Environmental, Economic, and Legal Issues Related to Rangeland Water Developments

Proceedings of a Symposium

November 13-15, 1997
Arizona State University College of Law
Tempe, Arizona

Sponsored by:

Center for the Study of Law, Science and Technology of Arizona State University

Arizona Game and Fish Department

Arizona Wildlife Federation

Arizona State University
School of Planning and Landscape Architecture

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Preface

The management of arid rangelands in the West has become an acutely controversial policy issue whose informed resolution has important implications for the future of the region. Public managers of land and natural resources, in particular, are frequently asked to make decisions about proposed uses that cut across a complex matrix of environmental science, competing economic interests and claims, and legal constraints. In the summer of 1996 the two of us, law professors at Arizona State University (ASU), began to perceive the potential value of a symposium that would approach the study of this larger policy problem through the exploration of a specific, concrete and recurring issue which such managers face: the decision whether, where, and under what circumstances to construct rangeland water developments, either for the management of grazing livestock or for the anticipated benefit of wildlife. Such decisions have often been made based on perception and past practices; hard data and analysis have been more difficult to come by.

One of us (Joe Feller) has had extensive experience with these issues, both in the real world of environmental policymaking and litigation, and in academic research and teaching. The other (Dan Strouse) is the Director of the ASU Center for the Study of Law, Science and Technology, one of whose missions is to advance the legal system's knowledge and use of relevant science in order to improve decisionmaking. It was our thought that by exploring this one specific aspect of the rangeland management problem in detail, and from several vantage points -- environmental, economic and legal -- we might begin to identify and better understand what is really known about it, what remains to be learned, and what might realistically be ascertained. The goals from the outset were to contribute, through research, to the formulation of wise policy; to eschew political rhetoric in favor of dispassionate study and analysis; and, to the extent that debate would arise over the meaning and implications of research presented at the Symposium, to conduct that debate as productively as possible.

Many state and federal agencies, and various interest and advocacy organizations, have stakes in the rangeland management debate of which water installations are such an important part. Accordingly, early on in the process we invited representatives of most of these groups to join us in planning the Symposium. A Steering Committee was soon formed, whose charge was to provide guidance in planning the contents of the Symposium and assistance in ensuring that it would succeed -- through topic selection, publicity, recruitment of speakers, and numerous other tasks both substantive and administrative. Over the course of the year preceding the Symposium this Committee met regularly, often monthly, and worked extremely hard to produce the Symposium whose contents are reflected in the materials that follow. We now want to recognize and publicly thank both the invididuals who constituted the Committee, and the organizations they represented -- who, along with the ASU Center, co-sponsored the Symposium. Accordingly, we express our enduring gratitude to our partners in this enterprise:

Eddie Alford, Biological Resources Group Leader, Tonto National Forest, USDA Forest Service

Professor John Brock, School of Planning and Landscape Architecture, Arizona State University

Al Burch, Group Administrator, Arizona U.S. Bureau of Land Management

Jeff Burgess, Sierra Club, Grand Canyon Chapter

Jim Burton, Branch Chief, Habitat Division, Arizona Game and Fish Department

Mike Ferguson, Deputy State Director (Arizona), Resources Division, U.S. Bureau of Land Management

Ray Lee, Wildlife Specialist Supervisor, Game Branch, Arizona Game and Fish Department

Larry Riley, Wildlife Specialist Supervisor, Habitat Division, Arizona Game and Fish Department

Sam Spiller, U.S. Fish and Wildlife Service

John H. Stephenson, Arizona Wildlife Federation

Ron Engle-Wilson, Wildlife Specialist Supervisor, Arizona Game and Fish Department and President, Arizona Chapter, Wildlife Society

The papers that constitute these Proceedings were submitted to the Steering Committee pursuant to both individual invitations and a Call for Abstracts. In order to attract work of the greatest relevance and highest quality, the Committee worked tirelessly to identify promising invited speakers, to publicize the event in order to encourage submission of Abstracts, and to review Abstracts once submitted. The Committee sought papers on a range of topics, which are reflected in the structure of the Symposium and serve as the organizational units of these Proceedings:

