

Viewpoint:

Bridging the Gap Between Rangeland Management and Rangeland Research: The Need for Regular Inclusion of Synthetic Review Articles in the *Journal of Range Management*

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During 1997, we sent separate letters to Gary Fraiser, editor of *Journal of Range Management (JRM)* and *Rangelands*, that argued for the regular inclusion of scientifically based, management oriented, synthetic articles in the *JRM*. We were subsequently invited to attend the annual meeting of the Editorial Boards for both the *JRM* and *Rangelands*, to present our concerns, and to answer questions raised by the editorial Boards. Brad Schultz briefly presented our arguments to both Editorial Boards and he engaged the Editorial Boards in a lengthy discussion about the merits and problems of adding regular synthetic review articles to the *JRM*. Neither Editorial Board voiced any strong, adamant objections to having review articles as a feature of their publication, and several *JRM* Board members thought review articles were a good idea. There were very legitimate concerns (shared by the *JRM* Board and myself) about the additional cost of publishing review papers, and their scientific (scholarly) quality. The discussion ended with a request by the *JRM* Editorial Board and Gary Fraiser that we write a paper for publication in *Rangelands*, that explains why we believe the *JRM* should add regular synthetic review articles to its current format, and to solicit input from the SRM's membership about their information needs.

Below, we outline our perspective of the Society for Range Management (SRM) information transfer problem, why regular synthetic reviews are needed, our view about the style these articles should follow, who would benefit, and potential problems. After reading this paper we urge all SRM members to provide input (favorable, unfavorable, and preferred alternatives) to Gary Fraiser and/or one of the SRM's officers.

The Problem

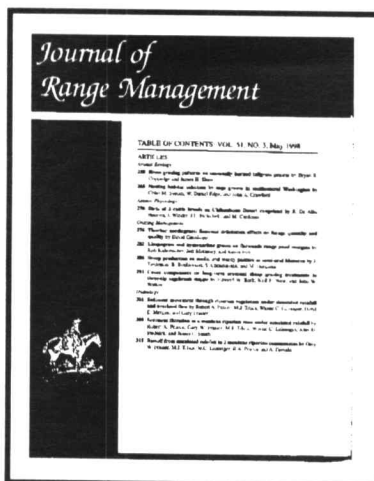
In recent years, many SRM members have failed to renew their membership. In part, we believe this is due to many members believing they receive little professional benefit from the organization. One significant cause is a perception that the technical information in the *JRM* and/or *Rangelands* does not benefit the SRM's management oriented professionals. We believe this is one part of the problem, but re-

quires further explanation to be well understood.

Almost all articles in the *JRM* are published by research scientists. The research scientists typically follow a reductionist approach to publish their results. This approach is appropriate for those involved in highly focused research programs that address specific disciplines and/or subdisciplines, and/or issues at limited ecological, spatial, or temporal scale. The reductionist approach, however, does not readily provide land managers with the integrated technical information they require to manage extensive and diverse rangeland systems and resources. The current format of the *JRM* is well suited for academic research scientists, but not for practicing land managers, who are a substantial (if not majority) component of the SRM.

Most land managers manage rangeland systems that cover hundreds-of-thousands of acres. Furthermore, each manager must address issues that cross disciplines, rangeland systems, and ecological, spatial, and temporal scale. The large number of diverse, reductionist papers in the *JRM* (and other journals) usually address limited resources issues, at limited scale. The highly technical nature, and limited scope of these articles impedes the ability of most if not all land managers, and agency administrators, to effectively incorporate new concepts, theories, and ideas into their daily or annual work plans. Rangeland managers do not lack the interest in incorporating new technical ideas and concepts. They simply do not have the time and/or the infrastructure (e.g., data bases and search programs) to find, read, and integrate (synthesize) a large number of technical articles, each with a limited scope.

