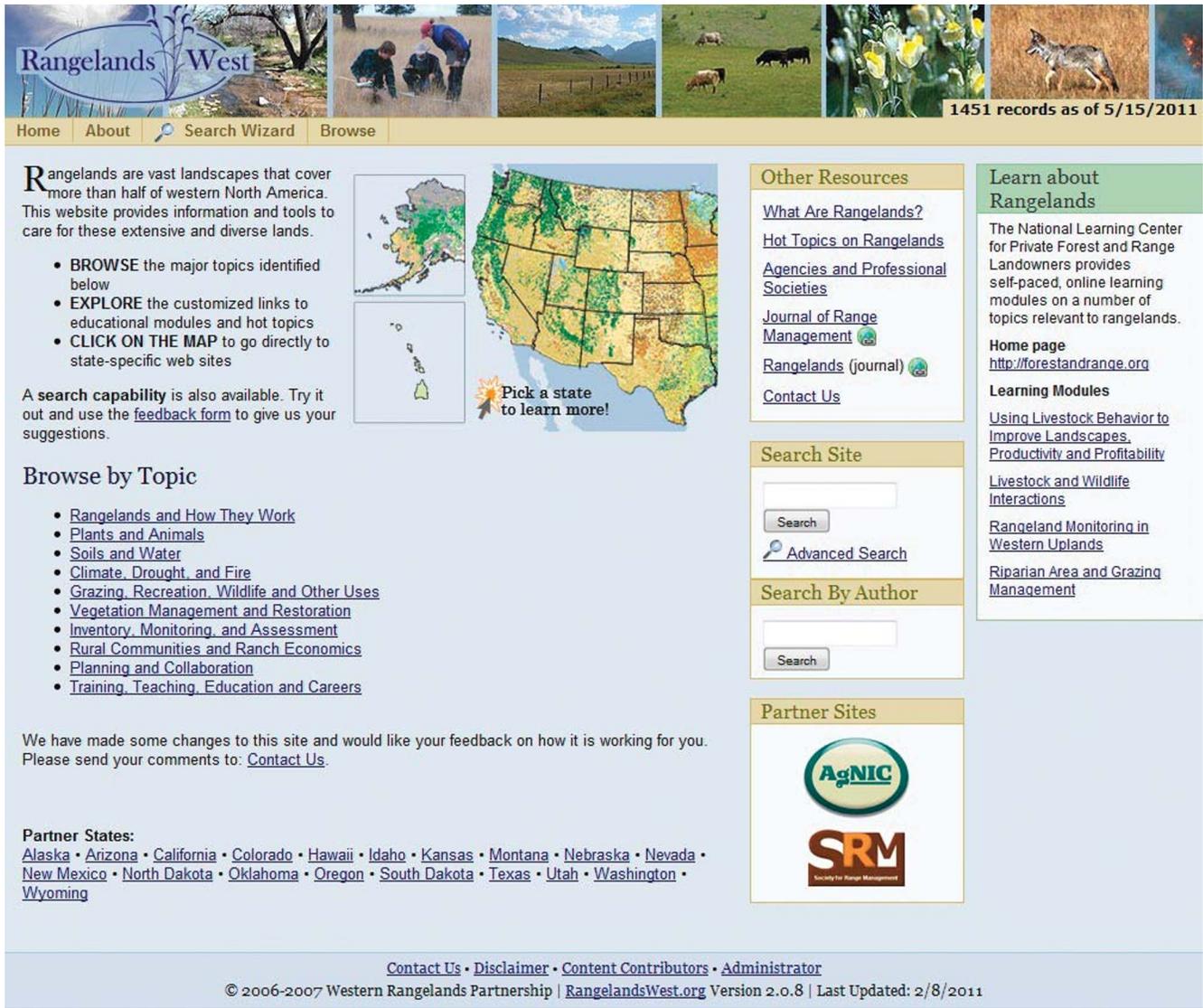


Figure 1. Rangelands West home page (<http://rangelandswest.org>) as of 9 May 2011 (redesigned summer 2011).

journal articles, descriptions of “hot topics,” learning modules, and a database of links to resources for key rangeland science topics.

