



**Western
Watersheds
Project**

Wyoming Office

PO Box 171

Bondurant, WY 82922

Email: Wyoming@WesternWatersheds.org

Web site: www.WesternWatersheds.org

Working to protect and restore Western Watersheds

Dave Booth

Pinedale RD

PO Box 220

Pinedale, WY 82941



**Western
Watersheds
Project**

Wyoming Office
PO Box 171
Bondurant, WY 82922
Tel: (877) 746-3628
Fax: (208) 475-4702
Email: Wyoming@WesternWatersheds.org
Web site: www.WesternWatersheds.org

Working to protect and restore Western Watersheds

January 13, 2020

Dear Dave,

The following are comments for the Blucher Creek group EA

The EA does not provide a chart of actual use on the 3 allotments over the last 15-20 years. It is actual use that creates current conditions, not permitted use. As a result, impact analyses based on current conditions would not be accurate for full permitted numbers, which is what this decision will authorize.

The proposed action authorizes “Specific allowable use levels include a maximum forage utilization of 50 percent of key forage species in the uplands” but the proposed action does not provide any scientific basis for this high of a utilization rate by livestock. The EA is also silent whether this high level of utilization provides for Sensitive Species or other wildlife habitat, as required by the Forest Plan. As discussed in detail in the attached, there is little, if any, scientific support for a 50% utilization level providing for the habitat needs of Wildlife.

Most of the analysis area is DFC 12, which has a specific wildlife emphasis. Despite the fact that DFC’s are the zoning of the Forest Plan and prescribe differing management, the EA is entirely silent on this foundational Forest Plan direction.

The IDT seem to not understand what cumulative impacts are under NEPA. The EA’s definition of cumulative impacts is inaccurate and does not comply with NEPA. See attached.

The EA’s reliance on ground cover values as low as 60% does not comport with current science, as discussed in the attached review of this issue. One other District on the B-T has attempted to misuse foliar cover as ground cover. This needs to be clarified.

The EA provides two potentially contradictory descriptions:

This measure accounts for any basal vegetation, litter, and rock fragments greater than three-fourths inch in diameter. It represents the percent of material other than bare ground (e.g. live or dead vegetation, litter, cobble, gravel, stones and bedrock) covering the land surface (USDA Forest Service, 2003).

The first sentence above is the correct definition. The second could be interpreted to include foliar and standing dead which is incorrect.

On page 6, the EA states misleadingly that “Guidelines are flexible by definition and are meant to generally constrain organizational actions or define desired resource conditions (Forest Service 2015).”

Responsible Official may adjust guidelines when it is necessary to address effectively specific circumstances. In such a case, the Responsible Official should:

1. Document a clear rationale for adjusting the guidelines in both the project analysis and decision documents.
2. Recognize the purposes for which the guideline was developed and provide assurance that the project or activity will still achieve those purposes.
FSM 1909.12_10 (emphasis added)

Again on page 8, the EA incorrectly states “Although some monitoring sites do not meet all desired conditions, Forest Plan guidelines are intended to be flexible with the overall goal of continuing a positive trend in meeting resource goals and objectives.” Both Standards and Guidelines are requirements.

This statement on page 7 is misleading, illogical and incorrect. “Based on downstream monitoring, water quality of streams in each allotment support their assigned beneficial use and stream channels are generally in good condition (WDEQ 2018).” Firstly, there is the foundational principle of logic that absence of evidence is not evidence of absence. Without actual data collection on the water quality impacts of the action, no such inferences can be drawn. Further, without any information regarding the location of this “downstream” monitoring, no inference can be drawn. Finally, without a connection between the parameters assessed and the parameters affected by the action, no rational inferences can be drawn.

On page 9 of the EA, we see the following misleading statement “Current grazing management practices are in place to minimize impacts to streams and associated riparian areas. These practices currently include scheduled rest, scheduled rotation, placing sources of salt and minerals well away from streams, and managing herd locations with routine riding and herding.

