the inspection, they had considered the possibility of fencing a portion of this creek bottom on an experimental basis. After the inspection, they discarded the fencing project because of the improved condition of the habitat. Mr. Kelley stated that he was pleased with the number of new aspen and willow seedlings, even though this was the pasture that was used heavily that year. He also stated that the gravel beds showed little sediment, and that he observed trout in almost every pool. The grass had been grazed to the water's edge in most cases, but this was to be expected. This pasture will go into rest next season, and the next season it will not be grazed until seed-ripe time.

It is my opinion that it is much too soon to abandon this management system.

In conjunction with this, I believe that every effort should be expended to develop off-stream watering facilities for both domestic livestock and wildlife. Springs should be fenced and many "wet" areas could be protected. Pipelines can be constructed to better distribute grazing animals.

In many areas, run-off ponds and tanks should be fenced to allow sufficient ground cover for nesting waterfowl. The water for domestic livestock could then be piped to water troughs. It is surprising how fast the wildlife will learn to drink from them.

The President recently signed the "Public Rangelands Improvement Act of 1978," now known as Public Law 95-514. This legislation was opposed by the BLM, the Forest Service, Office of Management and Budget, and by almost every conservation and wildlife group represented at this conference, as well as most wild horse protective groups. In spite of this opposition, the bill passed the house on an unanimous voice vote and cleared the Senate with only seven opposing votes. After the passage of the Act by Congress, several of the groups represented at this conference appealed to the White House to veto the measure. Under the leadership of Senator Church of Idaho and Representatives Udall and Roncalio, and with the support of the National Cattlemen, National Woolgrowers, and all major farm organizations, we were able to enlist the support of Secretary Andrus and obtain the signature of President Carter.

This law, among other things, provides for the expenditure of large sums of money for range improvements. It also provides that at least $10,000,000 annually shall be taken from the grazing fees for onsite range improvements, this money to be expended after consultation with the District Grazing Boards.

It is our hope that the people represented at this meeting will join with us in approving projects that have multiple-use benefits. Certainly, some projects will be more beneficial for livestock and some for wildlife and fisheries, but if we keep our lines of communication open I believe that we can find many projects that we can all support.

I have heard some people contend that livestock should be removed from our public lands. Some of them are present here today. The solution to our problems is not going to come from confrontation but from cooperation. Certainly, much research needs to be done. Most range scientists agree that our public lands are in the best condition they have been in this century. Most of the trends are up, or at least stable. Let us work together to improve and protect our environment, for, as Dr. Thomas stated: "It is, indeed, later than we think, sooner than we thought."

RIPARIAN AND STREAM ECOSYSTEMS, LIVESTOCK GRAZING, AND MULTIPLE-USE MANAGEMENT

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This symposium was organized to address the relationship of livestock grazing and stream and riparian ecosystem conditions in the Intermountain West. Most papers—including this one—will emphasize these ecosystems and their use as trout habitat. The problems generally attributed to this relationship include (1) vegetation deterioration in the riparian zone near the streams, (2) streambank destruction, (3) shallower and wider streams, (4) higher stream water temperature, (5) sediment-covered stream bottoms, (6) loss of trout spawning beds, and finally, (7) loss of trout.

There should be little doubt that unregulated livestock grazing in a pasture through which a trout stream flows can result in the above retrogressive process. But *livestock grazing does not have to result in these impacts to riparian and stream ecosystems or trout habitat. Also, it is not reasonable to conclude that livestock grazing is the only, nor necessarily the major, cause of these impacts.* The objectives of this paper are to discuss (1) trends of livestock grazing and other uses of western rangelands in which riparian and stream ecosystems and trout habitat occur; (2) implications of these use trends to past and present ecological condition of western riparian and stream ecosystems and trout habitat; and (3) range, livestock and multiple-use management approaches that might help improve and maintain desirable riparian and stream ecosystems and trout habitat conditions. This paper includes an appeal for multiple use rather than single-use "finger pointing," when appropriate, and true multiple-use management for most natural resource situations.

