

can raise to be the most limiting factor affecting their ability to expand their cow herd. They considered raising hay a viable alternative for providing winter feed, but not purchasing hay because of their financial situation. This result indicates the critical nature of the winter feeding period for eastern Oregon. Financial considerations were also an important factor associated with expansion. Ranchers who received an increase in permitted use saw more changes in the overall ranch operation when faced with a decrease in federal forage than did the ranchers who had not received an increase. Experience with changing conditions may have permitted these ranchers to better consider the induced effects of a change in federal forage.

Although the most likely response to changes in federal forage is a shift in herd size, planning agencies must consider the entire ranch operation, as well as effects induced by an increase in herd size. The most important induced effect is impact on winter feed. If the herd size increases, more

winter feed is needed; if the herd size decreases, less winter feed is needed. Another important consideration in planning the changes anticipated from shifts in permitted use is the one-fifth who only change location of their summered livestock.

Literature Cited

- Bromley, D.W., G.E. Blanch, and H.H. Stoevener. 1964. Effects of selected changes in federal land use on a rural economy. Oregon State Univ., Agr. Exp. Sta., Sta. Bull. 604.
- Bedell, T.E., and T. Stringham. 1984. Forage sources for eastern Oregon cattle ranches with federal grazing permits. In: 1984 Progress Report—Research in Rangeland Management. Oregon State Univ., Agr. Exp. Sta., Spec. Rep. 715.
- Obermiller, F.W., and L.F. Miller. 1983. Grant County, Oregon: Impacts of changes in log flows on a timber-dependent community. In: Competition for National Forest Timber: Effects on Timber-dependent Communities. R.W. Haynes, Tech. Ed PNW-148, Feb. 1983. Pacific Northwest Exp. Sta., USDA, Forest Service, Portland, Ore.



Are the Public Rangelands Ailing?

Karl Hess and Ronald J. White

The Natural Resources Defense Council (NRDC) and the National Wildlife Federation (NWF) released in December 1985 a report on range conditions on public domain lands. The study is entitled, "Our Ailing Public Rangelands: Condition Report—1985" (Wald and Albersweth 1985). Utilizing data from 116 Environmental Impact Statements (EISs) issued by the Bureau of Land Management (BLM) from May 1978 through June 1985, the report concluded that 84 million, or 71%, of the 118 million BLM acres reported in the EISs were in unsatisfactory (poor or fair) range condition.

Methodology of the NRDC-NWF Report

The NRDC-NWF report claims that statistics in BLM-EIS documents "...constitute the most current condition data available." Yet, the report omits reference to the 1984 BLM Range Condition Report (USDI 1984) which covers 96% of BLM acreage in contrast to the 66% of BLM acreage examined in the NRDC-NWF study. Comparison of the two reports indicates the 1978–1985 figures used by NRDC-NWF understate 1984 BLM estimations of excellent and good condition range by 20% and overstate current BLM estimations of poor condition range by 40%.

The 1984 BLM data base is not definitive. Completion of current BLM monitoring studies in New Mexico, for example, is expected to show significant improvement in range conditions statewide (personal communication, New Mexico state office, BLM). The expected improvement in range condi-

tions, however, may be more reflective of enhanced and standardized measurement techniques and methodologies than major vegetative changes.

BLM estimations of range condition have been determined by a number of techniques in the past. The different techniques have resulted in variable range condition estimations, frequently not comparable across time. For example, a range condition rating of 15 (mid-poor) was estimated in 1978 on a BLM allotment in the Las Cruces-Lordsburg Resource Area of southwestern New Mexico using the Soil Vegetation Inventory Method (SVIM). In 1981, range condition on the same allotment was estimated to be 45 (high-fair) using a modified SVIM. Such a dramatic improvement in range condition over a period of three years in which annual precipitation was below normal suggests the probable cause was changes in BLM procedures and not vegetative development.