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd584429.pdf

https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd648968.pdf

A review of the 2019 shows no requirements to minimize impacts to riparian areas. In fact, the AOI is silent on limits of utilization or riparian impacts. One of the cursory AOI’s doesn’t mention salt and there are no requirements for herding in either of them.

In the range section, the EA states that range condition is assessed by species composition, but no information is provided regarding species composition or production.

Upon request, I obtained summary data for the 5 transects established in the 3 allotments and a review of the primary production species, one sees that the plant community is dominated by unpalatable and increaser species. While the summary sheets don’t provide production data, given the dominance by unpalatable and increaser species, there is little chance that forage production is meeting the demand in the permits.

The EA fails to take a hard look at the ESDs for the capable acres but a simple review of likely ESD's such as the 20+ Loamy or the 12-19 Sandy show massive departures from HCPC.

As this site deteriorates due to a combination of frequent and severe grazing, species such as three-tip and mountain big sagebrush, buckwheat, and yarrow will increase. Rhizomatous wheatgrass and less palatable grasses such as Letterman needlegrass increase. Kentucky bluegrass may invade. Cool-season grasses such as bluebunch wheatgrass and Columbia needlegrass will decrease in frequency and production.

Potential vegetation is estimated at 70% grasses or grass-like plants, 20% forbs, and 10% woody plants.

It is likely that the Forest Service avoided providing Similarity Index calculations for grasses, forbs and shrubs because it would show that the grazable acres are in upper "poor" to lower "fair" condition.

This failure to examine the most basic components of range condition, which is critical to informed decision making is arbitrary and a violation of NEPA's 'hard look requirement.

The EA appears to be based on a now 15 year old range report (EA at 9), that's like half of entire federal career old.

The ancient range report states:

Current livestock management led to low-to-moderate utilization rates on key forage species and resulted in range and watershed conditions being maintained or enhanced. No need for different livestock utilization levels has been identified to meet wildlife habitat needs.

No definition of use levels or what the key species were, or what the time frame or what stocking rates. Without this information the conclusory statement is meaningless.

In a recent review of utilization monitoring sheets on the Kemmerer District, it was found that the range con was using unpalatable and increaser species, including larkspur and wyethia as 'key species' so of course utilization was 'low to moderate'. It would be nearly impossible to get high utilization levels on these species.

What wildlife were examined in the range con's report? Why is the range con report making determinations for wildlife? What were the habitat requirements for each of the species examined and how did they compare with conditions 15 or 20 years ago? What Sensitive Species did the out of date report look at? The EA fails to examine these questions.

The ancient report opines that:

Livestock numbers are within capacity as evidenced by conditions of vegetation, soil, and riparian resources.

But as stated above, the EA fails to provide any data regarding conditions of vegetation and soil. And the only information regarding vegetative condition is that that can be

gleaned from the summary data sheets which were not included in the EA. This data shows severely degraded vegetative conditions.

As far as riparian conditions the EA itself states that a significant portion of the riparian areas are not meeting Forest Plan minimum requirements. So the EA's statement is false and unsupportable.

The EA states that shrub cover is too high but provides no literature to support this claim. What data provided shows sagebrush within the HRV according to RMRS literature.

The summary data sheets for the 5 transects within the 3 allotments all show low to very low cover of sage brush.

“A history of fire suppression has also contributed substantially to the existing condition of high sagebrush canopy cover.”

But no data is provided to back this statement up. In order for the Forest Service to make such a statement it would have had to have mapped fire starts in the area, reviewed documentation of fire suppression efforts and related the two. Since it is extremely unlikely that the Forest Service has done this, it can not honestly make this statement. And again, the data does not support the contention that sage density is outside the HRV.

Please review and incorporate RMRS-RP-40 and RMRS-GTR-144. The figures in Table 4 (how these sites relate to the 5 transect sites is unknown) do not show sage brush density outside the HRV.

