

2015

Elk and Livestock in New Mexico: Issues and Conflicts on Private and Public Lands



5356164

RITF Report 82

Samuel T. Smallidge

Extension Wildlife Specialist

Heather J. Halbritter

former Extension Wildlife Associate

Terrell T. Baker

former Extension Riparian Specialist

Nicholas K. Ashcroft

Extension Range Management Specialist

Doug S. Cram

Extension Wildland Fire Specialist

John M. Fowler

Professor and Linebery Chair



Cooperative Extension Service
Agricultural Experiment Station

10/2015

Elk and Livestock in New Mexico: Issues and Conflicts on Private and Public Lands

Samuel T. Smallidge, Heather J. Halbritter, Terrell T. Baker, Nicholas K. Ashcroft, Doug S. Cram, John M. Fowler¹

Conflicts involving elk and livestock most often relate to animal interactions, private and public land uses, and perceptions of humans. Perceived overuse of forage resources and subsequent damage to ecosystem functions by livestock and elk often cause conflicts among private land owners, federal land users, federal land managers, and environmental interest groups (Lyons and Ward, 1982; Boe et al., 1991; Adkins and Irby, 1992; Irby et al., 1997). Forage competition, long-term herbivory impacts on important habitats, crop damage, and haystack depredation by wildlife have beset Western states for decades (Leek, 1911; Cooney, 1952; Morris, 1956; Conover, 2002; Kantar, 2002). Conflicts over use of minerals, heavy use of weak water sources, creating wallows in good water sources, fence damage, and preventing/precluding rangeland rest or even deferment from grazing pressure represent additional concerns. Reductions in livestock numbers on federal lands with apparent coincident increases in wild ungulate numbers concern agricultural producers (Boe et al., 1991). Conflicts may be intensified when management policies are not clearly linked to desired outcomes or are not scientifically defensible.

Livestock reductions on federal lands, through a variety of mechanisms, are not unprecedented (Linger, 1943). In association with other management practices, livestock reductions have likely contributed to increased elk numbers in recent years (Skovlin, 1982). Elk may persistently use and sometimes damage spring (Murie, 1951, p. 313) and summer (Hobbs et al., 1996a,

b) pastures intended for livestock. Similar to livestock, wild herbivores may negatively (Gill, 1992; Kay and Bartos, 2000; Lyon and Christensen, 2002) or positively (Hobbs et al., 1996a) affect forest or range ecosystems, with the type and degree of impact dependent on timing, duration, and intensity of use by individual and multiple herbivore species.

Land management agencies are required to uphold multiple use mandates and manage federal lands for a variety of resource opportunities, including livestock grazing, mining, recreation, timber, and wildlife (Multiple Use Sustained Yield Act, 1960). Forage resources need to be appropriately managed for multiple purposes, including forage for wild and domestic herbivores, habitat, and water production. State wildlife agencies have a vested interest in maintaining a sustainable wildlife population for hunting, but often have no jurisdiction over federal land and forage resources. Game species such as elk are a valuable resource and can bring increased revenue to local communities through recreation and tourism. While certain programs designed to offset depredation losses by elk are available to agricultural producers on private lands, no programs are available to producers on federally administered lands. These and other issues create challenges for effective natural resource management in New Mexico and involve ecological, biological, social, and economic aspects of elk–livestock interactions. Solutions to these challenges will require open dialogue based on an objective analysis of disparate points of view with a commitment to developing solutions to

¹Respectively, Extension Wildlife Specialist, former Extension Wildlife Associate, former Extension Riparian Specialist and Range Improvement Task Force Coordinator, Extension Range Management Specialist, Extension Wildland Fire Specialist, and Professor and Linebery Chair, all of the Department of Extension Animal Sciences and Natural Resources, New Mexico State University.

problems. Our objective is to frame the issues associated with negative interactions between elk and livestock, beginning with conflict resolution approaches used for private lands, in order to improve the manner in which depredation issues on federal lands may be addressed.

BACKGROUND

To effectively address elk–livestock issues and conflicts, we must first understand that they are predominantly human–elk issues and conflicts. While it is unlikely we will completely eliminate human–elk conflicts, a framework can be developed to effectively analyze and address conflicts when they arise. An effective discussion will have to address (1) biological, (2) socio-economic, (3) temporal, and (4) spatial aspects of the conflict. Development of common-sense objectives and consistent efforts by private, state, and federal stakeholders will improve remedies for human–elk conflicts and simultaneously improve wildlife habitat, ecosystem function, and agricultural productivity. This approach is based on the premise that wildlife and agriculture interests are often common integrated pursuits and not mutually exclusive. Thoughtful management of one can yield benefits to the other, as well as enhance a suite of ecosystem services.