In addition, the individual state rangelands sites, maintained by partners at each of the 19 participating land-grant universities, are essential to the Rangelands West portal. These sites are continually updated to meet the specific needs of local private and public range managers. Included are geographically relevant tools and information such as the Kansas Wildflower and Grasses Web databaseⁱⁱ (Fig. 2) and Montana’s Small Acreage Landowner teaching materialsⁱⁱⁱ (Fig. 3).

ⁱⁱ Kansas Wildflower and Grasses Web database, available at: <http://www.kswildflower.org>.

ⁱⁱⁱ Montana’s Small Acreage Landowner teaching materials, available at: <http://www.animalrangeextension.montana.edu/articles/range/main-smallacre.htm>.



Figure 2. Kansas Rangelands home page (<http://www.kswildflower.org>), accessed 9 May 2011.



Figure 3. Montana Rangelands home page (<http://www.animalrangeextension.montana.edu/articles/range/main-smallacre.htm>), accessed 9 May 2011.

In 2009, the WRP underwent a complete review, including reassessment of its technical architecture, development of its business plan, and extensive assessments of primary client needs in the US Western region (J. L. Pfander, unpublished data, 2009). The results of these actions substantiated the need for a major redesign and expansion of the Rangelands West portal.

One of the most requested new features from the needs assessment was a comprehensive database offering quick access to the most current, relevant, reliable, and authoritative rangelands literature. Range managers also requested simple Google-like search capabilities that rank results in terms of relevancy and importance. In addition, they wanted an easy way to suggest resources for the site and the opportunity to post comments.

In 2010, WRP members received funding from the USDA National Institute of Food and Agriculture's International Science Education program to create a "Global Rangelands Knowledge System" with a repository of full-text materials through international partnerships, and at the same time to



Figure 4. Prototype Global Rangelands home page (to go live summer 2011).

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Figure 5. eXtension.org home page, accessed 15 May 2011.

redesign and improve the usability of the Rangelands West portal. Although the Rangelands West portal already contains a number of full-text resources, including the open-access article archives from the Society for Range Management's periodicals *Journal of Range Management*, *Rangeland Ecology & Management*, and *Rangelands*,⁶ members of the WRP have made strategic contacts to increase the amount of similar content. These contacts have included international partners such as the Australian Rangeland Society and Rangelands Australia, the Grassland Society of Southern Africa, and the Food and Agriculture Organization of the United Nations.

Agreements with these organizations are underway (at the time of this writing) that will greatly expand access to journal back issues as well as key conference proceedings. Furthermore, conversations with Allen Press have been initiated to explore the inclusion of additional journal back issues and other publications relevant to rangeland management. Building on these efforts, other rangeland societies and organizations around the world are expected to become collaborators in this effort.

Since fall 2010, the Partnership has begun to build the Web portal that will provide new levels of functionality and