TRENDS IN AND IMPLICATIONS OF LIVESTOCK GRAZING USE OF WESTERN RANGELANDS

Accurate data of the kind and amount of grazing use that occurred on western rangelands prior to 1935 are scarce. However, historical descriptions of the period from early settlement to 1935 provide much useful information. Historical records indicate that large numbers of cattle and sheep grazed most areas of the "free range" (those lands not claimed by homesteaders and thus belonging to the "public") by 1880. This use was unregulated, and considerable damage to the plant and soil resources occurred.

Probably the poorest rangeland conditions—including riparian and stream ecosystems and trout habitats—occurred between 1885 and 1935. Esplin *et al.* (1928) described the situation found on many Utah rangelands presently included in the National Forest System:

> After about 1884 or 1885 there no longer were any unoccupied ranges, at least in central Utah. Sheep grazing developed a "tramp" aspect, as a result of which there was more or less frenzied struggle, especially for early spring ranges. Five or six years of unremitting competition on crowded ranges greatly reduced the vegetative cover. In regions where the intensity of overgrazing was cumulative, great areas of bare dusty hillside replaced previously well-covered forage areas. Spring freshets (floods) came with sudden and augmented volume. Heavy summer showers poured down the gullies and flooded neighboring farm lands, and even towns.

Reynolds (1911), Cannon (1931), Bailey *et al.* (1947), Berwick (1962), and Keck (1972) provide similar historical descriptions of western mountain watershed conditions at the turn of the century.

Much of the land presently managed by the Bureau of Land Management was also depleted by overgrazing, particularly between 1905 and 1934 when livestock no longer allowed on National Forest lands grazed the remaining free-use Public Domain. McArdle *et al.* (1936) provided this description of the lands that were assigned to the Grazing Service (now the Bureau of Land Management) with passage of the Taylor Grazing Act in 1934:

> The primary cause of forage depletion is poor management. For example, it is well known that the unreserved public domain has been treated as "free range," open to any number of livestock and subject to no regulations designed to maintain its productivity. As a consequence 84 percent of the public domain has lost more than half its forage value . . . and the entire area has been depleted an average of 67 percent . . .
>
> That drastic and immediate action is necessary on a large scale is indicated not only by the present deplorable condition of most of the western range but also in the present trends of forage depletion . . . It is estimated that fully 75 percent of the present range has declined in forage value during the past 25 or 30 years . . .

Privately owned lands did not escape deteriorating, though the free-use public lands probably suffered the most. Bentley (1898) provided the following description of the condition of privately owned land near Abilene, Texas:

> Men of every rank were eager to get into the cow business. In a short time every acre of grass was stocked beyond its fullest capacity. Thousands of cattle and sheep were crowded on the ranges when half the number was too many. The grasses were entirely consumed; their very roots were trampled into the dust and destroyed.

In all fairness to early livestock operators, it should be noted that poor farming, timber, and burning practices also contributed to poor range conditions, floods, and dust storms. The point of the above historical descriptions is not to damn the livestock industry, but rather to illustrate just how bad range conditions—including riparian and stream ecosystems and trout habitats—were, prior to 1935. *I personally cannot picture any more deteriorated riparian and stream ecosystem and trout habitat conditions than must have resulted from a mud-rock flow flood capable of covering towns and farmlands occurring in a mountain stream, or a dust storm blowing soil into a foothill or desert stream.*

The final result of the above-described deteriorated range conditions was public action. The Forest Service was created in 1905, the Grazing Service in 1934, and the Soil Conservation Service (to provide conservation assistance to private land owners) in 1935. Although range conditions on every acre have not improved to the level that many (including myself) would like, much progress has been made. For instance, management of the Forest Service between 1905 and 1935 resulted in 77 percent of the National Forest lands being classified in an improving trend (Table 1). Unfortunately, the Public Domain and private land show an even greater percentage in declining condition (Table 1). This latter situation occurred because animals no longer allowed to graze on National Forest lands grazed the Public Domain and private lands. Deterioration of lands presently managed by the Bureau of Land Management was probably greatest during the period 1905-1934. Beginning in 1935, improvement in range conditions similar to those indicated above for National Forest lands occurred on lands managed by the Bureau of Land Management (Table 2).