Competition or Conflict

The potential for competition between wild ungulates and cattle is greatest during times of forage scarcity. Coe et al. (2001) identified late summer and autumn as times when competition between elk and livestock was most likely because they presumably converge simultaneously on areas with better-quality forage. Heavy cattle use on autumn ranges can reduce forage quantity and quality in areas that elk use during winter (Severson and Medina, 1983; Miller, 2002). Conversely, elk winter range is also spring cattle range, so there is potential to reduce forage available for cattle when elk use is heavy (Powell et al., 1986). Hobbs et al. (1996b) reported a 10% decrease in beef calf performance due to prior use of range resources by elk in winter. However, Hart et al. (1991) found little habitat use overlap between elk and cattle on elk winter ranges in southeastern Wyoming,

where cattle preferred to graze lowland range sites in summer. In places and circumstances where elk moved to lower elevations in the winter they preferred upland range sites. Cattle infrequently grazed these sites during the summer months (Hart et al., 1991). Competition is not only site-specific but also season-specific, and strategies for dealing with competition (or human conflicts) issues may differ from one site to the next and from one season to the next.

Edge and Marcum (1990) proposed that elk interactions with livestock rarely result in competition, though conflict is common. Conflict occurs between users of resources who perceive that their values are being compromised. Competition occurs when two or more animals use the same areas and forage resources are in short supply (Holecheck, 1980; Miller, 2002). Biological competition does not occur if there is no effect on fitness or ability to survive and reproduce between species (Vavra et al., 1989; Wisdom and Thomas, 1996). While possible, it is difficult and expensive to determine and document whether biological competition has occurred. Stakeholders may believe competition is occurring between elk and livestock when human conflict is a more accurate description of the actual relationship.

Animal Distribution

Competition between elk and livestock is also limited by the extent to which each species is able to spatially segregate itself from the other based on terrain and other factors. Convention suggests that cattle tend to select areas with gentle slopes close to water sources (Stoddard and Rasmussen, 1945; Hart et al., 1991; Sheehy and Vavra, 1996; Holechek et al., 2004). Cattle can and will use steeper slopes if enticed or if this behavior is achieved through selective breeding. Elk will make use of rugged terrain with dense cover (Hart et al., 1991; Yeo et al., 1993) more than cattle. Yeo et al. (1993) found that elk preferred rested pastures during the grazing season (June through October) and avoided habitat frequented by cattle by using higher elevations and steeper slopes. Conversely, Smallidge (2005) determined elk avoided cattle while present on a pasture but tended to use previously grazed pastures more frequently than rested pastures.

Wildlife and livestock are both attracted to high-quality forage areas, which may be limited at times. In the Lincoln National Forest, for example, the most productive, accessible, and available foraging areas are found in mountain meadows, which are also the most limited habitat type available (approximately 1.4%) on a landscape scale according to Frost et al. (2007). Elk and cattle both use open meadows and canyon bottoms of this forest, sometimes resulting in higher-than-anticipated forage use, particularly during times of drought. This phenomenon also results in underutilized forage outside of the canyon bottoms and mountain meadow habitats, clearly creating an imbalance in animal distribution, both wild and domestic. Therefore, what is often perceived as a stocking rate or population problem is more likely to be a distribution problem. Fencing, supplements, water placement, and other distribution aids typically influence location of livestock more than wildlife (Porath et al., 2002; Holecheck et al., 2004; Bailey, 2005). Elk and livestock distributions can be positively affected through long-term habitat management activities, such as tree thinning, prescribed burning, and planting/seeding designed to create or improve habitats for wild and domestic herbivores.

Approach

We contacted state wildlife agencies around the West to better understand and outline the approaches each state takes to mitigate human–elk conflicts on private lands. Table 1 summarizes the different approaches used in Western states for private lands. Approaches range from short-term direct monetary payments and remuneration for infrastructure losses to issuance of increased tags during hunting season. For example, the Colorado Division of Wildlife will offer direct monetary payments for fence destruction and crop loss on private land, and reports that they view this as a cost of managing wildlife in an effort to maintain higher populations of big game animals. The Wyoming Department of Game and Fish emphasizes prevention methods, such as providing fencing to protect haystacks, conducting depredation hunts, and using harassment techniques. Idaho is one of the few states that reports compensation

for loss of rangeland forage on private lands. Providing fencing materials or monetary payments and issuing kill permits are among a few of the options available to landowners in New Mexico. Typically, state agency personnel will evaluate depredation claims and recommend the best course of action to remedy the conflict.