Of note it that most of the grazable acres should have a major component of bluebunch wheatgrass, a strong decreaser under grazing pressure. Of the 5 transects, this species have been functionally eliminated from 4 of the 5.

Again, the data does not support the Forest Service's unsupported claims that vegetative composition is fine, unless low “fair” or high “poor” is A-OK with the Forest Service.

The EA mentions part of the utilization guideline, but omits:

During AMP revision, the Interdisciplinary (ID) Team and livestock permittees will prescribe site-specific utilization levels needed to meet Forest Plan objectives.

During monitoring and evaluation a Utilization Guideline may be changed if the prescribed level is not accomplishing planned objectives.

Site-specific utilization levels on key wildlife ranges will be established by an ID Team.

ID Teams will prescribe other proper-use standards to achieve site-specific objectives for the rangeland being managed. The standards will be a combination of forage utilization, ground cover, plant vigor, soil disturbance, or streambank stability. For example, on domestic sheep range, an objective of minimizing soil disturbance will be more important than forage utilization.

The EA ignores the Sensitive Species, wolf, despite the fact that dozens of wolves have been killed in the analysis area to protect private livestock.

The amphibian section is woefully inadequate and fails to utilize the best available science. Please review the attached and revise the analysis.

The cultural resource section is also fact-free. To have any understanding of the current conditions, the EA would have to provide mapping and information regarding areas surveyed, what class of survey effort was done, whether the survey effort complies with current standards and the relationship between the areas surveyed, and the purpose of the survey and capable acres within each allotment.

The EA states “Forest Service presented a plan to measure compliance with the desired conditions.” But doesn’t detail the plan or define what the “desired conditions” for cultural resources are or how that relates to the requirements of the NHPA and Forest Service and USDA directives on the management of cultural resources. This doesn’t constitute a ‘hard look’ as required under NEPA.

Here is another wild leap of specious logic:

The proposed action within the project area could impact Brook Trout populations and perhaps impact the recreational sport fishery, but would have no effect to special-status fish species. Because the allotments have been and are currently grazed, and because those grazing practices have not caused noticeable impacts to the fish community, the proposed action would have minimal impact to the resource.

So Forest Service actions have extirpated CRCT from historic habitat and now because they have been extirpated, everything is A-OK, wonderful.

Does the Forest Service have a duty to recover Sensitive Species? Does the Forest Plan provide any direction for the management of CRCT? One wouldn’t know from reading the EA because it completely failed to take any look at that, let alone take the ‘hard look’ required by NEPA.

All in all, this EA appears to have been thrown together with the sole intent of supporting the foregone conclusion that status quo livestock grazing will continue on these allotments no matter what.

Again, grizzly bears exist within the allotments, there is a well-worn path regarding grizzly bears eating unnatural food attractants (i.e. non-native private livestock) and being killed as a result, but somehow stuffing the area full of unnatural food attractants will have no effect on grizzly bears.

I think the biologist needs to review USFWS call definitions because their current call fails to comply with these definitions.

For sage grouse, the EA states that the amendment will be implemented but no requirements of the amendment as described in the proposed action. As such, it appears that the EA’s assertion is false.

For amphibians, the EA repeats the unsupported, conclusory statement:

“Additionally, the allotments will meet all BTNF Forest Plan Standards and Guidelines. Therefore, continued grazing would not alter overall structure or composition of native plant communities, including riparian areas and aspen habitats, and impacts to Columbia spotted frogs would be minimal.”

The EA fails to even mention all applicable Forest Plan Standards and Guidelines and certainly doesn't analyze compliance with them. Without providing such an analysis, the Forest Service is basically saying 'trust us' but NEPA doesn't allow for that. The Forest Service must take a 'hard look' at each applicable Forest Plan direction and provide full rationale that can be examined.

