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Improving Elk Habitat Characteristics with Livestock Grazing

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Elk (*Cervus elaphus)* are an important large wild herbivore in the western United States that need to maximize intake of digestible energy and essential nutrients. Elk, similar to other free ranging herbivores, are governed in their search for food by the *law of least effort*, as expressed by Geist (1982). Necessary resources must be obtained with a minimum of effort and risk in order to maximize the benefits derived. The acquisition of nutrients either by maximization of quantity consumed, and/or optimization of quality through selectivity, requires least effort so that the net gain to the animal is maximized.

This says that managers need to ensure the highest quality forage possible while providing security for wild herbivores from predators, or harassment or interruption of natural activities by outside influences such as human activity. We need to understand that overrides between influences can occur. If animals are denied high quality forage they often increase risk to obtain forage elsewhere. Wild ungulates use of agricultural land when native ranges lack forage quality is one example. The extensive migration of elk through seemingly adequate habitat to non-traditional ranges is another.

Elk numbers in the United States have been increasing over the last 25 years. In most cases the limiting factor to growth and maintenance of the elk populations has been the availability of winter range habitat. Elk no longer have the opportunity to exert freedom in their choice of winter range habitat and seasonal migration routes because of various human activities that directly or indirectly influence elk behavior and habitat availability. In some cases, historic winter ranges are completely gone, or greatly restricted by urbanization through construction of human habitation and/or intensive agricultural operations.

Winter range habitat for elk varies from public ownership, to a mosaic of public and private, to completely private land. The need exists to manage winter ranges more intensively to prevent reduced elk production, damage to the range resource, and conflicts with private landowners. In this paper we provide a rationale for livestock grazing systems that enhance the grazing opportunities of elk.

Incomplete Habitats

An important concept in developing management plans for wild ungulates, and most wildlife species in general, is the concept of incomplete habitats mentioned by Cole (1971), and discussed by Vavra (1992), and Sheehy and Vavra (1995). Native ungulates are no longer able to exert preference for habitats or occupy historically used areas because many of the habitats no longer exist or are altered. Human habitation and all its trappings have greatly decreased the land base available for wildlife and wildlife habitat.

Incomplete habitats exist at spatial, temporal, and ecological scales. Spatially incomplete habitat exists when conversion of habitat to other purposes reduces access to a critical habitat component. Good examples are: agricultural land development, cities, 10-acre ranchettes proliferating across critical winter habitat, and habitat dissection by highways and rail lines.

Controlled livestock grazing enhances the quality of forage for wintering elk.

Temporarily incomplete habitat occurs when a change in the short-term creates less than optimum habitat. The presence of cattle on elk range may temporarily reduce the use of that habitat by elk due to social intolerance. Over-logged forests where cover is reduced below optimum levels may reduce the use by elk. By the same token, decadent forests of second-growth that are all cover and no forage may also be incomplete. In most situations given time, management changes or the removal of causative agents allows the habitat to return to its former degree of completeness.

Ecologically incomplete habitat occurs when spatial and temporal components remain intact, but a critical qualitative component formerly present is absent. Controlled livestock grazing enhances the quality of forage for wintering elk. Removing livestock grazing may reduce the availability of higher quality forage for wintering elk. Elk may then migrate from traditional winter ranges in search of conditioned forage, and concentration may occur on private lands and result in conflicts.

It is probable that all types of incomplete habitat are interactively affecting elk throughout the West and may be a primary cause of the on-going conflict involving elk use of private land. We must remember that regardless of what we achieve in terms of habitat restoration and improvement for wild species, it is unlikely that their habitat will ever be as complete as it was prior to European settlement, especially

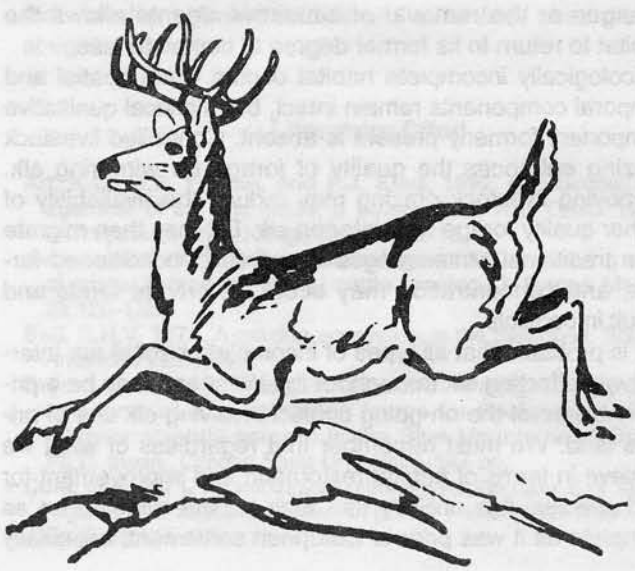
with the increasing populations that get fed in bad times. This is often forgotten by those managers and advocacy groups focused on single species and/or issues, as well as by those who exploit resources for purely economic gain.