Our review revealed few direct or formal measures for dealing with human–elk conflicts on federal lands. Table 2 displays that there are no tags, permits, or monetary payments issued on federal lands. All approaches were long-term, and most focused on habitat management. Several states reported efforts to coordinate with federal agencies and non-governmental organizations (e.g., Rocky Mountain Elk Foundation) in planning habitat improvements.

MITIGATION OPTIONS FOR NEW MEXICO

A logical approach to addressing conflicts involving elk and livestock will be to distinguish between short- and long-term efforts (Table 3). We discuss long-term solutions for New Mexico first since these strategies are the most widely agreed upon management approaches by professional managers and other stakeholders. Additionally, long-term solutions regarding human–elk conflicts also represent solutions to many natural resource-based conflicts associated with human reliance on, procurement of, and concern for natural resources. However, we must recognize that substantial obstacles exist and will need to be removed before successful adoption of long-term approaches can occur. For example, landscape-level vegetation manipulation and habitat restoration will not occur without three key components being successfully addressed: (1) streamlining processes and removing bureaucratic resistance, (2) securing adequate resources, and (3) targeting science-based educational efforts to lawmakers, the general public, and agency personnel regarding the multiple benefits of landscape-level vegetation restoration. Long-term solutions should be accompanied by specific strategies and action items to develop a long-term management approach to address key components as well as a healthy dose of flexibility regarding their timely action.

Table 1. Programs In Western States Designed to Address Human–Elk Conflicts on Federal Lands (compiled August 2008)

State Agency	Programs to Address Conflicts on Federal Land	Allocate Tags/Permits	Provide Monetary Payments
NM	State offers a minimum of three intervention methods—such as deterrents, fencing modifications, technical assistance for habitat manipulation, or some other innovation or technique—to address landowner complaints.	No ¹	Forage lease: landowner is paid \$2,500/yr for a max of 2 yr and then commits to building a game-resistant fence at end of lease.
CO	Program to manage and mitigate crop damages caused by wildlife. A habitat program funds diverse projects to assist landowners.	Voucher tags: game damage tags distributed following regular hunting season.	Mitigation payments in form of fencing materials, deterrents, and some payment for forage
WY	<i>Depredation Prevention and Compensation Program</i> emphasizes prevention through means of depredation hunts, fencing, and harassment techniques; landowner must allow a minimum amount of hunting. The <i>Habitat Extension Program</i> uses money from a variety of sources for habitat improvement on private lands. The <i>Private Land/ Public Wildlife Program</i> (PLPW) is designed for hunter access on private land to help manage the population objective for a herd and indirectly deal with conflicts.	No	Provides damage prevention materials such as fencing and compensation for forage. Funds are provided for habitat projects. Landowners get nominal financial compensation per acre enrolled in PLPW program.
MT	<i>Habitat Montana</i> funds a program used to negotiate conservation easements with landowners. <i>Block Management</i> is an incentive-based program that provides hunter access to participating private lands. The <i>Game Damage Program</i> provides fencing materials and manages special late season hunts as a last resort.	Landowner elk permits: gives landowner preference to receive a special (antlerless) elk permit in the annual drawing; they cannot sell tags.	Pays up to 40% of ranch value in conservation easements. Land owners may receive a small fee for each hunter allowed access to hunt. State may provide materials to fence haystacks.
ID	<i>Depredation Program</i> : Idaho legislature established the Wildlife Damage Law specifying that landowners and the Dept. are to work cooperatively to prevent as much wildlife damage as possible. Landowners may file claims for damage compensation if prevention methods are inadequate.	Landowner Appreciation Permits: landowners receive a permit based on acreage.	State pays for crops and use of privately owned rangeland forage damaged by wildlife.
AZ	Reported no specific program to address conflict directly. Special population management hunts to address severe elk issues are possible. State covers cost of fertilizer and seed for irrigated hay fields if landowner allows unrestricted use by elk. Voluntary landowner programs designed to implement mutually beneficial projects (e.g., vegetation enhancement or water developments).	No	No direct payments; programs designed to provide cost-share funds to landowners.

¹New Mexico state law allows private landowners to shoot elk that are depredating on private lands (17-2-7.2, NMSA 1978). New Mexico's Elk Private Land Use System (E-PLUS, 19:30.5 NMAC Private Land Elk License Allocation) is not specifically designed to address human–elk conflicts on private lands, but recognizes the contributions of private lands and landowners to the management of elk and their habitats while providing for economic benefit and appropriate, biologically sound, and effective harvest through sport hunting. Landowners that kill depredating elk are automatically withdrawn from eligibility for E-PLUS.