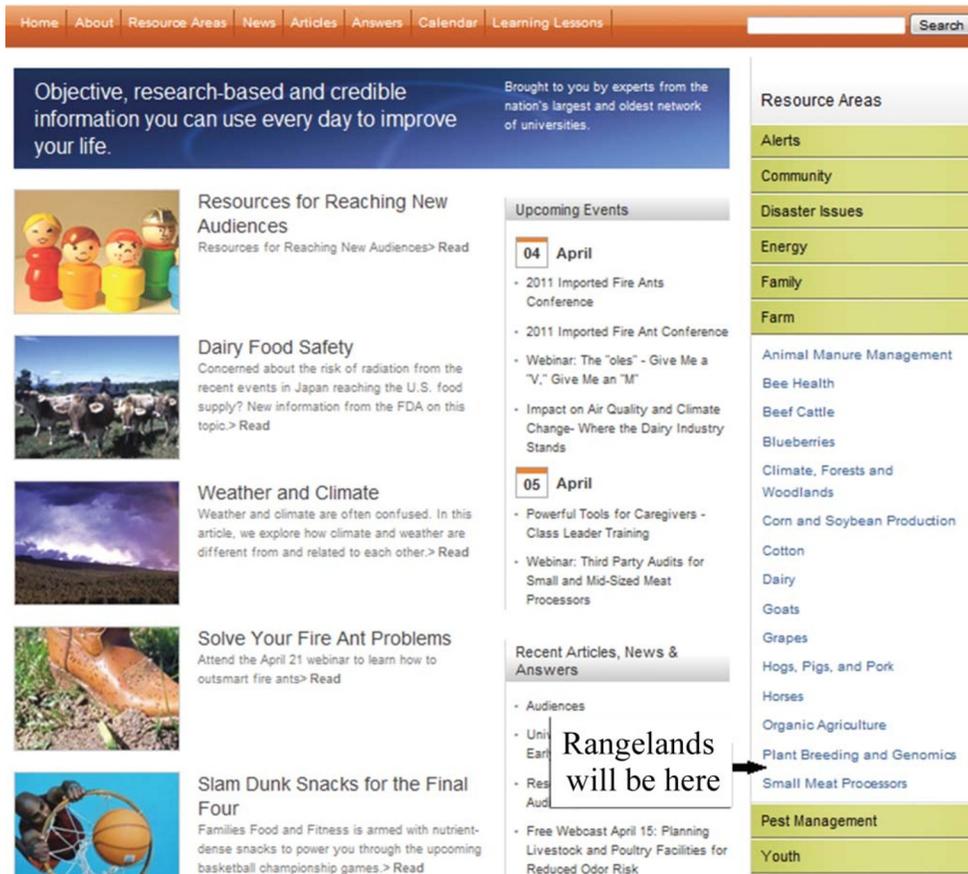


Figure 6. Resource areas under “Farm” on eXtension.org Web site. “Rangelands” location is shown and will also be listed under the page that opens.

content for both US-focused and global audiences. The first phase will be launched in the summer of 2011 as an international repository of rangeland research, education, and training resources. It will also include social media applications (e.g., YouTube, Facebook, Twitter, and SlideShare) to facilitate communication and sharing among the rangeland community (Fig. 4). Drawing on a dynamic combination of committed partners, innovations in Internet technologies, and critical content needed for improved management, education, and decision making for the world’s rangelands, this project is the foundation for and a first phase of a truly global rangelands initiative and collaboration. The goal is to provide convenient and efficient access to international resources on sustainable rangeland management.

Rangelands Community of Practice on eXtension.org

The Rangelands Community of Practice (CoP) will give people from around the world access to information that was written for the lay person and has been fully peer reviewed for accuracy of the interpretation of the scientific literature. The Web site will be available through the Cooperative Extension Service’s national Web site called eXtension.org (Fig. 5). eXtension seeks

to develop a coordinated, Internet-based information system where customers will have round-the-clock access to trustworthy, balanced views of specialized information and education on a wide range of topics. For customers, the value will be personalized, validated information addressing their specific questions, issues, and life events in an aggregated, nonduplicative approach.⁷

This national initiative is seeking to bring programs together into a single Web presence for the general public. The top banner will change to the university in your state that is part of the eXtension initiative. In addition to information on specific resource areas, calendars of upcoming events, current news articles, FAQs and answers (Answers), and the ability to ask specialists specific questions (Ask an Expert) will also be available. The Rangelands CoP in eXtension has the potential to provide information to and answer questions from the general public and practitioners that are science based but are written for a nonscientific audience. The information provided comes from the experts in the field and is peer reviewed before going on the Web.

As part of the WRP, a group of rangeland specialists and librarians developed a proposal to produce a Rangeland Stewardship and Health eXtension Web site (expected to be

Table 1. Outline of the eXtension Rangeland Stewardship and Health Web site

Main topic	Subtopics
Rangelands and how they work	Recognizing and classifying rangeland systems; vegetation types on rangelands; forces that mold rangelands; ecological properties of rangelands; changing rangelands through time
Rangeland plants and animals	Plants; poisonous plants; invasive species; wildlife and wildlife habitat on rangelands
Rangeland soils and water	Soil types; riparian areas and riparian health; stream classification
Rangeland climate, drought, and fire	Regional climate patterns; monitoring weather; effects on plants and plant communities; drought preparedness and management strategies; coordinated fire prevention and planning; policies and laws; prescribed burning; vegetation responses to fire; wildfire
Rangeland vegetation management and restoration	Vegetation and soil complex; goals of vegetation management; tools used to manage and manipulate vegetation; ecological processes of vegetation change
Rangeland management	
Grazing management guidelines on rangelands	Grazing management principles; grazing management guidelines
Rangeland inventory, monitoring, and assessment	Rangeland monitoring; rangeland assessment and monitoring (i.e., What is the difference?); rangeland vegetation and habitat classification
Rangeland economics and rural communities	Ranch management; economics of rangeland improvement practices; economics of invasive species; economics of public rangelands; ranch values; uses of rangelands and their values; regional economics related to rangelands; social science of ranching and rural communities; legal and policy issues on rangelands
Planning for rangeland stewardship	Setting land management goals; adaptive management and planning
Rangelands for students and teachers	For teachers and students; professional range manager certification and training; university and colleges; rangeland career opportunities