* Introduction: Agency Perspectives on Rangeland Water Developments
* Historical Perspectives on Rangeland Water Developments
* Rangeland Water Developments and Livestock Management
* Rangeland Water Developments and Wildlife I: Mammals
* Rangeland Water Developments and Wildlife II: Fish, Reptiles, and Amphibians
* Costs and Benefits of Rangeland Water Developments
* The Effects of Rangeland Water Developments on Soils and Watersheds
* Legal Issues Related to Rangeland Water Developments
* Planning, Decisionmaking, and Monitoring for Rangeland Water Developments
* Technical and Design Issues Related to Rangeland Water Developments
* Research Needs (Concluding With a Panel Discussion)

The Symposium was held November 13-15, 1997 at the ASU College of Law. Three days of lively, rigorous presentations and searching but balanced discussion passed quickly. We think the Symposium was successful, in at least three important senses. First, the range and quality of the papers, both invited and submitted in response to the Call for Abstracts, exceeded our most optimistic expectations. Second, we think significant progress was made toward the articulated goals of evaluating the state of present knowledge, identifying gaps in that knowledge, and, in some cases, suggesting promising avenues for additional research. Finally -- though we harbor no illusions that a policy issue as complex and divisive as rangeland management will be readily resolved by a single project like this -- we do believe, and surely hope, that in years to come these materials will prove to be useful to decisionmakers, scholars and advocates seeking guidance as they struggle with concrete decisions about water installations in arid rangelands.

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Daniel S. Strouse, Director, Center for the Study of Law, Science and Technology and Professor of Law
Arizona State University College of Law
Tempe, Arizona

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Symposium on Environmental, Economic, and Legal Issues Related to Rangeland Water Developments

Tempe, Arizona
November 13-15, 1997

Do Livestock Waters Help Wildlife?

Joan E. Scott[1]

Abstract -- Wildlife benefit is often cited as a justification for development of livestock waters; and now livestock water, with its perceived benefit to wildlife, is being used as justification for domestic livestock grazing in general. However, many livestock waters provide little if any benefit to wildlife. Furthermore, if the development of a livestock water results in greater livestock use of an area, or if it leads to loss of riparian or xeroriparian areas, the net result may be detrimental to wildlife instead of beneficial.

Agency personnel can conduct a better evaluation of the environmental impacts of a livestock water, and do a better job of designing a livestock water, by reviewing the following four questions.

1) Will the livestock water change the distribution and/or the stocking rate of the livestock? If there is a concurrent increase in the stocking rate, or if new cattle use will occur in areas with other resource concerns, the net impact to wildlife may be adverse. Rather than creating a new livestock water, a decrease in livestock numbers may be a better solution to overuse around current water sources.

2) What is the impact of removing water from its natural source? Water that is captured, piped, and stored for livestock may come from a drainage, from a natural spring or seep, or from groundwater reserves. Removal of that water from the source could adversely affect other important components of wildlife habitat, especially riparian values.

3) Is the livestock water available to wildlife? Some water storage and delivery systems deny wildlife species access to free water. Also, many livestock waters do not have wildlife escape ramps, and wild animals drown. Some livestock drinkers are turned off when cattle are moved out of the area; if water is not provided during the dry periods, the value to wildlife is diminished or eliminated.

4) What wildlife species will use the water, and what are their habitat needs? One species may benefit from free water alone, but another species may need associated riparian vegetation that is not available at some livestock waters.

With wildlife-friendly design and management, livestock waters can maximize the number of wildlife species that can use the water, and wildlife values can be provided.

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[1] Habitat Program Manager, Arizona Game and Fish Department, Tucson.

INTRODUCTION

> *"Wildlife populations will be negatively impacted without ranchers to construct and maintain water developments."*
>
> Arizona Cattle Grower's Association (1977)

Wildlife benefit is often cited as a justification for development of livestock waters; and now livestock water, with its perceived benefit to wildlife, is being used as justification for domestic livestock grazing in general.