Table 1. Programs In Western States Designed to Address Human–Elk Conflicts on Federal Lands (compiled August 2008) (Continued)

State Agency	Programs to Address Conflicts on Private Land	Allocate Tags/Permits	Provide Monetary Payments
WA	State statute requires state to deal with elk/deer damage on cash crops. Does not apply to range forage. Landowners report damage to agency and state assesses damage. Once all non-lethal methods are exhausted and damage continues, kill permits are issued.	Three approaches used depending on situation: (1) agency harvests animal and donates meat, (2) landowner/family members only may hunt on their property and retain meat, or (3) landowner may choose tag recipient.	Direct payments are made for the value of crop loss. State cost-share program provides fencing materials and landowner provides labor to build the fence.
UT	Landowners are compensated for damage done to fences, irrigation equipment, and crops. Cooperative Wildlife Management Units (CWMU) are designed to help improve tolerance for wildlife and allow hunting access on private lands. Landowner receives permits depending on acreage. Permits may be sold with a designated percentage allocated to the public draw.	Mitigation permits and voucher permits are issued if non-lethal control methods are ineffective.	State pays for damages to fences, irrigation equipment, and crops.
CA	Landowner is responsible for providing every means necessary to prevent damage to their property. After every option has been exhausted and damage persists, the state will issue kill permits. State provides landowner incentives to manage private property for the benefit of wildlife.	When prevention methods addressing physical damage to crops or property do not work, kill permits are issued; cannot sell tags and meat must be donated.	No compensation programs.
NV	Refused to participate.		

Table 2. Programs In Western States Designed to Address Human–Elk Conflicts on Federal Lands (compiled August 2008)

State Agency	Mitigation Programs Addressing Conflict on Federal Land	Allocate Tags or Permits	Provide Monetary Payments
NM	No program identified.	No	No
CO	Indirect: <i>Habitat Partnership Program</i> designed to resolve livestock/big game conflicts on federal land.	No	No
WY	No program identified.	No	No
MT	Indirect: Field staff spends time coordinating with federal agencies on hunter access, hunting season structure, land use practices, and coordination between different land ownerships.	No	No
ID	No program identified.	No	No
AZ	Indirect: Various programs designed to work voluntarily with landowners to implement mutually beneficial projects such as grassland/forage enhancements. Water developments that benefit both livestock and wildlife are conducted on private and federal land.		
OR	Indirect: Coordinate with Rocky Mountain Elk Foundation and federal agencies and provide some funding for projects when available.	No	No
WA	Indirect: Coordinate with federal agencies and support grant proposals for projects on federal land dealing with habitat enhancement.	No	No
UT	Indirect: Have provided millions of dollars for habitat enhancement projects on federal lands in cooperation with federal land management agencies.	No	No
CA	No program identified.	No	No
NV	Refused to participate.		

Long-Term Solutions

Long-term solutions are costly and require substantial collaboration among private citizens and state and federal agencies. Including stakeholders that experience conflicts with elk (e.g., private landowners and public land ranchers) in development of goals and objectives and subsequent management planning will build a solid foundation for continued and productive communication and action. Development of long-term strategies in conjunction with short-term mitigation planning and

action will most effectively serve human interests and concerns for natural resources. Development of long-term management objectives that recognize linkages between elk populations and habitat management is an important first step. Managing elk abundance and distribution on the landscape should be considered relative to availability and quality of habitats, as well as a variety of human interests. Adequately considering the human elements when managing wildlife populations and distributions is important for minimizing conflicts. In conjunction with habitat and population management planning,

development of incentive-based damage reporting and mitigation programs for citizens experiencing conflicts with elk is essential.

Most professionals agree that vegetation management to enhance available habitats would help reduce human–elk conflicts. This “increase-the-pie” (ITP) paradigm complements the related goals that state and federal agencies, such as the State Forestry, Game and Fish, USDA Forest Service, and the Bureau of Land Management, have for restoring several of New Mexico’s vegetation zones/habitats to conditions within their natural range of variability. This ITP approach is a continuous process that maintains a shifting mosaic of variable habitats on the landscape. For example, ponderosa pine habitats currently support 10 to 100 times more trees per acre than they did historically when frequent fire kept tree density low and maintained large expanses of grassland habitat better suited to supporting wild and domestic herbivores. While the long-term goal from a human–elk conflict perspective is to manage conflict through landscape-level habitat manipulation, benefits of improving overall hydrological function, improving habitat for a wide range of wildlife species, and decreasing the risk of stand-replacing wildfire would also be realized. Science-based management strategies are currently available that include silvicultural treatments and prescribed burning that may improve understory and meadow vegetation communities. Mountain meadows are among the most productive habitats within some of the heavily forested federal lands, and meadow encroachment by conifers is threatening to reduce these high-quality forage sites. Habitat management can improve quality and quantity of habitat components (Bender et al., 2008) and change distribution and timing of use, which would reduce conflict.