The DM, the project file and reports must list each of the applicable Forest Plan Standards, Guidelines and Objectives, both Forest-wide and DFC specific, if they are being met and what data is being relied upon to make that determination.

I would also like to call your attention to the recent Order by the U.S. District Court in the matter *Western Watersheds Project v. USFS, No. 05-cv-189-E-BLW (D. Idaho)*.

As that decision holds, the Forest Service must assess “capability” of forest lands for livestock grazing on a site-specific basis, before authorizing livestock grazing. That decision recognized that the Forest Plans contains a more generalized capability analysis, which should act as the starting point for more site-specific analysis at the allotment level.

We conducted a capability analysis from GIS data obtained from the Forest Service, using just vegetation and found only a small fraction of the allotments in question to be capable. See attached.

Note that for a number of the pastures a significant portion of the capable acres are contained in tiny patches separated by large areas of non-capable lands. This has significant implications on their practical availability and management.

For the Blucher Creek group, only 9614 acres (31%) met the capability criteria. Maps included in these comments do not take into account slope

Pasture	Capable Acres	% Capable of Total	AUM's	CapAcres/AUM
Blucher Cr	2396	21%	645	3.7
Sweetwater	3855	22%	400	9.6
			Based on 2019 AOI	
Chicken Cr	698	61%	152	4.6
East Fork	708	34%	152	4.7
Middle Fork	276	15%	305	0.9
	1682		610	2.8

Based on the primary Holechek range management textbook and the USDA Range and Pasture Management Handbook, the East Squaw Creek allotment would need to be

producing 700 pounds of forage (not total production) to support the status quo authorization. The EA provides no evidence that the number of AUM's being authorized is being produced.

Unfortunately, the extremely poor quality of the EA despite the waste of \$70,000 of taxpayer money to the outsourcing company, has resulted in a document that needs to either scrapped entirely or heavily revised to be complaint with NFMA and NEPA. Likely the Forest Service spent another \$30,000 in contracting, oversight and review.

So only looking at the direct expenses from this NEPA process, ignoring the money lost in administration and other expenses of the range program for these three allotments, the Forest Service wasted over \$60 per AUM permitted. This is about what AUM's are sold for on the open market and nearly as much as AUM's are worth in the context of buyouts.

Does this not seem absurd to you?

Let's look at this absurdity from another perspective. The Forest Service charges these welfare ranchers \$1.35 per AUM. Half of this goes back into welfare subsidies, so only half of that or 0.67 cents actually goes to defraying the costs of the range program. So it will take over 90 years for their grazing fees just to cover the expense of this pathetic EA.

Does that not seem absurd to you?

Sincerely,

A handwritten signature in blue ink, appearing to read "Jonathan B. Ratner". The signature is fluid and cursive, with the first name "Jonathan" written in a larger, more prominent script than the last name "Ratner".

Jonathan B Ratner
Director – Wyoming Office

REFERENCES:

Agree, J.K. 1993. Fire ecology of the Pacific Northwest Forests. Island Press.
Washington DC

Arnold, J.F. 1950. Changes in ponderosa pine bunchgrass ranges in northern Arizona resulting from pine regeneration and grazing. Journal of Forestry 48:118-126.

Belsky A.J. and D.M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the Interior West. Conservation Biology 11(2) 316-327.

Belsky, A.J., and J.L. Gelbard. Livestock grazing and weed invasions in the arid West. 32 pgs. Published by the Oregon Natural Desert Association, Bend,

Oregon.

Billings, W.D. 1990. *Bromus tectorum*, a biotic cause of ecosystem impoverishment in the Great Basin. Pages 301-322. In: Woodwell, G.M. ed. Cambridge University Press, NY

Anderson, J.E. and Inouye, R.S. 2001. Landscape-scale changes in plant species abundance and biodiversity of a sagebrush steppe over 45 years. *Ecological monographs* 71: 531-

Armour, C.L., D.A. Duff and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* 16(1): 7 – 11.