Facilitation

The discussion of ecologically incomplete habitats brings us to an important concept. **Controlled livestock grazing can be used to improve foraging habitat available to elk and may influence distribution of elk across the landscape.** The hypothesis is explained very well by Anderson and Scherzinger (1975). It draws heavily on research and observations from Africa through the work of Bell (1971), McNaughton (1976, 1979, and 1984) and others.

The basic premise is that the grazing of one herbivore modifies the vegetation in such a way that it is more acceptable to another. The four general pathways are excellently described by Severson and Urness (1994). Livestock grazing systems can be developed that alter the composition of vegetation, increase the productivity of selected species, increase the diversity of the habitat by altering structure, and increase the nutritive quality of the forage.

Grazing with livestock for elk alters primarily vegetation structure and to a lesser extent diversity. In the semi-arid West, decomposition of standing dead vegetation is slow and may take several years. Therefore, if ungrazed, bunchgrasses accumulate previous years' material. Generalist grazers like elk avoid such plants. Elk usually do not graze in sufficient intensity or timing to properly alleviate this condition themselves or do so on an insufficient scale. On elk-only ranges small patches of conditioned forage are present, but these patches may intensify elk use on the small areas while others are essentially ungrazed. Cattle grazing if properly timed and stocked, increases the palatability of individual plants and provides pasture sized patches of current year's growth.



The nutritive quality of the forage can be enhanced as well with livestock grazing. The premise here is that properly timed livestock grazing in the spring during the active growth stage of bunchgrasses delays the growth cycle of the plants. Removing the current year's growth beginning at the boot stage of the plant followed by removal of the livestock allows the plant to regrow. The regrowth is interrupted by seasonal drying soil conditions that cause the plant to terminate physiological processes and not complete the growth cycle. The plant is unable to translocate nutrients to the roots so that the nutrients are fixed in the above ground parts. This provides high quality winter elk forage. Care must be taken to provide adequate rest in subsequent years to allow plants to regain vigor because this livestock grazing treatment occurs during a time critical to bunchgrass health. Timing of cattle removal is extremely critical in that sufficient soil moisture must be present to allow regrowth.

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There are 4 major objectives in the development of a facilitative grazing program: 1) provide high quality winter forage for elk; 2) remove mature vegetation to increase the availability of new growth to elk; 3) provide tall ungrazed current year's growth to elk; and 4) provide for the maintenance of vigor in the vegetation. Rest rotation is 1 way to accomplish these goals.

Provide high quality winter forage for elk

This pasture treatment is provided by a grazing entry with livestock when the perennial grass component is in the boot stage. Livestock are removed when sufficient soil moisture remains to allow regrowth. This treatment is usually referred to as the conditioning phase. Regrowth that reaches the early seedstalk stage at the time of summer drought induced dormancy is optimal. Time of cattle removal is critical because delaying removal too long results in less regrowth. If an error is made it should be toward early livestock removal. The regrowth should be of higher nutritional quality than ungrazed forage. This treatment provides forage of high quality and medium availability. It must be recognized that this treatment occurs at the time when bunchgrasses are at their most susceptible to grazing damage and cannot be used every year.

Remove mature vegetation

Upon removal of livestock from the conditioning pasture treatment, entry into the next pasture will provide removal of current year's growth. Usually little soil moisture remains at the end of this grazing treatment so that no immediate regrowth occurs. However, if late summer or fall rains

occur, so should regrowth. This regrowth is usually rather short in stature and does not amount to a large volume (pounds per acre). It is very high in nutritive quality and can best be described as a supplement. Snow cover limits its effectiveness. This treatment may also provide for earlier green-up in spring and increased availability for that regrowth.

Provide current year's growth

The rest cycle provides for the uninterrupted growth of current year's material that, due to the previous year's treatment, does not have several years' accumulation of standing dead material. Although less nutritious than the other treatments, this vegetation has only current year's growth so it is of a more superior nutritional quality than a long-term ungrazed range. Additionally it provides tall, voluminous (compared to the other 2 treatments) growth that is more available during snow cover.

Maintenance of vigor

A total year's rest is required following the conditioning treatment to allow the plant to regain vigor. Deferred grazing also occurs on the other grazed pastures not on the conditioning treatment. The amount of deferment is dependent on the total number of pastures in the system and the length of the grazing season.