Habitat management is an important tool for wildlife managers and ranchers. However, state wildlife agencies have limited jurisdiction or input over the majority of lands providing habitat for elk. As such, state wildlife agencies tend to focus on population management, with less effort being allocated to habitat management. To

Table 3. Selected Short- and Long-Term Actions to Address Human–Elk Conflicts

Short-Term Approaches	Long-Term Management
<ul style="list-style-type: none"> • Harass depredating elk • Repair damaged fences • Stakeholders pay for fence repairs • Stakeholders pay for riders • Adjust grazing management (e.g., season-long continuous instead of a rotation)¹ • Science-based educational workshops¹ • Adjust hunting tag issuance¹ 	<ul style="list-style-type: none"> • Develop community-based advisory boards • Landscape-level timber thinning • Halt and reverse meadow encroachment • Prescribed fire • Herbicide application • Adjust hunt timing • Adjust hunt strategy to alter herd structure • Replace fences • Install new fences • Develop water

¹Some short-term approaches may and should be considered over longer periods of time. Such short-term approaches may be treated, therefore, in a long-term context.

more effectively address these shortcomings, state wildlife agencies would be well served to develop good working relationships with private landowners, public land ranchers, and federal land management agencies. Incentive programs that support science-based habitat management strategies would lead to better quality and greater quantities of available habitats for all wildlife. These efforts would lead to productive communication and cooperation among private landowners, public land ranchers, and state wildlife and federal land management agencies, and would serve to remove many obstacles facing habitat management interests. Science-based educational programs designed to increase understanding of the objectives, benefits, and tradeoffs of population and habitat management approaches would ensure affected stakeholders operate with similar information backgrounds. These approaches would complement current state wildlife agencies’ population management programs that ostensibly manage elk populations in coordination with habitats’ abilities to support them. Good population information and flexibility in population management methodologies will be most beneficial when developed in conjunction with habitat conditions and multiple uses.

Other longer-term solutions may include construction and improvement of critical range management infrastructure for ranching activities. Strategic placement of fences and distribution of water sources would benefit ranchers and elk. Fencing helps manage livestock timing, intensity,

distribution, and duration of grazing. Fencing does not offer an option to manage elk grazing unless elk-proof fences are used. Elk-proof fences have been used with success to exclude elk from specific sensitive or recurring problem areas (e.g., riparian areas, alfalfa fields). In known high-use areas, installation of fencing designed to allow elk to cross without injury or damaging infrastructure improves accessibility for elk and decreases associated fence repair costs for ranchers. Several wildlife-friendly fence designs are available, and cost-share programs could be initiated between agencies and individuals. When needed, metal gates could replace traditional wire gates with similar benefits as mentioned above. Fencing to control access at important water sources may be used to minimize the potential for damage by elk and allow producers to manipulate livestock and elk distributions. When fencing is combined with relocating water sites to hardened or protected sites (e.g., a trough, tire tank), benefits are possible for both cattle and wildlife. Developing additional watering sources throughout a ranch or allotment with appropriate fencing or shut-off valves is a proven technique for manipulating livestock distribution and may improve elk distribution. Appropriate areas where water is underdeveloped or not available should be targeted for water development through wells, dirt tanks, or trick tanks. State and federal funding may be available to help offset costs of developing additional water sources with the intent of minimizing conflict between livestock and wildlife; justification for accessing this funding should be straight-forward.

Development of water infrastructure raises the issue of New Mexico water rights. With a limited few administrative exceptions, state and federal agencies cannot own water rights on federal lands (*Sensu* State Land Office Rule 12 and *U.S. v. New Mexico*). Ranchers should take the necessary steps to ensure that all water sources and water rights remain property of the ranch and commensurate property. The water right owner or appropriator owns the right to use the water but not the corpus or body of water itself (Harris et al., 2002). Often, water development will occur on springs or stock waters in which water rights have already been established by the rancher. However, the developments and the existence

of rights associated with them are incentives for ranchers to maintain these water sources in working condition, which benefits wildlife. Water development can play an important role in the distribution of wild and domestic herbivores and long-term habitat management planning.

Short-Term Solutions

While long-term solutions are being pursued, short-term actions should be considered and implemented to alleviate human–elk conflicts. Similar to long-term strategies, short-term objectives should be developed to accomplish three primary functions: (1) alleviate human–elk conflicts in a timely manner, (2) remain effective or be repeatable until long-term solutions are in place, and (3) support the implementation of long-term strategies. Within this short-term paradigm, innovative and untested approaches should be attempted and carefully monitored to determine efficacy. Collaboration among those involved in long-term efforts should develop and plan short-term strategies to ensure continuity of effort. The types of short-term actions that may temporarily alleviate human–elk conflict involve grazing management, animal distribution, and harassment techniques.