Barnes, Burton V., Donald R. Zak, Shirley R. Denton and Stephen H. Spurr. 1998. *Forest Ecology*. John Wiley & Sons, New York. 774p.

Bartos, Dale L. and Robert B. Campbell, Jr. 1998a. Water depletion and other ecosystem values forfeited when conifer forests displace aspen communities. *Rangeland Management and Water Resources of American Water Works Association*. May 1998: 427-433.

Bartos, Dale L. and Robert B. Campbell, Jr. 1998b. Decline of Quaking Aspen in the Interior West – Examples from Utah. *Rangelands* 20(1):17-24.

Belsky, A.J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation* 54(1): 419-431.

Belsky, A. Joy and Dana M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the Interior West. *Conservation Biology* 11(2):315-327.

Blackwell, Jack. 2001. Letter on capability and suitability

Blaisdell, James P. and Ralph C. Holmgren. 1984. *Managing Intermountain Rangelands – Salt-Desert Shrub Ranges*. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah. General Technical Report INT-163. 52p.

Braun, Clait E. 1977. Guidelines for maintenance of sage grouse habitat. *Wildlife Society Bulletin* 5(3):99-105.

Carter, John G. 1998. Investigation of Spawn Creek, Utah Coliform Contamination and Stream Bank Stability in Relation to Cattle Grazing; Investigation of Erosion and Riparian Damage on the Maple Bench Allotment in Relation to Cattle Grazing and Investigation of Ground Cover, Soil Conditions, Riparian Areas and Forest Practices in the Little Bear Sheep and North Rich Cattle Allotments. Willow Creek Ecology Report.

Carter, John G. 1999. Watersheds, Livestock and Water Quality: A Case Study from the Cache National Forest, Utah and Idaho. Willow Creek Ecology Publication 99-01. Willow Creek Ecology, Mendon, Utah.

Carter, John G., Brandon Chard and Julie Chard. 2000. Analysis of ground cover in forest openings in the Bear Hodges Analysis Area - Little Bear Sheep Allotment, North Rich Cattle Allotment. Wasatch-Cache National Forest, Utah. Report of Willow Creek Ecology, Mendon, Utah.

Chard, Brandon L., Julie Chard and John Carter. 2002. Assessment of Habitat Conditions in the Bear River Range Caribou National Forest, Idaho. Western Watersheds Project Report accessed online at www.westernwatersheds.org in the archives.

Connelly, John W., Michael A. Schroeder, Alan R. Sands and Clait E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin* 28(4):967-985.

CNF. 2001. Process Paper I: Rangeland Capability and Suitability for Sheep and Cattle Ranges. USDA Caribou National Forest.

Cummins, K.W. and George L. Spengler. 1977. Stream ecosystems. *Water Spectrum*. 10:1-9.

Cummins, K. W. 1974. Stream ecosystem structure and function. *Bioscience* 24:631-641.

Dodge, Marvin. 1972. Forest fuel accumulation – a growing problem. *Science* 177:139-142.

Duff, Donald A. 1979. Riparian habitat recovery on Big Creek, Rich County, Utah. In *Proceedings: Forum – Grazing and Riparian/Stream Ecosystems*. Trout Unlimited, Inc. 91 p.

Dyksterhuis, E. J. 1949. Condition and management of range land based on quantitative ecology. *Journal of Range Management* 2:104-115.

Ecosystem Research Institute. 1984. 1983 Annual Report Ecosystem Analysis. Report to White River Shale Oil Corporation, Salt Lake City, Utah. 106p. Report available thru Western Watersheds Project Utah Office at P.O. Box 280, Mendon, Utah 84325.

EPA. 1976. Quality criteria for water, July 1976. Fecal coliform bacteria. U.S. Environmental Protection Agency, Washigton, D.C.: 42-50

Fleischner, Thomas L. 1994. Ecological costs of livestock grazing in western North America. *Conservation Biology* 8(3): 629-644.