Unfortunately, many livestock waters are constructed and operated in such a manner that little or no wildlife benefit is realized. Furthermore, no livestock water provides benefit for all wildlife species. Resource managers will improve the accuracy and clarity of their statements if they avoid the generic term "wildlife benefit" and instead identify which species are expected to use the water.

To further illustrate how this concept can be taken to the extreme, I'll share with you a recent experience. I was reviewing a public land grazing allotment with a land management agency and the permittee. We were riding through a range that had been significantly degraded by overgrazing. We stopped by an earthen tank that had been so overused that all vegetation was gone from the surrounding area. The rancher turned to me and stated:

> "You wildlife biologists should thank the ranchers, because without livestock waters there would be no wildlife over much of Arizona."

In fact, the degraded condition on this ranch, which was solely caused by this rancher's grazing practices, had caused much more adverse impact to wildlife habitat than could have ever been offset by the addition of livestock waters. Livestock water will never benefit wildlife if it is associated with over-grazing and poor grazing management.

Resource agencies have a responsibility to clearly articulate the justification for public land uses. Grazing of public lands can be and is justified for numerous reasons, including community economic stability and multiple-use mandates. But, if we use wildlife as a justification for development of livestock waters, and even as a justification for grazing, we should analyze more thoroughly and articulate more clearly the benefits that will come to wildlife from the livestock water. Agency personnel can conduct a better evaluation of the environmental impacts of a livestock water, and they can enhance the design of a livestock water, by reviewing the following four questions.

EVALUATION OF LIVESTOCK WATERS

1. Will the livestock water change the distribution and/or the stocking rate of the livestock?

To illustrate this point simply, let us assume a case of an allotment with some number of cattle, but only one reliable water source, such as a natural creek. Most cattle use is near the water source, and little use occurs on other portions of the allotment (Figure 1.A.). A common proposal would be to develop a livestock drinker in another part of the allotment in order to increase cattle distribution. The usual environmental assessment would simply state that the increased water would benefit wildlife.

If the addition of the livestock water results in the same number of livestock distributed more evenly throughout the allotment (Figure 1.B.), the project would likely benefit wildlife as a result of lighter grazing near the old water source.

However, there can be scenarios where the project might not benefit wildlife. If the proposal includes a concurrent increase in livestock numbers (Figure 1.C.), the new water will not lead to decreased livestock use around the old water; rather it will lead to additional livestock use around the new water on land that was relatively ungrazed. The negative impacts from increased livestock use will more than outweigh any benefit from the additional water. Project proponents might justify that the development had <u>no adverse effect</u> on wildlife, if they could show that the proposed stocking rate was at a sustainable level. However, it would be more difficult to claim an actual <u>benefit</u> to wildlife. The livestock water might still be justified for economic or multiple-use reasons, but we should not claim a benefit to wildlife if it cannot be demonstrated.

Also, we need to consider other resources in the area where livestock use will increase. A proposal might bring livestock into habitat that is relatively pristine because of its distance to water. From a commodity point of view, it is an advantage to utilize more of the land. However, from the wildlife point of view, it may not be a benefit. Suppose there was a bighorn sheep population on hills that were previously only lightly used by cattle (Figure 1.D.). Increasing cattle distribution to that area would not likely benefit the bighorn (Figure 1.E.). Or, if this area had steep slopes and erodible soils, increased cattle use would cause adverse land impacts. Under either of these scenarios, the new livestock water could result in negative impacts to wildlife.

If the current grazing level around an old water source is excessive, but greater livestock distribution is undesirable, one could justify an alternative to decrease the stocking rate rather than add a new water (Figure 1.F.). Overgrazing is sometimes the result of a stocking rate that is based on full use of the grazing range, when only a portion of the range is actually used. Consideration of a stocking rate reduction will facilitate an objective analysis of alternatives.