The condition rating of 15 (mid-poor), not 45 (high-fair), was incorporated into the grazing EIS for the Las Cruces-Lordsburg Resource Area and was used in the computation of overall resource area range conditions (USDI 1981). Range condition estimations for the other allotments included in the grazing EIS for the same resource area were subject to identical inter-methodological variations. Such discrepancies in range condition estimations occurring in other resource areas and their implications for the accuracy of BLM-EIS documents West-wide highlight the inutility of the NRDC-NWF study.

The inadequacy of the NRDC-NWF data base and the question of its current validity (a criticism also applicable to the 1984 BLM data base) is of secondary importance when

The authors are employed at the New Mexico Department of Agriculture, New Mexico State University, Box 5702, Las Cruces, New Mexico 88003. Hess is the range resources specialist; White is a division director and a certified wildlife biologist.

viewed against the report's omission of range trend information. Range condition estimations convey limited information unless accompanied by trend, the traditional indicator of change in range condition through time. The NRDC-NWF report makes no reference to upward, downward, or static trend on public domain rangelands.

The Ecological Range Condition Concept

Ecological range condition class, as currently used by the BLM, indicates the present state of a site's vegetation relative to its climax potential (Dyksterhuis 1949). The ecological range condition modifiers of excellent, good, fair, and poor are value-free. Their use does not imply that a site in excellent condition is necessarily better than a site in fair condition. Rangelands in good or fair ecological condition sometimes provide superior forage for livestock or more suitable habitat for selected wildlife than the same rangelands in excellent ecological condition (Smith 1979 and 1984).

Pinyon-juniper woodlands, for example, occur as climax vegetative types on many southwestern range sites. The value of these woodlands for habitat of selected wildlife or livestock grazing is reduced when dense climax overstory canopies limit herbaceous and woody understory production. Opening the woodland canopy through natural events (fire) or man-directed manipulations can dramatically increase vegetative diversity and yield in the understory. Although the ecological range condition of the site, relative to a woodland climax, may only be fair after opening the woodland canopy, the forage or habitat condition of the site will be significantly enhanced for livestock and selected wildlife.

NRDC-NWF Interpretation of Range Condition

The NRDC-NWF report ignores the subtle nuances of the ecological range condition concept. The study's assumption that excellent and good condition sites are inherently better than or superior to lower condition sites is a generalization not supported by the ecological range condition concept (Smith 1979, Wilson and Tupper 1982). The NRDC-NWF report, for example, interprets sites in less than good condition to be unsatisfactory "...because their soils and plant cover are in a deteriorated state...."

The claim made in the NRDC-NWF study that fair and poor condition rangelands are unsatisfactory and deteriorated is unsupportable on the singular basis of the successional position of a site's occupying plant community. "Deteriorated" and "unsatisfactory" are value-laden terms which may or may not apply to particular sites in less than good ecological condition. Whether a fair or poor condition site, for example, is "unsatisfactory" or "deteriorated" must be predicated on (1) the intended use of that site, and (2) the degree to which physical site changes are induced by deviation from climax vegetative potential (Smith 1979 and 1984).

Physical deterioration of a site, as projected by NRDC-NWF for unsatisfactory condition rangelands, would presumably alter the vegetative potential of the site, and the site's relative ecological condition, if the edaphic environment was sufficiently transformed (e.g., excessive soil loss). Yet, accelerated soil erosion is not a necessary or intrinsic property of sites estimated to be in less than good ecological range condition (Smith 1979 and 1984). The occurrence and magnitude of erosion processes are frequently related more to a site's physical characteristics (e.g., soil type and landscape position) than to the presence of potential or seral

vegetation. The ecological range condition categories reported and used by the BLM in the EISs and referenced by NRDC-NWF in their report are descriptive primarily of vegetative conditions relative to site potential. By linking edaphic transformations to sites exhibiting fair or poor ecological range condition, the NRDC-NWF report reveals a misunderstanding of the ecological range condition concept and the causal relationship between a site's abiotic environment and its vegetative potential.