Galt, Dee, Greg Mendez, Jerry Holechek and Jamus Joseph. 1999. Heavy winter grazing reduces forage production: an observation. *Rangelands* 21(4):18-21.

Galt, Dee, Francisco Molinar, Joe Navarro, Jamus Joseph and Jerry Holechek. 2000. Grazing capacity and stocking rate. *Rangelands* 22(6):7-11.

Gregory, Stanley V., Frederick J. Swanson, W. Arthur McKee and Kenneth W. Cummins. 1991. An ecosystem perspective of riparian zones. *Bioscience* 41(8): 540-550.

Holechek, Jerry L. 1996a. Financial returns and range condition on southern New Mexico ranches. *Rangelands* 18(2):52-56.

Holechek, Jerry L. 1996b. Drought and low cattle prices: hardship for New Mexico ranchers. *Rangelands* 18(1):11-13.

Holechek, Jerry L., Hilton de Souza Gomes, Francisco Molinar and Dee Galt. 1998. Grazing intensity: critique and approach. *Rangelands* 20(5):15-18.

Holechek, Jerry L., Milton Thomas, Francisco Molinar and Dee Galt. 1999a. Stocking desert rangelands: what we've learned. *Rangelands* 21(6):8-12.

Holechek, Jerry L., Hilton Gomez, Francisco Molinar and Dee Galt. 1999b. Grazing studies: what we've learned. *Rangelands* 21(2):12-16.

Holechek, Jerry L., Rex D. Pieper and Carlton H. Herbel. 2001. *Range Management: Principles and Practices*, Fourth Edition. Prentice-Hall, New Jersey. 587p.

Howard, Gary L., Steven R. Johnson and Stanley L. Ponce. 1983. Cattle grazing impact on surface water quality in a Colorado front range stream. *J. Soil and Water Conservation*. March-April 1983:124-128.

- Hubbard, R.K., D.L. Thomas, R.A. Leonard and J.L. Butler. 1987. Surface runoff and shallow ground water quality as affected by center pivot applied dairy cattle wastes. *Trans. ASAE* 30(2):430-437.
- Hutchings, S.S. and G. Stewart. 1953. Increasing forage yields and sheep production on Intermountain winter ranges. U.S. Department of Agriculture Circular 925. 63p.
- Jones, Allison. 2000. Effects of cattle grazing on North American arid ecosystems: a quantitative review. *Western North American Naturalist* 60:155-164.
- Julander, Odell. 1962. Range management in relation to mule deer habitat and herd productivity in Utah. *Journal of Range Management* 15(5):278-281.
- Kauffman, J. Boone and W.C. Kreuger. 1984. Livestock impacts on riparian ecosystems and streamside management implications – a review. *Journal of Range Management* 37(5): 430 – 437.
- Kay, Charles E. 2001. The Condition and Trend of Aspen Communities on BLM Administered Lands in Central Nevada – with Recommendations for Management. Final Report to Battle Mountain Field Office, Bureau of Land Management. Battle Mountain, Nevada.
- Kay, Charles E. and Dale L. Bartos. 2000. Ungulate Herbivory on Utah Aspen; Assessment of Long-term Exclosures. *Journal of Range Management* 53:145-153.
- Kreuger, William C. and A. H. Winward. 1974. Influence of cattle and big-game grazing on understory structure of a Douglas-fir Ponderosa Pine- Kentucky bluegrass community. *Journal of Range Management* 27(6):450-453.
- Madany, Michael H. and Neil E. West. 1983. Livestock grazing-fire regime interactions within montane forests of Zion National Park, Utah. *Ecology* 64(4):661-667.
- Marcuson, Patrick E. 1977. Overgrazed streambanks depress fishery production in Rock Creek, Montana. Fish and Game Federation Aid Program. F-20-R-21-11a.
- McKee, T.B., N.J. Doesken, and J. Kleist, 1993. The relationship of drought frequency and duration of time scales. Eighth Conference on Applied Climatology, American Meteorological Society, Jan 17-23, 1993, Anaheim CA, pp. 179-186.
- Packer, Paul. 1998. Requirements for watershed protection on western mountain rangelands. Unpublished manuscript. Dr. Packer is retired from the USDA Intermountain Forest and Range Experiment Station, Logan, Utah.
- Pell, Alice N. 1997. Manure and microbes: public and animal health problem? *J. Dairy Sci.* 80:2673-2681.
- Peterjohn, W.T. and D. L. Correll. 1984. Nutrient dynamics in an agricultural watershed: observations of a riparian forest. *Ecology* 65: 1466-1475.
- Pearce, Richard. 1988. Where deer and cattle roam. Forest Research West, Forestry Sciences Laboratory, Fresno, California.
- Platts, W. S. 1991. Livestock Grazing. In: *Influence of Forest and Rangeland Management on Salmonid Fishes and Their Habitats*. American Fisheries Society Special Publication 19:389-423.
- Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management Recommendations for the Northern Goshawk in the Southwestern United States. Gen. Tech. Rep. GTR-RM-217, Fort Collins,