We believe the following two examples will illustrate the severity of the information transfer problem the SRM faces. First, the 1993 edition of *Ecological Applications* (volume 3) has a section of review articles titled, *Grazing Theory and Rangeland Management*. The 10 review articles (Bartolome 1993, Briske 1993, DeAngelis and Huston 1993, Dyer et al 1993, McNaughton 1993, Noy-Meir 1993, Painter and Belsky 1993, Patten 1993, Risser 1993, and Trlica and Rittenhouse 1993) critiqued, and synthesized information relevant to grazing management. We believe there is an inherent problem with the *JRM* when an extensive review of



grazing management is found in *Ecological Applications*, but not the *JRM*. There are probably few SRM members that subscribe to *Ecological Applications*. Also, many if not most management professionals do not live near libraries that subscribe to *Ecological Applications* or other journals that publish range related research. These managers, therefore, are not getting some of the best information available to enhance their ability to do their job. Professional development of its members is one of the stated objectives of the SRM. It is printed on the first page of every issue of the *JRM*.

Second, the problem is compounded by the periodic appearance of review articles in other journals that focus entirely on the negative aspects of grazing rangelands (Fleischner 1994, Belsky and Blumenthal 1997). Few would argue that all grazing, on all rangelands, is always beneficial; however, papers that directly or indirectly blame the range science profession, and/or current management of rangelands for all undesired situations cannot be left unaddressed by the SRM, which touts itself as the scientific leader for the management of rangelands. External criticism of our profession can be good, as it helps us focus on important issues and values held by all members of the society. We must, however, regularly show that we are integrating all available information sources into enhancing the management of rangelands, and improving the capabilities of our management professionals. Scientifically based, synthetic review articles are an important step in this process.

The problem as we see it, is at least threefold. First, the information and technology available to rangeland managers is extensive, but is spread across many resources and often in small pieces that individually are of little use for our management oriented membership. When the information from appropriate papers is adequately synthesized, however, it can be invaluable. Second, land managers have insufficient time and resources available to find and integrate all relevant information (from multiple sources), that can enhance their work, and provide a continuing professional education. Third, the SRM is not adequately demonstrating to the public how a substantial amount of research justifies the use of rangelands by both domestic livestock and other resource uses, and how the regulation of grazing can restore and improve rangelands for a variety of uses.

Why Synthetic Review Articles

Scientifically, based, synthetic review articles are the best method of transferring large amounts of widely dispersed technical information needed by the management oriented segment of the SRM. The *JRM* provides some of the re-

THE SOCIETY FOR RANGE MANAGEMENT, founded in 1948 as the *American Society of Range Management*, is a nonprofit association incorporated under the laws of the State of Wyoming. It is recognized exempt from Federal income tax, as a scientific and educational organization, under the provisions of Section 501(c)(3) of the Internal Revenue Code, and also is classed as a public foundation as described in Section 509(a)(2) of the Code. The name of the Society was changed in 1971 by amendment of the Articles of Incorporation.

The objectives for which the corporation is established are:

- to properly take care of the basic rangeland resources of soil, plants, and water;
- to develop an understanding of range ecosystems and of the principles applicable to the management of range resources;
- to assist all who work with range resources to keep abreast of new findings and techniques in the science and art of range management;
- to improve the effectiveness of range management to obtain from range resources the products and values necessary for man's welfare;
- to create a public appreciation of the economic and social benefits to be obtained from the range environment;
- to promote professional development of its members.

Membership in the Society for Range Management is open to anyone engaged in or interested in any aspect of the study, management, or use of rangelands. Please contact the Executive Vice-President for details.

search results that managers need to manage rangelands, but there is also substantial information from a broader suite of disciplines that publish their results in many other journals. Maintaining and upgrading the technical skills of land managers, and hence their ability to manage extensive and diverse rangeland systems, requires that these large number of diverse reductionist research papers be regularly synthesized into management oriented review articles that transcend disciplines, ecological levels, and spatial and temporal scale. The goal should be to integrate a vast amount of technical, but very

specific reductionist research into a more acceptable (interpretable) format for land managers. Most managers simply do not have the time or resources to find, collect, read, interpret, and integrate the large number of articles located in many different sources.

Content and Style of the Review Articles

The synthetic review articles we envision are an extension beyond the current Viewpoint and Opinion articles in the *Journal*. Viewpoint articles typically address a single theme or issue, and often do not integrate important research across disciplines and scales in a format suitable for managers. The review articles we envision must be synthetic, and have a strong scientific and scholarly basis. That is, they integrate a substantial amount of peer reviewed published research, and when appropriate gray literature from symposium proceedings, experiment station reports and similar sources. The articles should be focused around one or more central themes and to the extent possible should address multiple rangeland systems (e.g. short-grass Prairie and Great Basin), ecological processes, ecological levels, and/or scales. Rangelands are diverse and the concepts, theories, and principles developed for one system may not be fully transferable to other systems. Land managers need to understand when research conclusions are and are not directly transferable among rangeland systems, otherwise mis-management will occur, and may become the predominant form of management. Review articles, however, may also address specific issues that are critically important to specific regions.