Site potential, predicated on the abiotic environment, is the key to interpreting range condition and trend. Deficiencies in current knowledge of site potential on some rangelands make estimations of range condition and trend tentative at best. Yet, the NRDC-NWF report attributes a level of significance to BLM range condition estimations which may not be justified. Site potentials on Southwestern rangelands, for example, typify this problematic aspect of ecological range condition estimations.

Major vegetation changes on Southwestern rangelands have been documented by Herbel (1985) and Neilson (1986). Herbel has attributed them to such factors as fire control, climatic changes, and grazing. Neilson has emphasized the importance of long-term climatic trends in determining floristic structure in the Southwest. Edaphic changes may also have occurred since European settlement. Not surprisingly, the new patterns and composition of vegetation generated by these factors present a significant interpretational problem to today's rangeland manager: what is site potential? The answer is not known in many cases (Smith 1979, Wilson and Tupper 1982).

Ecological range condition measured on sites where vegetative potential is not known has minimal utility. At best, the measurements are approximations based on the best judgment of field technicians and range ecologists. At worst, they are miscalculations of a site's current ecological status and potential for future change.

Even on Southwestern rangelands where a specific site's potential is known, it is debatable whether such knowledge is managerially meaningful. The invasion of creosotebush, juniper, and mesquite onto lands formerly dominated by grasses may be an irreversible process on some rangeland sites. There is no indication that natural succession can or will reestablish historic grasslands in these cases without high levels of rangeland investment—levels of investment that are not economically justified at the present time. Under these circumstances, it may be more reasonable to measure range condition relative to a "new climax" dominated by woody species than to a potential grassland climax that in all probability can never be achieved (Smith 1979).

The point to be emphasized is that range condition and its interpretation is far more complex than the NRDC-NWF study implies. Range condition data should be interpreted not only in the context of time (trend) but also in the context of existing ecological knowledge and management objectives and possibilities. The NRDC-NWF report, by ignoring the interpretational and contextual dimensions of range condition, presents a misleading and oversimplified view of the condition of America's public domain rangelands.

Analysis of NRDC-NWF Report Conclusions

The NRDC-NWF report asserts that its determination of

71% unsatisfactory (fair to poor) condition rangelands on the public domain conclusively establishes that "...vast areas of the public rangelands are being mismanaged" and that "overgrazing by domestic livestock is the most serious form of mismanagement occurring." Examples of overgrazing on today's public rangelands do exist. However, available data indicate overgrazing does not occur on the "vast" scale claimed by the NRDC-NWF study. Vast overgrazing on public rangelands ceased when unlimited access to the public domain was curtailed by the Taylor Grazing Act of 1934.

NRDC-NWF claims BLM-EIS condition ratings reveal the enormity of public domain mismanagement and overgrazing. In reality, all that the EISs reveal are estimations of ecological range condition. The inference by NRDC-NWF that substantial acreage of poor and fair condition rangelands equate with ongoing, extensive mismanagement and overgrazing of BLM lands is an untenable assumption.

The adequacy of livestock management on BLM lands cannot be determined from ecological range condition alone (Stoddart et al. 1975). Trend must be considered. The management of poor condition rangelands would be viewed as satisfactory (or at least nondetrimental) if range trend was upward. Conversely, the management of excellent condition rangelands exhibiting downward range trend would be judged unsatisfactory unless factors other than management (such as broom snakeweed invasion) could be identified as controlling site retrogression.

The percentage of public rangelands in unsatisfactory ecological condition is not relevant to an evaluation of current grazing management on BLM administered lands. Trend is the appropriate tool for determining adequacy or inadequacy of grazing management. The 1984 BLM range condition report reveals an upward trend in range condition on public domain lands from 1936 to 1984 (96% of BLM acreage reported in 1984). Poor condition rangelands decreased from 36.3% to 18.0% and excellent and good condition rangelands increased from 15.8% to 36%.

Testimony of range professionals also indicates a real and continuing improvement of BLM range conditions (USDI 1984). Although this does not imply all public domain grazing allotments are improving in ecological condition, it does indicate that mismanagement and overgrazing of public domain lands is not occurring on the vast scale claimed by NRDC-NWF.