One also should consider whether the habitat around a proposed livestock water is suitable for grazing. For example, if the slope of the land is greater than 60 percent, little livestock use will occur (Holechek, 1988); this land should be deleted from the stocking rate calculations. Similarly on slopes of 31-60 percent, expected livestock allocations should be reduced 60%

(Holechek, 1988). Thus, it is inappropriate to develop a livestock water on a steep slope, because cattle use would be light even if water is provided. The project is unlikely to increase livestock distribution, so expected land improvement would not occur. The expense of creating this livestock water would not be offset by either better cattle management or increased cattle profits.

The environmental review should also evaluate how cattle will be managed around the new water source. High livestock use of forage around a livestock water can adversely impact many species of wildlife. Swank (1958) reported that deer and livestock congregate in the vicinity of permanent water during dry months, depleting forage in these areas; if the food supply falls below demand, a die-off of deer can result. Similarly, Ockenfels et al. (1994) found that pronghorn avoided the first 1320 ft (400 m) surrounding water sources. They attributed the apparent avoidance around water sources to concentrations of livestock which denuded the vegetation surrounding the water source. Stoddart et al. (1975), too, reported that concentrations of livestock at water sources on arid rangelands cause severely denuded areas, which pronghorn avoid.

2. What is the impact of removing water from its natural source?

There is no net gain of water by creation of a livestock water. Water is either diverted from running down a drainage, or tapped from a spring or seep, or pumped from groundwater supplies. The question that begs asking is whether we are causing adverse riparian impact by removing water from its natural source.

Any management action that decreases riparian functions and values generally is considered adverse to wildlife species. More than 60 percent of vertebrates in the arid Southwest are obligate users of riparian areas, while another 10 to 20 percent are facultative users (Ohmart and Anderson, 1986). Even xeroriparian drainages, which have water for only hours after a storm, provide important habitats for wildlife. Johnson and Haight (1985) found that xeroriparian habitats supported five to ten times the bird densities and species diversity of surrounding Sonoran Desert uplands.

Removal of water from the natural source may be significant or insignificant, depending on the quantity of water in the system and the percentage of source water being removed. Of course, wildlife also use water, but cattle use is an increase above the natural wildlife use—an added biomass in the ecosystem requiring free water. How much of our range water resource do we convert to livestock production?

One mature cow requires 8 to 10 gallons of water per day (Vallentine, 1980), and the U.S. Department of Agriculture recommends that water development plans consider 12 to 15 gallons per day for cattle to meet maximum free choice water consumption and allow for evaporation (U.S. Forest Service, 1969; U.S.D.A. Soil Conservation Service, 1982). If we use a figure of 10 gallons of water per day for one cow, 100 cows using a water source for 1 month, or 33.3 cows using a water source for 3 months, will result in 30,000 gallons of water being removed from the source for livestock use (100 cows x 10 gal. x 30 days = 30,000 gallons, or 33.3 cows x 10 gal. x 90 days = 30,000 gallons). Vallentine (1980) reports that at least one watering facility should be provided for every 50-60 animal units for full growing season use.

(For comparison, daily water consumption for big game herbivores has been estimated at 1.5 gallons for mule deer and desert bighorn sheep, and at 1.0 gallons for white-tailed deer and pronghorn [Clarkson and Sturla, 1990]. The standard rainwater catchment design now used by the Arizona Game and Fish Department has a storage reservoir of 17,000 gallons [Gunn, 1990]. AGFD has found that wildlife water developments of 10,000 gallons or more usually meet wildlife needs if filled annually.)

If the water source is a drainage, we need to assess the function the water previously served in that drainage. Did that water support any riparian or xeroriparian habitat? What portion of the water from that drainage are we giving to livestock? Although one might argue that diversion for a livestock development does not remove the water, rather just delay it or slow it down, I would argue that the portion consumed by livestock is removed. Could this removal of water from drainages be causing loss of riparian functions, above and beyond any grazing impacts from forage consumed and trampling? If water diversion for a livestock development, and associated increases in livestock use, decreases or eliminates riparian or xeroriparian functions and values, the net effect is adverse to wildlife.