The review articles must be directly relevant to and directed toward the management of rangelands, not simply the dissemination of new research, or the regurgitation of old research. A simple review of the literature should not be the focus, but rather how the results of the past and current research can be applied to current management problems, and the limitation of their application. Articles by West (1990), Johansen (1993), Fitzsimmons (1996), and Young (1992) illustrate the types of articles we believe should appear in the *Journal*.

As an example, the papers by West (1990) and Johansen (1993) critically discuss the perceived importance of cryptobiotic crusts in arid and semi-arid rangeland systems, and identify the problems and limitations of past research. West (1990) also provides good arguments why land managers should not globally accept the concept that all cryptobiotic crusts are valuable, and must be preserved. The value of cryptobiotic crusts on western rangelands is a hotly debated topic among ecologists. Most rangeland managers, including many in policy making positions, are probably unaware that much of the research about cryptobiotic crusts has been critically reviewed in various journals. Fitzsimmons (1996) provides a similar review about ecosystem management, a potentially flawed policy (according to Fitzsimmons) now being widely implemented across several public land management agencies. These three articles present no new research, but integrate and synthesize a wide variety of published material that is very relevant to the SRM's management oriented membership, and perhaps the long-term viability of rangelands and the SRM.

Benefits

Land Managers: The benefits to land managers are many. There is a large amount of high quality technical information found in many different journals. This information is often beyond the reach (or easy reach) of managers who live in small isolated communities, far from high quality libraries. Once students move from their university environment and accept positions with natural resource management agencies they often lose their ability to: (1) remain up-to-date with the literature, and (2) to rapidly obtain previously published materials (i.e., published prior to the first issue of any journal they received). This is an unfortunate result of many field offices located in rural locations. The functional result is that much of the scientific research our management professionals need to support and defend their conclusions is never incorporated into their written documents. Many resource management decisions, particularly those scrutinized by narrowly defined special interests, are based on emotion or values, not research results. We believe range management decisions are often not being based on appropriate science because the science is not finding its way to the practitioners that need it the most, and/or is not being presented in a useable format. Review articles are the best method to integrate and synthesize this information and provide it to our management oriented membership. The increased availability of review articles that synthesize material from a wide variety of sources would provide land managers the beginning of a literature base they could use to support the conclusions they draw in their reports, allotment evaluations, and documents to meet the National Environmental Policy Act (NEPA).



Researchers: The most difficult task a researcher encounters is finding, reading, and synthesizing the literature that clearly defines the important and relevant research questions, for inclusion in proposals, and/or project design. Researchers, just like land managers, have limited time to review and synthesize the extensive literature base that has developed over the last 5, let alone 50 years of rangeland research. Well written, synthetic review articles should benefit many researchers, particularly as the breadth of subjects reviewed increases.

SRM Membership and Finances: Membership has declined throughout the 1990's. This decline is not due just to the downsizing of land management agencies and declining enrollments in many range management/science programs. We know numerous range management specialists who have let their membership lapse, and when questioned they often state two reasons. First, their agency often provides minimal, if any, support or incentive for maintaining active membership. Many agency personnel are not provided financial assistance (transportation costs, per diem, salary coverage) to attend section or national meetings, and most cannot bear the cost themselves. Second, they often feel they are not receiving the information they need from the *JRM* or *Rangelands*. The *JRM* is often mentioned as being too technical and narrow in scope. *Rangelands* is often described as interesting, but too general for application to most management problems. If SRM members are not receiving support from their employer to remain active in the Society and to continue their professional education by attending meetings that provide relevant management oriented information, then continuation of their professional education so they excel in the application of

sound science to rangeland management is possible only from material published in the *JRM* or *Rangelands*. If the *JRM* and *Rangelands* do not provide range managers the information they need in an acceptable format, then there is no need to maintain membership in the SRM, and most likely it will not be renewed. If former SRM members were not satisfied with our primary publications (*JRM* and *Rangelands*) they probably will not buy the technical books published by the SRM, despite their inclusion of a substantial amount of useful information. The functional result is that the SRM loses financially. It has failed to meet some of its most critical objectives (see the first few pages of a *JRM* or *Rangelands*), and rangelands will not be managed with the best science possible.