available during summer 2011). The eXtension site is being developed to interpret the scientific information presented on the RangelandsWest.org Web site and is the public outreach arm providing access to scientific literature. The Rangelands page will be found by clicking the “Resource Areas” tab on the top bar or “Farm” on the right-hand side menu (Fig. 5) and selecting “Rangelands” (Fig. 6) under “Farm.” While the site may be browsed in a traditional Web-site manner, it is really set up to provide information through searching. Most users will either use the search box on the eXtension homepage or will use search engines such as Google, Bing, Yahoo, or others to access the information resources available from the eXtension Rangelands site.

The Rangelands eXtension Web site is designed to mirror the RangelandsWest.org Web site in terms of its outline structure (Table 1). The purpose of the eXtension site is to provide general information to the public on the specific topics listed in Table 1. Information provided on the eXtension site is peer reviewed and is based on either Extension Service publications or on peer-reviewed journal articles. For

those wanting the technical details or the original articles, links to or citations of those publications are provided on each page and will be linked to the RangelandsWest.org Web site and to the Range Science Information System.

In addition to general information, the Web site will also answer FAQs and will include a function with which the general public may ask questions. The “Ask an Expert” function will route questions to Extension Service educators based on their areas of expertise. These questions and answers can also become part of the FAQ sections and remain on the system. Extension educators that receive questions at their offices are encouraged to check the eXtension.org Web site for answers.

Most of the eXtension Rangelands Web site pages have been written by Lovina Roselle (University of Idaho), Rachel Frost (Montana State University), Mindy Pratt (Utah State University), and John Tanaka (University of Wyoming). Faculty and staff at these and other western land-grant universities have contributed material and FAQs and have conducted reviews.

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Figure 7. Early version of the Range Science Information System home page (<http://arc.lib.montana.edu/range-science/>), accessed 15 May 2011.

Range Science and Information System (RSIS)

RSIS allows users to search an annotated bibliography of almost 1,400 citations, many of which are directly linked to the articles^{iv} (Fig. 7). In its current iteration, the RSIS focuses on collecting and indexing articles on rangeland topics such as riparian areas, weeds, wildlife, vegetation, and soils research. At first glance, it is a search engine geared

for the range-science professional, but a couple of unique elements make it more like a recommendation engine. RSIS often provides more helpful results than common search tools (like Google Scholar) for two reasons: 1) the citations are preselected for their relevance to rangeland management, reducing time reading extraneous abstracts, and 2) the annotations provided by respected rangeland scientists provide concise insight into the articles. A primary vision of the RSIS was to recreate your favorite professor's bookshelf—the place to go to ask a peer, “If I was doing research about *x*, what articles should I start reading?”

^{iv}Range Science and Information System (RSIS), available at: <http://arc.lib.montana.edu/range-science/>.

The screenshot shows the RSIS interface with the following metadata and links:

- Item:** Livestock exclusion increases the spatial heterogeneity of vegetation in Colorado shortgrass steppe
- Title:** Livestock exclusion increases the spatial heterogeneity of vegetation in Colorado shortgrass steppe
- Authors:** Alder, P. B., and W. K. Lauenroth
- Date:** 2000
- Journal:** Applied Vegetation Science
- Volume:** 3
- Pages:** 213-232
- Vegetation Type / Area of Influence:** Unknown
- Summary of Methods:** Adler and Lauenroth recorded canopy cover, density, litter, bareground, soil texture, and small mammal activity on eight paired plots of moderately grazed pastures and ungrazed exclosures. Autocorrelation of individual species abundance was measured and the strength of spatial dependence in different treatments was compared using Moran's I. *Bouteloua gracilis* cover is lower in grazed areas; therefore, spatial heterogeneity increases with livestock exclusion; grazing increases randomness of spatial structure of ungrazed vegetation. The study found that spatial dependence is fine scale and has a subtle effect on ecosystem process.
- Article Summary / Main Points:** None
- Agrovoc Control Words:** Riparian zones Rangelands Wildlife
- Article Review Type:** Refereed
- Article Type:** Experimental Research
- Keywords:** disturbance, grazing, moran's i, plant competition, spatial dependence, bunchgrasses, *bouteloua gracilis*, *buchloe dactyloides*, *agropyron smithii*, *stipa comata*, *aristida longiseta*, *sitanion hystrix*
- Annotation:** None