Changes in streamflow due to man-made diversions can affect vegetation in the downstream drainage. Diversions of stream water negatively affect riparian vegetation by increasing water stress; by decreasing leaf area; by decreasing cover, abundance, density, and growth rate of riparian trees; by changing the size-class distribution of riparian trees; by increasing tree mortality; by tempering high-flow periods that recharge aquifers and soils; by lowering the water table below the rooting zone of many plant species; and in extreme cases by destroying the riparian ecosystem altogether (Medina, 1990; Smith et al., 1991; Stromberg and Patton, 1991).

Is it possible that without livestock waters there would be more water for wildlife in creeks? Decreases in drainage vegetation can lead to lower summer flows in streams, decreased water intake of soil, and decreased water storage function of the soil (Rauzi and Hanson, 1966; Elmore and Beschta, 1987). Healthy riparian soil acts like a sponge, holding water in the streambanks and slowly releasing it to stream channels; thus groundwater reserves are increased, and the seasonal quantity and quality of water are increased (Chaney et al., 1990; Stromberg, 1993). Early accounts of Coues white-tailed deer in Arizona indicated greater use of riparian areas than we see today (Davis, 1982). With the loss of perennial streams and wetlands in Arizona, Coues white-tailed deer may now be more dependent on human-made water sources (Ockenfels et al., 1991).

If the water source is a natural spring or seep, the environmental assessment should assess whether removal of the water will decrease the riparian and wetland values of the source site. Springs and seeps are formed when ground water meets tilted rock formations or impervious soil layers which direct the water to the surface, or when ground water is released through fissured rock. An outstanding attribute of these aquatic habitats is that the water they provide is of relatively constant temperature, being warmer in winter and cooler in summer than other waters. Consequently, springs and seeps support a high level of biological activity (Melton et al., 1984).

Water discharge from most springs is insufficient to water many livestock at a time, so the water is usually piped to a storage site for periodic high volume consumption (Kindschy, 1996). A spring that yields only one gallon every six minutes can provide enough water for 25 head of cattle if developed (Vallentine, 1980). Unfortunately, the original riparian/wetland zone associated with the spring is often destroyed by the spring development, which collects all the available water (Kindschy, 1996). Some riparian/wetland values of the natural spring might be preserved if overflow is maintained and the spring is fenced, or if the overflow is diverted to an adjacent area that is fenced (Kindschy, 1996). Nevertheless, if a large portion of the available outflow is converted to livestock water, significant riparian/wetland values will be lost.

If the water source is a well to ground water, the cone of depression around the well may dry up nearby springs which provided other attributes of wildlife habitat. Also, wells may lower the local water table, which could impact vegetation, favoring deeper-rooted shrubs over shallower-rooted grasses.

Ground water in southern Arizona is being depleted at a rate which exceeds the natural recharge rate (Schumann, 1988). Although water use for range livestock is probably less than one percent of the total water use in Arizona (Lee Lambert, Arizona Department of Water Resources, Tucson, personal communication), livestock use may be significant for localized areas. For example, stockponds comprise 10 percent of the total agricultural water use in Cochise County, and most of the supply comes from groundwater (Liverman et al., 1997). In the San Rafael Basin, ranching is the main activity, and most groundwater withdrawal is for watering livestock (Arizona Department of Water Resources, 1997).

3. Is the livestock water available to wildlife?

An evaluation of the impact of a livestock water to wildlife should include a list of the wildlife species in the area, whether or not those species will have access to and exit from the water, and whether or not the water will be available during the period of the year when it would be used by those species.

Deer and pronghorn can access many cattle waters, but Ockenfels et al. (1994) noted that water sources built in drainages with abundant shrubs and trees or with rough topography are avoided by pronghorn because they provide predator hiding cover. Other livestock waters are fenced so that they function as cattle traps and holding pens; thus wild ungulate entry is restricted or prevented (Ockenfels et al. 1994).

Other forms of wildlife vary in their ability to access and/or use different types of livestock waters. For example, rabbits, javelina, young deer, quail, and reptiles cannot access many trough or metal tank drinkers.