Colorado. U.S. Department of Agriculture, Rocky Mountain Forest and Range Experiment Station. 90p.

Rummell, Robert S. 1951. Some effects of livestock grazing on Ponderosa pine forest and range in central Washington. *Ecology* 32(4):594-607.

Saxon, Keith E., Lloyd F. Elliott, Robert I. Papendick, Michael D. Jawson and David H. Fortier. 1983. Effect of animal grazing on water quality of non-point runoff in the Pacific Northwest. Project Summary, Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma. EPA-600/S2-83-071. 7p.

Schepers, J.S., B.L. Hackes and D.D. Francis. 1982. Chemical water quality of runoff from grazing land in Nebraska: II. contributing factors. *J. Environ. Qual.*, Vol 11(3):355-359.

Schulz, Terri T and Wayne C. Leininger. 1990. Differences in riparian vegetation structure between grazed areas and exclosures. *Journal of Range Management* 43(4):295-299.

Schwan, H.E., Donald J. Hodges and Clayton N. Weaver. 1949. Influence of grazing and mulch on forage growth. *Journal of Range Management* 2(3):142-148.

Sharp, Lee A., Ken Sanders and Neil Rimbey. 1992. Variability of crested wheatgrass production over 35 years. *Rangelands* 14(3):153-168.

Smith, David M., Bruce C. Larson, Matthew J. Kelty and P. Mark S. Ashton. 1997. *The Practice of Silviculture: Applied Forest Ecology*. John Wiley & Sons, New York. 537p.

Society for Range Management. 1989. *A Glossary of Terms Used in Range Management* 3rd Edition. Society for Range Management, Denver, Colorado.

Souder, Jon A. ca1997. *How Does Livestock Grazing Fit Into the Larger Societal Uses of Wildlands? Methods for Determining Benefits and Their Application to the Kaibab Plateau*. College of Ecosystem Science and Management, Northern Arizona University.

Stewart, Kelley M., R. Terry Bowyer, John G. Kie, Norman J. Cimon, and Bruce K. Johnson. 2002. Temporal distributions of elk, mule deer, and cattle: resource partitioning and competitive displacement. *Journal of Mammalogy*. 83(1):229-244.

Trimble, S.W. and A. C. Mendel. 1995. The cow as a geomorphic agent, a critical review. *Geomorphology* 13:233-253.

UDWR. 1997. *Conservation Agreement and Strategy for Bonneville Cutthroat Trout in Utah*. Utah Division of Wildlife Resources Publication 97-19.