Although the effects of hunting are expressed over the long-term, manipulation of the elk population may also have short-term benefits to those experiencing conflicts. Altering the timing and length of the hunting season, tag issuance (standard, landowner, and special), and herd structure objectives (i.e., the number of cow and bull tags) change the number and structure of the herd in the long-term. Also, these adjustments may allow short-term benefits through altering the distribution of elk, reducing conflict in specific areas, and providing additional income to affected stakeholders. This approach would need to be closely coordinated with long-term objectives to ensure optimal short-term and long-term benefits.

Producers use mineral blocks to redistribute livestock in pastures and provide supplemental nutrients. These mineral blocks also attract elk. When mineral consumption by wildlife becomes excessive, producers become less willing to quietly accept use of their minerals by wildlife. In situations where mineral block use by wildlife is a conflict,

mineral blocks could be placed in pastures unoccupied by livestock in an attempt to change elk distribution. Also, having state wildlife agencies purchase mineral blocks for producers could ease the financial burden placed on producers by heavy elk use of minerals. Research has shown enough promise with respect to using other supplements to attract and distribute wildlife that further research is warranted.

Maintaining fences in areas where elk occur can be challenging for private landowners and public land ranchers. Fence repair and maintenance may require the effort of a full-time person to keep up with damage caused by elk under some circumstances. This may represent a significant cost to the producer and represent specific challenges in trying to maintain grazing system integrity when fence damage is constant. These situations often lead to increased tension between producers, state wildlife agencies, and federal land management agencies. Where fence repair is difficult from consistent elk damage, direct monetary payments could be made to help producers hire sufficient personnel to repair/maintain fences. Wildlife-friendly adaptations to existing fences may help minimize future damage and potential injury to elk. Other approaches may include a full-time employee, from either a state or federal agency, to repair and maintain fences on a group of allotments in an area that experiences consistent elk damage. These approaches on federal lands would have to consider that maintenance costs are included in lower federal grazing fees, while fence reconstruction is not. Equitable criteria for enrollment in fence programs would need to be developed because fences in poor condition through neglect may need additional attention, with costs distributed according to set criteria.

Ranchers often employ full-time personnel, called “riders,” with demonstrated success in distributing domestic animals and protecting specific areas where fencing is impractical or unwarranted. Riders often have fence maintenance responsibilities that may quickly become unmanageable when persistent elk damage occurs. Riders provide additional benefits by maintaining a presence to reduce other unauthorized, irresponsible,

or illegal use of private or federally administered lands (e.g., poaching, littering, off-road vehicle abuse). Riders are not a cure-all to other long-term strategies and are only hired when ranchers have available resources to pay them. Riders must balance their herd management, animal welfare, and water- and fence-maintenance responsibilities with immediate action needs associated with prevailing weather, herd management objectives, and infrastructure limitations. Stakeholders may be able to contribute to mitigating some of the conflict if there were a mechanism for them to pay all or a portion of a rider’s salary.

Grazing on federal lands can be challenging since forage for livestock is also “allocated” to wildlife and other ecosystem functions. Quantifying the amount of forage available to herbivores is difficult to accomplish accurately because of spatial and temporal variability. This variability also necessitates very large sample sizes to accurately portray the amount of forage produced. The problem has been, and remains, how much should be allocated to each user or demand component. Allocation is based on value judgments, not science, or it is frequently extrapolated well beyond the strength of any available scientific data. Though there have been multi-agency attempts to address the issue in New Mexico, no agreement has been possible, and disagreements during on-the-ground assessments are commonplace; therefore, the conflict persists. Forage allocation is a primary cause in the strained relationships among federal land management agencies and public land ranchers. Separating value judgments and opinion from scientific fact or data is extremely important when discussing allocation of limited resources. Attempts to apply any forage allocation model rigidly assume a level of precision in the assessment of forage production and use not currently possible. Modifying this approach away from a rigid application standard and implementing it as a general concept guideline recognized during management planning would help alleviate some of the human–elk conflicts encountered today. This is best implemented under the short-term strategic action that will have long-term benefits.

Fencing and harassment are frequent considerations in alleviating crop and ranch

infrastructure damage. Fencing out elk is cost prohibitive and fits more appropriately in the long-term solution category. Harassment with disruptive stimuli, such as noise or visual stimulants, is effective for short periods of time. Animals typically become desensitized to these efforts over time, the duration of which is determined by the frequency, consistency, and intensity at which they are exposed. Unless automated systems are used, it is difficult for ranchers, farmers, or state wildlife agency personnel to consistently be present at times when damage is likely to occur.