TABLE 1. Trends in range forage depletion from 1905 to 1935 (from Box, Dwyer, and Wagner, original source after U.S. Senate 1936)

	Percent of land, by trend class		
Land Control	Improved	Declined	Unchanged
National Forest	77	5	18
Public Domain	2	93	5
Private	10	85	5

Today most of our western range is in fair condition and is stabilized in that condition. Ecologically speaking, "fair condition" means a range area is producing from 26 to 50 percent of the kind of vegetation that would be found on the area if it were in excellent condition. Often the amount of plant production is equal to that of excellent-condition range, but the production is from a different mix of plants and the ability of fair-condition range to withstand environmental fluctuations such as drought is less than that of excellent condition. *But fair is far superior to*

TABLE 2. Forest Service and Bureau of Land Management percentages of lands in three condition classes (from Box, Dwyer, and Wagner, 1976)

Year	Percent, by condition class		
	Good or excellent	Fair	Poor or bad
1936[a]	16	26	58
1966[b]	18	49	33
1975[c]	17	50	33

[a]Original source of data adapted for U.S. Senate Document (1936). Moderate depletion was used to represent good condition; material depletion, fair condition; severe and extreme depletion, poor or bad condition.
[b]Original data source, Pacific Consultants (1968).
[c]U.S. Bureau of Land Management (1975b).

"denuded" in terms of livestock forage production, wildlife habitat, watershed condition, recreational opportunities, and riparian and stream ecosystem and trout habitat conditions.

Several factors have contributed to the improved federal range conditions, including (1) elimination of the tramp herds mentioned by Esplin *et al.* (1928), (2) assignment of allotments on which livestock grazing can be monitored, (3) general reduction of livestock grazing on Forest Service and Bureau of Land Management lands (Table 3), and (4) regulation of early spring grazing. I would conclude that range conditions are not as good as might be desired, but they are far better than the denuded, deteriorated conditions found throughout the west 40-70 years ago. This is also true for riparian and stream ecosystems and trout habitats.

TABLE 3. Animal-unit months (x 1,000) of forage consumed by livestock on U.S. Forest Service and Bureau of Land Management ranges at three time periods (from Box, Dwyer, and Wagner, 1976)

Year	Forest Service	Bureau of Land Management	Total
1935[a]	11,925	21,648	33,573
1966[b]	7,989	13,275	21,264
1972[c]	6,390	11,999	18,389

[a]Original source of data, U.S. Senate Document (1936).
[b]Original source of data, Pacific Consultants (1968).
[c]Original source of data, Council for Agricultural Science and Technology (1974).

Much can still be done to improve livestock management and range condition, but one of the most important factors is the time required for improvement. Senate Document 199, published by the U.S. Senate (1936), estimated it would take 100 years or more for the Public Domain range to recover to its pre-grazing condition. We have utilized 54 years of that time, and I believe we have made significant progress toward our goal of improved range conditions. I also believe that improved management of livestock has been largely responsible for that progress.

CRITICISM OF LIVESTOCK GRAZING CONTINUES

Despite the above information that I believe supports my opinion that domestic livestock grazing is generally properly managed, many reports have recently surfaced that indicate the opposite. For instance, the *Nevada Report* (Bureau of Land Management 1975a), *Public Rangelands Continue to Deteriorate* (Comptroller General 1977), *Nibbling Away of the West* (Miller 1972), and *Secretary Andrus Makes His Stand* (Miller 1978) all indicate that livestock grazing is as uncontrolled today as it was in the period 1880-1935. Each report bases this conclusion on a Bureau of Land Management (1975b) report that stresses that 32 percent of the federal range is in poor condition rather than that 68 percent is in fair or better condition (Table 2). In addition, the report emphasizes that 16 percent of the range is in declining condition rather than that 19 percent is improving and that 65 percent is static. You say, "big deal, that isn't good enough," and I agree, *but much of the 67 percent now in fair or better condition was in a poor, denuded, and deteriorated condition only 50 years ago. And almost all of the land now managed by the Bureau was in a declining trend in 1934.* That represents some progress.