Management/Research Linkage: The SRM will remain an effective organization only as long as there is a strong link between both the research and management oriented membership. Funding for range science has declined in recent years. Research on rangelands and in arid ecosystems is still widespread, but is becoming dominated by "pure" or more theoretical ecologists. These scientists con-

duct excellent experimental studies that have helped unravel the processes and interactions that structure and function many ecosystems, however, they have minimal interest in applying their research results to the management of rangelands (Risser 1993). The disconnect between ecological researchers and resource managers is growing wider, and in the long-term benefits neither. Less and less research is finding its way into improved management practices, or is taking far too long to be implemented. We believe the result has been an increase in management by regulation and court action, and less by sound science. If management continues to be driven by regulation and court action, and less by research there will continue to be funding cuts for range science research, and sound management will decline.

Formulation of Rangeland Policy: High quality rangeland research should be a driving factor in the development of policy for the management of rangelands. In recent years this has not always been the case, and we believe this has important implications of the SRM and our profession. Two examples illustrate our point. The two largest policy initiatives since 1994 have been *Range Reform* (U.S. Department of the Interior 1994) and *Rangeland Health* (National Research Council, 1994). A review of the literature cited in *Range Reform* counts 225 citations, of which only 6 are from the *JRM* (Herbal 1955, Tausch et al. 1981, Richard and Cushing 1982, Taylor 1986, Laycock 1991, West 1993), and 7 from *Rangelands* (Winegar 1977, Elmore and Beschta 1987, Osborn and Simanton 1989, Swanson 1989, Bostick 1990, Grette 1990, Cool 1992, Emmerich et al. 1992). The authors of *Rangeland Health* cite 177 articles, and only 5 are from *JRM* (Dyksterhuis 1949, Passey and Hugie 1962, Wilson and Tupper 1982, Westoby et al 1989, Friedel 1991). Interestingly, of the 21 SRM (published) papers cited in either document, 8 are synthetic reviews or viewpoint style articles (Wilson and Tupper 1982, Branson 1985, Elmore and Beschta 1987, Swanson 1989, Westoby et al 1989, Friedel 1991, Laycock 1991, West 1993). Simply put, the thousands of experimental and descriptive research studies published in the *JRM* are not driving the development of policy for the management of rangelands. A few high quality review articles that integrate and synthesize research results appear to have the highest value for policy development for rangeland management. If the SRM wishes to be at the forefront of the development of policy for managing rangelands on a scientific basis, it must incorporate the scientific literature into the style that policy makers rely on.

Continuing Education and Professional Certification: While continuing education and/or professional certification for rangeland managers are topics many SRM members do not wish to address, they are probably inevitable, and undoubtedly will become a matter of professional development. Its not a question of if it will happen, but when. Professional certification has expanded into too many other disciplines, not to eventually affect resource managers. The simplest and cheapest way for range managers to improve their technical knowledge and skills throughout their careers, particularly for those not located near Universities, is the regular publication of scholarly, synthetic review articles that address pressing rangeland issues.

Why the *JRM* and not *Rangelands*

The synthetic review articles we envision belong in the *JRM* because they will have a strong scientific and scholarly basis. They are not meant to be generic, feature articles for the layperson. They are meant to further the scientific and management education of range management professionals throughout their career, while providing research results (from multiple sources) that can be used (when appropriate) to support and defend ongoing management actions and/or decisions. The layperson nature of rangelands does not fit within this frame work. Effective use of the articles in the policy and management arena requires that they be tied to a scholarly journal that is accepted by the scientific community.

Potential Problems

Who Writes the Manuscripts: There is a common perception that research scientists at Universities are paid to obtain outside funding to support graduate students and research projects, not the preparation of review articles. Does this mean that research professors cannot or will not write scholarly synthetic review articles? Almost all of the review articles we have cited in this paper were written by University professors, some of whom are SRM members. This suggests there are more than a few well qualified individuals willing to write review articles about topics that interest them. Many, if not most research scientist have interpretations of the literature they want to see widely accepted by other research scientists and resource managers. When researchers know there is an outlet that will publish their review and integration of published research many will voluntarily write high quality papers. One of the best methods to focus needed research is through a review article that clarifies the state of existing knowledge and identifies deficiencies.