Short-term approaches cannot provide a solution to conflicts. However, they may significantly reduce conflicts by reducing the burden certain producers bear in providing a public service in the direct support of New Mexico's elk herds. Expenses related to managing habitat for and livestock around elk populations continue to increase, with no future prospect of mitigation of that burden. Ranchers cannot reasonably be expected to continue bearing the cost of elk through livestock reductions and increased costs of doing business. With cooperation and implementation of the approaches outlined here there exists potential for improved communication and partnership among federal agencies, state wildlife agencies, and agricultural producers. Short-term mitigation strategies should be developed to provide a catalyst in support of long-term efforts. When science-based, equitable, and thoughtful short-term approaches begin to effectively mitigate human–elk conflicts on private and federal lands, progress toward long-term solutions will have an increasing chance of success.

SUMMARY

With the advent of grazing management (e.g., Taylor Grazing Act), fences, federal grazing allotments, multiple use, federal land managers, state wildlife managers, and a multitude of local, state, and federal policies, conflicts between elk and livestock interests were ensured. Moreover, without a collective commitment from all vested parties to short- and long-term mitigation solutions as outlined in this publication, continued consternation is also ensured. There is no “one size fits all” solution or roadmap in regards to short- and long-term mitigation measures. However, the common sense and science-backed idea of “increase the pie” is strongly recommended as part of any long-term strategy. Any attempt at solving the problem of how to balance use/value/preference should be equitably, judiciously, and objectively approached. Our objective was not to provide solutions or make value judgments, but to lay out a framework and identify and discuss issues in an organized manner so that decision-makers can make informed decisions regarding livestock–elk conflicts in New Mexico. Recently, the New Mexico Department of Game and Fish has increased its efforts to engage landowners in addressing issues involving wildlife as well as working with landowners to prevent future issues through habitat management efforts on private and non-private lands. Extension professionals can play key roles as partners in pursuing such objectives with livestock producers, state wildlife agencies, and federal land managers.

LITERATURE CITED

- Adkins, R.J., and L.R. Irby. 1992. Factors influencing game damage complaints in Montana. *Transactions of the North American Wildlife and Natural Resources Conference*, 57, 96–103.
- Bailey, D.W. 2005. Identification and creation of optimum habitat conditions for livestock. *Rangeland Ecology and Management*, 58, 109–118.
- Bender, L.C., J.G. Cook, R.C. Cook, and P.B. Hall. 2008. Relations between nutritional condition and survival of North American elk *Cervus elaphus*. *Wildlife Biology*, 14, 70–80.
- Boe, D., T. Darden, D. Rittenhouse, J. Metzger, J. Connelley, W. Green, G. Herzel, B. McQuivey, L. Williamson, S. Egeline, and J. Inman. 1991. Livestock/big game interaction activity review. U.S.D.A. Forest Service Intermountain and Southwest Regions, May 14–25, Albuquerque, N.M.
- Coe, P.K., B.K. Johnson, J.W. Kern, S.L. Findholt, J.G. Kie, and M.J. Wisdom. 2001. Responses of elk and mule deer to cattle in summer. *Journal of Range Management*, 54, A51–A76.
- Conover, M.R. 2002. *Resolving human-wildlife conflicts: The science of wildlife damage management*. New York: Lewis Publishers.
- Cooney, R.F. 1952. Elk problems in Montana. *Journal of Range Management*, 5, 3–7.
- Edge, W.D., and C.L. Marcum. 1990. Elk and cattle on public lands: A new look at an old conflict. *Western Wildlands*, 6(2), 12–15.
- Frost, R., C. Roberts, G. Hyatt, and J. Fowler. 2007. *Montane meadow and open area encroachment in the Lincoln Forest, Sacramento Grazing Allotment* [Report 69]. Las Cruces: New Mexico State University Range Improvement Task Force.
- Gill, R.M.A. 1992. A review of damage by mammals in north temperate forests: 1. Deer. *Forestry*, 65, 145–169.
- Harris, L.G., L. Blair, and C.T. Ortega-Klett. 2002. *New Mexico water rights*. Las Cruces: New Mexico State University, New Mexico Water Resources Research Institute.
- Hart, R.H., K.W. Hepworth, M.A. Smith, and J.W. Waggoner, Jr. 1991. Cattle grazing behavior on a foothill elk winter range in southeastern Wyoming. *Journal of Range Management*, 44, 262–266.
- Hobbs, N.T., D.L. Baker, G.D. Bear, and D.C. Bowden. 1996a. Ungulate grazing in sagebrush grassland: Mechanisms of resource competition. *Ecological Applications*, 6, 200–217.
- Hobbs, N.T., D.L. Baker, G.D. Bear, and D.C. Bowden. 1996b. Ungulate grazing in sagebrush grassland: Effects of resource competition on secondary production. *Ecological Applications*, 6, 218–227.
- Holechek, J.L. 1980. Concepts concerning forage allocation to livestock and big game. *Rangelands*, 2, 158–159.
- Holechek, J.L., R.D. Pieper, and C.H. Herbel. 2004. *Range management: Principles and practices*, 4th ed. Upper Saddle River, NJ: Prentice Hall.
- Irby, L.R., J. Saltiel, W.E. Zidack, and J.B. Johnson. 1997. Wildlife ungulate damage: Perceptions of farmers and ranchers in Montana. *Wildlife Society Bulletin*, 25, 320–329.
- Kantar, L.E. 2002. *Evaluating perceived resource conflicts in context with spatial dynamics of an interstate wintering elk herd* [Thesis] Las Cruces: New Mexico State University.
- Kay, C.E., and D.L. Bartos. 2000. Ungulate herbivory on Utah aspen: Assessment of long-term exclosures. *Journal of Range Management*, 53, 145–153.
- Leek, S.N. 1911. The problem with elk. *Outdoor America*, 46, 22.
- Linger, A.L. 1943. Wildlife and livestock on western ranges. *Transactions of the North American Wildlife and Natural Resources Conference*, 8, 62–66.
- Lyon, L.J., and A.G. Christensen. 2002. Elk and land management. In D.E. Toweill and J.W. Thomas (Eds.), *North American elk: Ecology and management* (pp. 557–581). Washington, D.C.: Smithsonian Institution Press.
- Lyon, L.J., and A.L. Ward. 1982. Land management. In J.W. Thomas and D.E. Toweill (Eds.), *Elk of North America: Ecology and management* (pp. 443–477). Harrisburg, PA: Stackpole Books.
- Miller, W. 2002. Elk interactions with other ungulates. In D.E. Toweill and J.W. Thomas (Eds.), *North American elk: Ecology and management* (pp. 435–447). Washington, D.C.: Smithsonian Institution Press.
- Morris, M.S. 1956. Elk and livestock competition. *Journal of Range Management*, 9, 11–14.
- Murie, O.J. 1951. *The elk of North America*. Harrisburg, PA: The Stackpole Company.