Research verification

The use of livestock to enhance winter range habitat for elk appears to be more facilitation by livestock for elk rather than competition. Researchers have long attempted to identify competition between wild ungulates and livestock, particularly through the avenue of dietary overlap. However, the existence of interspecific competition is difficult to determine scientifically from empirical data and the scientific evidence is scarce (Schoener 1983). Even though in a practical sense, interspecific competition between sympatric herbivores may appear to be obvious and may indeed exist, relationships between large herbivores are not necessarily competitive and may often benefit 1 or the other, or both herbivores (Vavra et al. 1989, Sheehy and Vavra 1995). The end result of most studies of competition have shown better evidence for coexistence and adaptability on the part of the elk (Lonner and Mackie 1983). Elk usually avoid areas being used by cattle, as long as the cattle are present. Even less evidence is available to substantiate the impact of long-term co-species grazing pressure on the condition of forage plants grazed by the 2 ungulate grazers.

At this time verification of the hypotheses involved in the development of the systems mentioned and originally proposed by Anderson and Scherzinger (1975) is limited. Pitt (1986) reported that quality of fall forage improves with successively later clipping treatments. Clipping at successively later dates changes the ratio of spring growth to fall regrowth. The less spring growth and the more fall regrowth present then the higher the nutritive quality. The problem here is lack of quantity at the later clipping stages. Forage

Grasses initiated growth earlier in the spring in grazed plantations,

quality of plants clipped during the boot stage is less than later clipped forage due to the aforementioned ratio change, but still superior relative to unclipped plants.

Bryant (1993) and Westenskow-Wall et al. (1994) conducted similar experiments on bluebunch wheatgrass. In both studies plants were defoliated in spring at pre-boot and in the fall.

Spring grazing resulted in most plants not reaching the seed stalk stage, subsequent nutritive quality was not substantially enhanced. Standing crop of spring clipped plots was not different than those not clipped. Fall clipping improved the nutritive quality of standing material only if fall rains occurred. Sheehy (1987) noted that on elk winter range, spring use by elk on pre-boot bunchgrasses did not improve the forage quality, nor decrease standing crop of the bunchgrasses for summer use by cattle.

Rhodes and Sharrow (1990) incorporated controlled sheep grazing on forest plantations to improve the nutritional quality of forage for elk in Oregon's Coast Range. Grasses initiated growth earlier in the spring in grazed plantations, thereby providing high quality forage for deer and elk at a physiologically critical time for the animals.

Results of research conducted to verify the hypothesis of Anderson and Scherzinger (1975) have thus far been limited and may be considered to be less than conclusive in establishing the benefits of spring grazing to improved nutritive quality of conditioned forage.

Related Management Activities

Several case history studies have been reported and provide applications of the ideas presented in this paper (Frisina and Morin 1991, Frisina 1992, and Alt et al. 1992). In most of the studies, reported implementation of a grazing management program to enhance elk range was incorporated because a grazing problem existed, the state wildlife agency had purchased winter range property, and/or private landowners were concerned with too much elk use. In most cases the area in question went from little or no management to intensive management with some degree of monitoring. In some cases a period of no livestock use was incorporated to allow recovery of overgrazed range.

Also important to the success of the projects was development of a coordinated management program that included Federal and state agencies and private landowners. With the development of the grazing plan came increased water developments, salting locations, and other activities aimed at improved livestock distribution. Reseeding, burning, fertilization, and public access control are other activities mentioned as assisting in the management program. Persons interested in the development of such a program should remember the importance of the other management activities just mentioned.

Other Considerations

We have focused on elk and livestock relationships on rangelands. We do not mean to imply featured species management. In the development of management plans, considerations for other species and resources must be made. Important examples are habitat for neo-tropical migrants and riparian concerns.

An intensive monitoring program is essential for maintenance of habitat for other species and vegetation trend. Success of controlled livestock grazing to provide improved elk foraging habitat requires "on the ground" time to fine-tune stocking densities and timing of livestock use. Elk use in the late spring period may also be important.

Conclusions

We have attempted to convey the importance of intensive management of rangelands occupied by sympatric ungulates. We have focused on elk and livestock because across the West this appears to be the most discussed conflict. However, application of controlled livestock grazing has the potential to provide a management tool that can enhance habitat for a wide array of wildlife (Severson and Urness 1994). We simply need to explore the possibilities rather than reiterate the negatives of livestock grazing.

The concept of incomplete habitats and its impact on wild ungulates needs continued emphasis and requires further development and clarification. Livestock grazing will probably be a part of most of the western landscape in the future as will the increased urbanization that is currently rampant in much of the West. Intensive agriculture will remain a factor as well. Accordingly, conflict situations between wildlife and other land uses can only be expected to increase.

In summation, there is little unaltered wildlife habitat left. Insuring perpetuity of our wildlife heritage will require facilitative grazing management strategies to be employed on habitat used by domestic and wild herbivores, rampant urbanization of critical wild ungulate habitat must be controlled, and new approaches to resolving conflict situations that develop between wildlife and other land uses must be sought.

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