Other species use water habitats for more than just drinking. Leopard frogs need free water for mating and laying eggs. Metal tanks with troughs high off the ground are not accessible to leopard frogs, but earthen stocktanks can provide excellent habitat. Herpetologists have speculated that maintenance of declining leopard frog species in Arizona may be dependent, at least in the short term, on populations in ranch stocktanks (Rosen et al., 1996).

Most bats (except those which feed on nectar) appear to drink water routinely during hot, dry summer months (Cockrum, 1981). Bats usually drink by flying low over a water surface and immersing the mouth (or lower jaw) into the water. Therefore, surface water must be large enough for the bat to successfully drink while in flight. Some bats, such as the Mexican free-tailed bat (*Tadarida brasiliensis*), pocketed free-tailed bat (*Tadarida femorosacca*), and Underwood's mastiff bat (*Eumops underwoodi*), have narrow wings and require large surfaces (15 to 30 feet or more) of free water for long gliding approaches and departures from the water (Cockrum, 1981). Also, barbed wire fences strung across the surface of waters can kill bats (Janet Tyburec, Bat Conservation International, Inc., Austin, Texas, personal communication), so waters designed to benefit bats should be free of obstructions in their flight path.

Some livestock drinkers and storage tanks, especially those with straight sides, allow some wild animal species to access the water, but have no provision for escape from the water, resulting in death of wild animals either from drowning or from struggling to escape the trap (Enderson, 1964; Craig and Powers, 1975). I have found dead rabbits, frogs, skunks, hawks, and quail chicks in steep-walled metal troughs and storage tanks. Although land management agencies encourage the use of escape ramps in livestock waters, I estimate that fewer than 50 percent of livestock waters I have visited have had functional escape ramps. Several designs for wildlife escape ramps have been developed (Wilson and Hannans, 1977; Yoakum et al., 1980; Woltering, 1981; Fredlake et al. 1983; Sherrets, 1989; Sanderson et al., 1990). Lids on large water storage tanks prevent wild animals from being trapped, or a floating platform can function for both access and escape in large storage tanks (Wilson and Hannans, 1977; Yoakum et al. 1980). Maintenance of escape ramps is also essential and too often deficient.

Some livestock waters are operational only seasonally. Cattle are usually rotated through different pastures, and some ranchers shut off water in pastures when cattle are elsewhere. Furthermore, some ranchers use "water-lotting" to move their cattle: waters are turned off at one place to encourage cattle to move to a different portion of the ranch. If a watering site is not available to wildlife during dry summer months, most benefit is lost. Livestock waters can be designed to meet the need for moving cattle and still provide year-round water for wildlife, if they are fenced in a manner to exclude livestock when necessary, but allow passage of wildlife.

4. What wildlife species will use the water, and what are their habitat needs?

A wildlife biologist stopped by my office after a day in the field during one of our many southwest droughts. He said:

> "Every deer I saw today was in the riparian areas. You can sure tell how dependent the deer are on water during these hot, dry times."

Those deer may have been using water in the riparian areas; but on the other hand they may have been keying in on the shade, hiding cover, and riparian forage. Free water alone may have not have provided those deer with essential survival advantages. We need to ensure that we do not interpret an animal's dependance on riparian areas as a dependance on free water.

Wildlife values of riparian areas include hiding cover; thermal cover and shade; enriched vegetation resources including additional species, succulence, and height diversity unavailable in surrounding uplands; abundant floral resources; enhanced invertebrate resources; microhabitat for prey and increased prey densities; nesting substrate; roosting substrate; hunting perches; night perches; enhanced decomposition and soil with higher organic material; travel corridors and migratory routes; rubbing sites; and wallows. Some stockponds provide riparian vegetation, and a few are even designed to slowly release water to create downstream riparian habitat (Arizona Game and Fish Department, 1996). However the majority of stockponds do not provide any riparian vegetation, and metal stocktanks have no associated riparian functions and values. We need to think more critically about the specific habitat needs of different wild animal species. The provision of water in a metal tank will be of little benefit to a vermillion flycatcher if no riparian habitat is available.