The NRDC-NWF report also fails to separate a historic cause of poor and fair ecological range condition from the current use and management of the public lands. Some of the BLM acreage classified in low ecological condition by the NRDC-NWF report, and which has a potential for recovery, arrived at its current vegetative state as the result of oversettlement on and overuse of the public domain in the late nineteenth and early twentieth centuries. The passage of the Taylor Grazing Act corrected many of the abuses associated with unrestricted use of the public domain. It did not, nor could it, accelerate the process of plant succession required to ameliorate range conditions.

Succession on arid lands is a slow process (Smith 1984). The persistence of low ecological condition rangelands to this day is as much, if not more, an indication of the slow rate

at which nature restores itself than an indictment of current public land grazing management and grazing use.

The significance of pre-1934 overgrazing is not meant to imply that overgrazing on public lands no longer occurs or that downward trend cannot be documented. Downward trend on specific BLM allotments can be documented. The change in range condition in these instances can be caused either by overgrazing or factors independent of stocking rate. Cyclical population patterns of broom snakeweed in the Southwest, for example, are more directly related to climatic conditions than to current levels of livestock use (McDaniel et al. 1984). Nevertheless broom snakeweed invasion is as effective as overgrazing in lowering a site's ecological range condition rating.

The NRDC-NWF report does recognize that factors other than overgrazing influence range conditions. Poor range conditions, it claims, have also resulted from "...the lack of funding for range management programs." Although the relative level of range management funding can affect the degree of range condition improvement realized, the magnitude of available management monies per se does not constitute a cause of range condition deterioration as stated by NRDC-NWF. Physical and biological factors, which may or may not be related to management funding levels, determine structural changes in range ecosystems. Furthermore, range management funding is not necessarily synonymous with, or universally implemented for, the improvement of ecological range condition.

Range management dollars are frequently allocated for range improvements which benefit livestock and wildlife but which do not enhance ecological range conditions. For example, forage quality and quantity existing at intermediate ecological range condition levels may be more preferable than those at higher levels to wildlife and livestock. Funding may be expended to achieve and maintain intermediate ecological range condition on sites currently supporting climax vegetation. Range management dollars may also be allocated for fencing and water development—range improvements intended to improve livestock distribution, livestock utilization of forage, and, in some instances, wildlife habitat. In both examples, the effect of range investment is to improve rangeland conditions relative to wildlife and livestock needs, not ecological potential.

Regardless of the impact of specific range management investments on ecological range condition, the demand for public range management dollars exceeds supply. The scarcity of public money, however, does not imply the imminent decline of ecological range condition on BLM-administered lands. The shortage of range improvement dollars has the potential of slowing, not reversing, the rate and direction of range trend on public domain lands.

Some arid rangelands do not have the biological potential for improvement. For others, the cost of achieving that improvement exceeds possible benefits. The NRDC-NWF report ignores the biologic and economic limits of range improvement. It assumes funding, or the lack of it, is a primary controlling factor of current and future ecological range conditions. The biological reality of many rangeland ecosystems suggests otherwise. Further, among rangeland ecosystems and specific range sites where investment dollars can be profitably expended, private funding can and frequently

does supplement public rangeland dollars. BLM permittees have contributed significantly to range improvement on the public domain.

Summary and Conclusion

If the purpose of the NRDC-NWF report is to conclusively establish the "ailing" status of our public rangelands, it has failed. The report is an oversimplified compilation of tentative, dated, and technically diverse measurements of range ecological condition. These measurements, by themselves or as interpreted by NRDC-NWF, provide no scientific documentation of the health and prognosis of BLM administered lands. The report's disregard for range trend and its failure to elucidate the biologic, ecologic, and economic dimensions of ecological range condition erodes its credibility and legitimacy as a serious commentary on the condition of public domain rangelands.