USDA. 1974. *Soil Survey of Cache County Area, Utah. Parts of Cache and Box Elder Counties*. USDA Soil Conservation Service, Forest Service and Utah Agricultural Experiment Station.

USDA. 1981. *America's soil and water: condition and trends*. U.S. Department of Agriculture Soil Conservation Service, Washington, D.C. 33p.

USDA. 1982. *Soil Survey of Rich County Utah*. USDA Soil Conservation Service, Forest Service and Bureau of Land Management.

USDA. 1993. *Rangeland Ecosystem Analysis and Management Handbook, R-4 Amendment 2209.21-93-1*. USDA Forest Service.

USDA. 1996. *Intermountain Regional Assessment: Properly Functioning Condition*. USDA Forest Service, Region IV, Ogden, Utah.

USDA. 1998a. Environmental Assessment for the Bear Hodges Analysis Area, Cache and Rich Counties, Logan Ranger District, Wasatch-Cache National Forest. Wasatch-Cache National Forest 8230 Federal Building, 125 South State Street, Salt Lake City, Utah 84138.

USDA. 1998b. Draft Sub-regional Assessment of Properly Functioning Condition for Areas Encompassing the National Forests of Northern Utah. USDA Forest Service, Region IV, Ogden, Utah.

USDA. 1999. Utah Northern Goshawk Project Environmental Assessment. USDA Forest Service Intermountain Region.

USDA. 2001. Utah Northern Goshawk Project Decision Notice: Finding of No Significant Impact, Finding of Non-Significant Amendment. Wasatch-Cache National Forest.

USDA. 2003a. Final Environmental Impact Statement Wasatch-Cache National Forest. USDA Forest Service, Intermountain Region, Wasatch-Cache National Forest.

USDA. 2003b. North Rich Allotment Draft Environmental Impact Statement. Wasatch-Cache National Forest.

U.S. Department of Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce and U. S. Census Bureau. 2002. 2001 National Survey of Fishing, Hunting and Wildlife-Watching Associated Recreation. 170 p.

Wambolt, C.L., K.S. Walhof and M.R. Frisina. 2001. Recovery of big sagebrush communities after burning in south-western Montana. *Journal of Environmental Management* 61:243-252.

Welch, Bruce L. 2002 (in editing). Big sagebrush: A sea fragmented into lakes, puddles, and ponds. Gen. Tech. Rep. RMRS-GTR-____. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain

White, Richard K., Robert W. VanKeuren, Lloyd B. Owens, William M. Edwards and Roberty H. Miller. 1983. Effects of livestock pasturing on non-point surface runoff. Project Summary, Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma. EPA-600/S2-83-011. 6p.

West, Neil E. 1981. Nutrient cycling in desert ecosystems. In: *Arid Land Ecosystems: Structure, Functioning and Management*, Volume 2. Cambridge University Press.

West, Neil E. 1983. Intermountain Salt-desert Shrubland. In *Temperate Deserts and Semi-deserts*, edited by N. E. West. Elsevier Scientific Publishing, Amsterdam. Pp375-397.

White River Shale Oil Corporation. 1984. Progress Report Environmental Programs 1983. White River Shale Oil Corporation, Salt Lake City, Utah. 785p. Report available thru Western Watersheds Project Utah Office at P.O. Box 280, Mendon, Utah 84325.

Winder, J.A., C.C. Bailey, M.G. Thomas and J.L. Holechek. 2000. Breed and stocking rate effects on Chihuahuan Desert cattle production. *Journal of Range Management* 53(1):32-38.

Winward, Alma. 1999. Verbal communication during tour of North Rich Cattle Allotment, Logan Ranger District, Utah. Dr. Winward is Regional Ecologist for Region IV, Forest Service.

Zimmerman, G. Thomas and L.F. Neuenschwander. 1984. Livestock grazing influences on community structure, fire intensity and fire frequency within the Douglas-fir/Ninebark habitat type. *Journal of Range Management* 37(2):104-110.