- Porath, M.L., P.A. Momont, T. DelCurto, N.R. Rimbery, J.A. Tanaka, and M. McInnis. 2002. Offstream water and trace mineral salt as management strategies for improved cattle distribution. *Journal of Animal Science*, 80, 346–356.
- Powell, J., G. Godbolt, and W.G. Hepworth. 1986. Questions about livestock-big game relations. *Rangelands*, 8, 281–283.
- Stoddard, L.A., and D.I. Rassmussen. 1945. Big game – range livestock competition on western ranges. *Transactions of the North American Wildlife and Natural Resources Conference*, 10, 251–256.
- Severson, K.E., and A.L. Medina. 1983. Deer and elk habitat management in the Southwest. *Journal of Range Management Monograph No. 2*.
- Sheehy, D., and M. Vavra. 1996. Ungulate foraging areas on seasonal rangeland in northeastern Oregon. *Journal of Range Management*, 49, 16–23.
- Skovlin, J.M. 1982. Habitats. In J.W. Thomas and D.E. Toweill (Eds.), *Elk of North America: Ecology and management* (pp. 369–413). Harrisburg, PA: Stackpole Books.
- Smallidge, S.T. 2005. *Temporospatial distribution of a northcentral New Mexico elk herd in relation to spring vegetation greenness values, vulnerability to harvest, and public land grazing* [Dissertation]. Las Cruces: New Mexico State University.
- Vavra, M., M. McInnis, and D. Sheehy. 1989. Implications of dietary overlap to management of free-ranging large herbivores. *Proceedings of the Western Section of the American Society of Animal Science*, 40, 489–495.
- Wisdom, M.J., and J.W. Thomas. 1996. Elk. In P.R. Krausman (Ed.), *Rangeland wildlife* (pp. 157–181). Denver: The Society for Range Management.
- Yeo, J.J., J.M. Peek, W.T. Wittinger, and C.R. Kvale. 1993. Influence of rest-rotation cattle grazing on mule deer and elk habitat use in east-central Idaho. *Journal of Range Management*, 46, 245–250.



Samuel T. Smallidge is the Extension Wildlife Specialist at New Mexico State University. He has degrees in wildlife and range management. His Extension program focuses on wildlife damage management, wildlife enterprises, and wildlife ecology and management education for youth and adults.

Cover photo by Terry L. Spivey, Terry Spivey Photography, Bugwood.org

New Mexico State University is an equal opportunity/affirmative action employer and educator.
NMSU and the U.S. Department of Agriculture cooperating.