Links on the right side include: Get article, Cite article with DOI, Find in a library, Persistent Link, Bookmark and Share, and Get Embed Code. A small preview of the article title is visible below the 'Get Embed Code' link.

Figure 8. An item level view of a Range Science Information System record with full metadata and full-text links (<http://arc.lib.montana.edu/range-science/item/29>), accessed 15 May 2011.

RSIS was designed for ease of research, and the simplified interface is a reflection of that goal. Using RSIS is as simple as using an Internet search engine: The search terms are entered and related articles are returned. Experienced researchers can use the controlled vocabulary of range-science key words (compiled by experts in the field) to narrow and refine their searches. Additionally, the mobile optimized version of RSIS^v provides a streamlined interface for smartphones and tablets.

The RSIS project began in May 2009 when Dr Carl Wambolt, a Montana State University (MSU) Professor of Range Science, and MSU extensionist Merrita Fraker-Marble approached the Digital Access and Web Services team at the MSU library with an annotated bibliography of 1,381 records that had been entered into the EndNote citation management software. The initial creation of the annotated bibliography had been sponsored by Undaunted Stewardship,^{vi} a statewide partnership between Montana's agriculture and conservation organizations, with the goal of bringing together experts in the field to select and write abstracts for the best articles related to rangelands science topics published between 1949 and 2009.

The goal for this initial phase of the project was to convert the EndNote citations which were stored on Professor Wambolt's desktop computer into an online database that could be searched and browsed by the world's researchers. The library was able to make these changes over a course of weeks, and the RSIS was released in the summer of 2009.

At the time of release, RSIS records consisted of only basic information including article title, journal title, authors,

date, and article summaries written by subject experts. To address metadata shortcomings and to improve the search functionality, a second iteration of RSIS was begun in partnership with the University of Idaho's Department of Rangeland Ecology and Management, sponsored by Dr Karen Launchbaugh and the Idaho Owyhee County Rangelands Project. Dr Launchbaugh's vision for the RSIS database was to simulate your favorite professor's bookshelf by building "searchable" relationships between similar articles that had been refereed and selected by experts in the field.

During this second phase of the RSIS project, full-text links to articles were made available whenever possible. The RSIS moved away from being a citation database and moved toward becoming a full-text retrieval resource. Most importantly, improved metadata and records began to include additional research information such as the type of article (i.e., primary research article, synthesis article, or case study), location of study, a summary of methods or area of influence, major findings or main points, topic categories, and annotations. This brought us closer to Dr Launchbaugh's vision by introducing even more domain expertise into the records. With summaries of methods and major findings written by field experts (e.g., professors, extensionists, graduate students), RSIS became much more of a recommendation engine for rangeland science research (Fig. 8).

Work with the University of Wyoming's Department of Renewable Resources to add additional field extension records and to assign additional subject categories based on common vegetation types and Major Land Resource Area regions has begun. RSIS records are also being optimized for shared use with larger content repositories such as Rangelands West. The goal is to make sure that RSIS data can be found and used by researchers in their chosen research environment.

^vA mobile version of RSIS, available at: <http://arc.lib.montana.edu/range-science/m/>.

^{vi}More information on Undaunted Stewardship is available at: <http://www.undauntedstewardship.montana.edu>.

Conclusion

Although the Rangelands West/Global Rangelands, eXtension Rangelands, and RSIS Web sites are “works in progress,” they hold great promise for facilitating access to the world’s authoritative rangeland literature, educational resources, and practical tools.

We welcome comments about and suggestions for continuing to develop and improve the usability of the Web sites. Please try them out and provide us with your feedback. Each of the sites includes contact information and forms for submitting questions and suggestions. We look forward to hearing from you!

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