Since most rangeland managers conduct little original research during their careers, part of their education may be better spent studying and writing about one or more current rangeland issues in depth. We believe many Masters level graduate students would benefit by writing review articles. The most likely candidates are those in non-thesis programs, who wish to work for a public land management agency. Once employed, these former students will be addressing many issues that scholarly synthetic review articles can explore. One approach to ensure that the best research (current and past) is being applied to the management of rangelands is for future management professionals to become intimately familiar with the current state-of-knowledge, integrate that information, and discuss its relevance. The experience collecting literature, and evaluating and integrating it into a scholarly peer-reviewed paper will be as valuable, if not more valuable than writing a thesis, and will provide a much greater service to the management oriented community. For doctoral students, a well written, comprehensive review of the literature relevant to their dissertation may also result in excellent material for a review article.

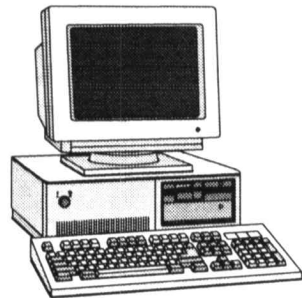
Topics: The selection of topics for review and publication can probably be addressed two ways. First, authors could voluntarily submit manuscripts about subjects in which they are interested. This should probably occur interactively with



the editor of the *JRM*. Review manuscripts are often difficult and time consuming to write, therefore, authors should discuss their ideas with the editor to ensure their compatibility with the *JRM*. Second, the membership can provide the editor with suggestions about possible topics they feel relevant to current management issues. This could be done by providing space on the membership renewal form so members could provide input. Adding a window to the SRM's webpage would also serve this purpose. The editor and editorial board (or individuals they designate) could identify the most desired topics, and solicit individuals to write papers focused around these topics. Eventually, we would expect papers to be written from a combination of both approaches.

Cost: Additional papers in the *JRM* will increase both printing and mailing costs. Most research grants include funds for publication of the results. Review articles, however, are not likely to be tied to specific research funds. The publication and mailing costs probably cannot be borne entirely by the SRM. An author's supporting organization may be able to cover some or all costs, but this is not guaranteed. Another option is to obtain funding from a foundation or association interested in natural resource management. There are hundreds of foundations and probably many associations that provide funding for environmental issues. Several may be interested in underwriting some or all of the cost of publishing additional papers in the *JRM*. Finally, the papers could be provided in an electronic format on the

SRM's webpage. The Ecological Society of America publishes its newest journal, *Conservation Ecology*, entirely on the Internet (see <http://www.consecol.org/journal>), with initial support from a grant from the Richard Ivey Foundation. A similar approach may be the best for publication of review articles focused on range management



issues. The cost of publishing review articles is a legitimate concern. But if the desire is there, we believe that constraints can be alleviated. Our membership should provide any idea they have to Gary Frasier, editor of *JRM* and *Rangelands*.

Conclusion

It is our opinion that the *JRM* has become dominated by the research oriented membership of the SRM, and that their short-term publication needs and research focus often do not meet the technical information needs of the management professional in the SRM. Since the SRM was founded to disseminate information that would enhance the management and condition of rangelands it is not appropriate for the *JRM* to have such a large divergence between the research and management components of the SRM. The purpose of rangeland research is to provide the information necessary for land managers to improve the management of rangelands. The land managers are the customers of the

research scientists and they are not getting the product they need to do their job. There is a place in the *JRM* for the presentation of reductionist research, and it should not be diminished; however, such papers should not be published at the complete expense of the relevant, detailed review articles, that land managers need. We point out that on the first page of each issue of the *JRM* there is a statement that says "The *Journal of Range Management* serves as a forum for the presentation and discussion of facts, ideas, and philosophies pertaining to the study, management, and use of rangelands and their several resources." There is nothing in this statement that says reductionist research, with limited scope and application, should be the dominant material presented. It is time for the *JRM* to include more technical review articles for the management oriented membership of our organization.

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Assistant / Associate / Full Professor--Range Science

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