But, habitat needs vary by species. While most wildlife will be adversely affected by declines in riparian condition, a sidewinder is probably unaffected. While most wildlife species will be negatively impacted by overgrazing, horned larks, lark sparrows, and kangaroo rats may actually profit from decreased ground cover resulting from overgrazing. And, while some species may realize no survival advantage from a denuded stocktank, Sonora tiger salamanders and waterfowl may benefit from a dirt tank regardless of a degraded condition. Thus, to evaluate the impact of a livestock water on wildlife, we must know what wildlife species are present and what habitat conditions they require.

Although water is essential to the survival of all animals, the water requirements of animals are met by a variety of means. Some animals do not require free water for drinking. While many animals will drink free water if it is available, there are still questions regarding which species show population benefits from water developments. (Burkett and Thompson, 1994; Broyles, 1995; Arizona Game and Fish Department, 1997).

CONCLUSION

Without wildlife-friendly design, construction, and maintenance, and without concurrent good range management, little wildlife value will be realized from a livestock water. Many wildlife species cannot use some types of livestock water developments. Furthermore, if the development of a livestock water results in greater livestock use of an area, or if it leads to loss of riparian or xeroriparian habitats, the net result may be detrimental to wildlife instead of beneficial.

We can design livestock waters to insure the provision of water for many wildlife species and to include some wildlife values. If we include the following four questions in our analysis, we will do a better job of planning a livestock water and of evaluating the expected impact to wildlife:

1) Will the livestock water change the distribution and/or the stocking rate of the livestock?

2) What is the impact of removing water from its natural source?

3) Is the livestock water available to wildlife?

4) What wildlife species will use the water, and what are their habitat needs?

I contend that to show a benefit to wildlife from a livestock water, one should demonstrate:

a. That there is no concurrent increase in the livestock stocking rate;

b. That construction of the livestock water will result in more appropriate levels of grazing through a better distribution of the cattle;

c. That the livestock water is being placed in an area 1) appropriate for grazing, 2) identified in the land management plan for grazing, and 3) where no resource concerns conflict with the proposed grazing;

d. That grazing around the new water will be light to moderate, and forage resources will not be depleted around the new water;

e. That the stocking level of the livestock is appropriate for the land, and the livestock management system allows for appropriate rest;

f. That removal of water from the natural source (drainage, spring or seep, ground water) causes no significant loss of riparian or other wildlife values;

g. That drinker design will maximize wildlife access to the water;

h. That adequate escape ramps will be provided in water storage tanks and drinkers, and/or storage tanks will be covered; and

i. That water will be available to wildlife year-round.

Furthermore, to be fiscally responsible, public agencies should evaluate the financial return on creation of a livestock water on public land. Is the public gain as measured by increased livestock production greater than the public cost of the livestock development? Development of a livestock water commonly costs $5,000 to $10,000 of public funds, and matching costs from the permittee are similar. Those cost should be weighed against the additional animal units that will be available for grazing, the net profit to the permittee, and the net public gain from increased livestock production. Also, if game populations are positively or negatively impacted by development of a livestock water, there can be an economic gain or loss from changes in hunting opportunity (Loomis et al., 1991).

To claim a wildlife benefit, a livestock water must be designed and managed to provide wildlife values. Livestock grazing can be compatible with good wildlife management, but it can also be adverse to wildlife without careful planning and management. If livestock grazing persists on public lands, it will be because ranchers and land managers have taken steps to insure that grazing is compatible with other public uses.