Literature Cited

- Dyksterhuis, E.J. 1949.** Condition and management of rangeland based on quantitative ecology. *J. Range Manage.* 2:104-115.
- Herbel, C.H. 1985.** Vegetation changes on arid rangelands of the southwest. *J. Range Manage.* 7:19-21.
- McDaniel, K.C., R.D. Pleper, L.E. Loomis, and A.A. Osman. 1984.** Taxonomy and ecology of perennial snakeweeds in New Mexico. *Agr. Exp. Sta. Bull-711*, New Mexico State Univ., Las Cruces.
- Nelson, R.P. 1986.** High-resolution climatic analysis and Southwest biogeography. *Science* 232:27-34.
- Smith, E.L. 1979.** Evaluation of the range condition concept. *Rangelands* 1:52-54.
- Smith, E.L. 1984.** Range condition and secondary succession. Paper presented at the American Institute of Biological Sciences Symposium on Range Condition and Secondary Succession, August 1984, Fort Collins, Colorado. Proceedings to be published.
- Stoddard, L.A., A.D. Smith, and T.W. Box. 1975.** Range management (Third Edition). McGraw-Hill, New York.
- U.S. Department of the Interior (USDI) 1981.** Draft environmental impact statement on grazing management in the Southern Rio Grande planning area. Bureau of Land Management, Las Cruces District, New Mexico.
- U.S. Department of the Interior (USDI) 1984.** 1984 range condition report. Bureau of Land Management, Division of Rangeland Resources, Washington, D.C.
- Wald, J., and D. Albersweth 1985.** Our ailing public rangelands: condition report—1985. Natural Resources Defense Council and National Wildlife Federation, Washington, D.C.
- Wilson, A.D., and G.J. Tupper. 1982.** Concepts and factors applicable to the measurement of range condition. *J. Range Manage.* 35:684-689.



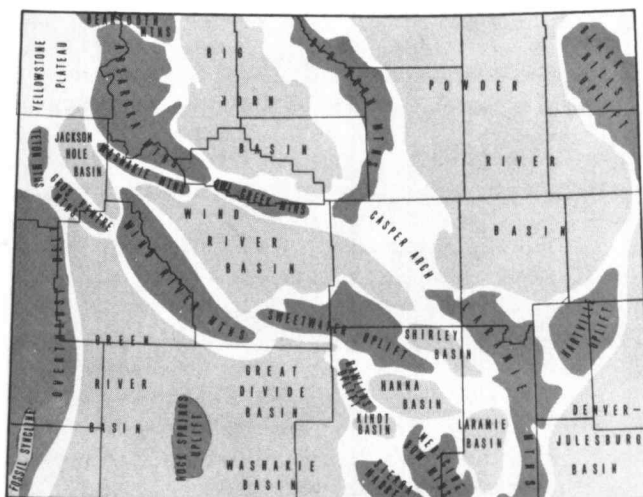
Questions about Livestock-Big Game Relations

Jeff Powell, Grant Godbolt, and Wm. G. Hepworth

Forage quantity and quality are not the only factors limiting big game carrying capacity of the Bighorn Mountains of Wyoming but they are major factors limiting livestock carrying capacity. Ranchers are dependent upon the Bighorn Mountains for livestock summer grazing and maximum livestock gains in a relatively short period of time. Big game also depend on the Bighorns for spring and summer grazing and to a considerable degree the lower areas for winter ranges. Therefore, if total animal output is to be maximized, the negative aspects of competition must be determined and minimized while all opportunities to increase both livestock and big game are explored.

In this paper we would like to ask questions because the situation in the Bighorns is not unlike the situation in many parts of the Rocky Mountains. The literature concerning livestock-big game relations has many answers, but these answers do not fit our questions. Therefore, we will appreciate a response from anyone who has the answers.

The Bighorn Mountains of north-central Wyoming are bordered on the east by the Powder River Basin and on the



Location of the Bighorn Mountains in Wyoming.

west by the Bighorn River Basin. On the north are the Pryor Mountains and the Bighorn Canyon of Montana. To the southwest lie the Owl Creek Mountains.

Powell is with the Wyoming Agricultural Experiment Station, Godbolt with USFS Bighorn National Forest, and Hepworth with the Wyoming Game and Fish Department.