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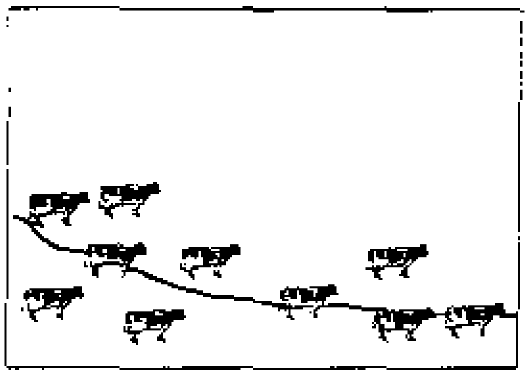
Figure 1. Graphic representation of possible effects of water development on livestock distribution. Line represents a stream. Oval represents a stockpond. See text for explanation of different livestock management scenarios and the potential impact to wildlife.



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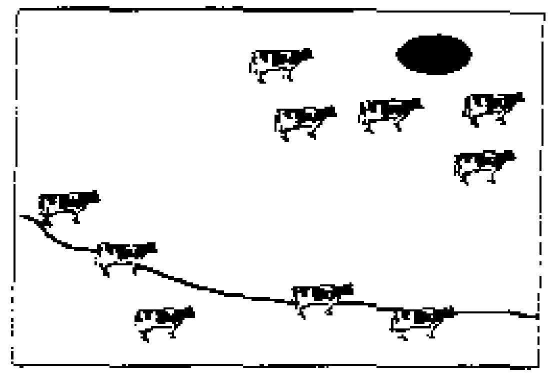

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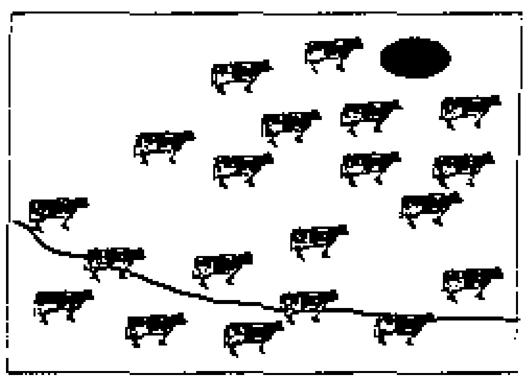

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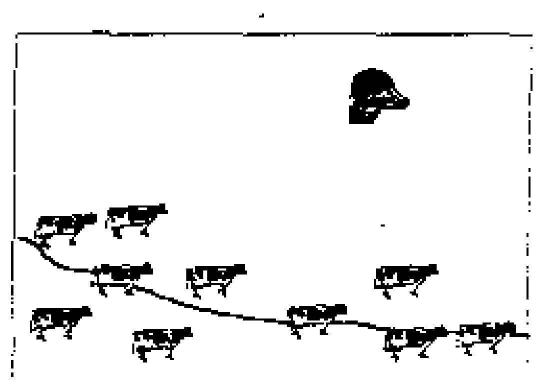

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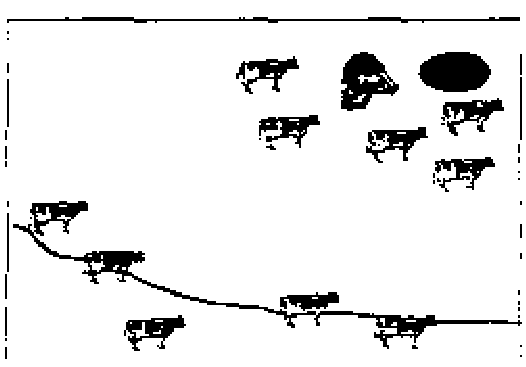

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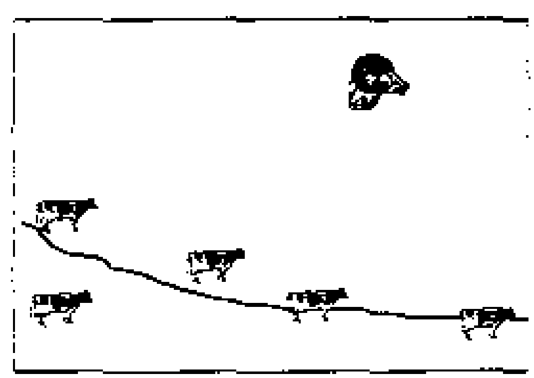

1.F.