Continued "single-use finger pointing" does not have a place in today's western rangeland management. What I mean by single-use finger pointing are such statements as one issued by the Office of the Comptroller General (1977):

> Deterioration can be attributed principally to poorly managed grazing by livestock—horses, cattle, sheep, and goats. Livestock have been permitted to graze on public rangelands year after year without adequate regard to the detrimental effect on range vegetation.

Also, a comment by Miller (1978) would seem to be single-use finger pointing:

> The results are visible today from Wyoming to Oregon to the Mexican border. Vast areas of the bare, gullied, cactus-and-sagebrush "desert" through which you drive for hours on end are actually not desert at all. Before the sheep and cattlemen came, much of this territory was a sea of waving grass from horizon to horizon—and would be today if the BLM had done its job. But livestock have been allowed to nibble the grass to its roots and then to trample the roots to dust and mud. Stripped of their protective matting, these man-made deserts have become easy prey to erosion, and today—almost half a century after the Interior Department was given the authority to prevent overgrazing—they continue to lose millions of tons of topsoil to the rivers of the West. Overgrazing, in fact, is the most widespread cause of environmental damage in America.

And finally, I classify comments included in a press release for this symposium as single-use finger pointing: "We've known for years that overgrazing by domestic sheep and cattle poses one of the greatest threats to our trout streams. It's time we did something about it." (Michael Owens, President of Trout Unlimited, personal communication, 1978).

I would not question any of those comments if they were directed toward a single area of land, because I agree that overgrazing still exists on some areas. I also fully agree that it should be one of our highest priorities to correct these situations. *What I question about the above comments is their all-inclusive nature. All rangeland is not overgrazed, all rangeland is not in poor condition, and all rangeland is not deteriorating.* I think that such comments do unnecessary harm to the western livestock industry, which has done much to correct abuses of the western land that occurred 50 or more years ago.

If data and observations indicate that deterioration is occurring on a specific area of range, in a specific riparian or stream ecosystem, or to a specific trout habitat, then we must look at all of the uses occurring, determine which uses are causing the deterioration, improve management of those uses, and correct the deterioration. *Proper management of all uses is the only answer.*

TRENDS IN AND IMPLICATIONS OF OTHER USE OF WESTERN RANGELANDS

As Table 3 indicates, livestock use on public lands is lower than it ever has been in this century. Likewise, in my opinion, control of the season of grazing use has never been better. Thus, resource managers must look more and more to range uses other than livestock as causes of range deterioration. Such uses and related ecosystem modifications that should be considered are off-road vehicles, hunting, fishing, boating, back-packing, improved roads and highways, improvised trails, and recreational housing. The trends of each of these uses is exactly opposite that of livestock grazing, which has declined in amount. *Each of these uses is at its highest level ever and is growing every year. And each of these uses has an impact on the environment.*

In relation to the topics of this symposium—riparian and stream ecosystems and trout habitats—Nash (1977) made the following comments about one kind of human activity occurring on streams:

> The recent rise of interest in river recreation must be seen against a background of fear of wild rivers as part of the uncontrolled wilderness. Revolutions in ideas, equipment, and technique paved the way for the transformation of river-running from a high-risk expedition to family fun. The future will see increasing competition for the recreational potential of rivers.

Settergren (1977) discussed the following ecosystem impact results to riparian and stream ecosystems from recreational activity:

1. Surface compaction and bulk density increased. The finer-textured soils display the greatest degree of compaction.
2. The greatest degree of soil compaction occurs immediately following the opening of a new area. Thereafter, surface-soil density stabilizes.
3. With surface-soil compaction and the reduction in protective ground-cover vegetation, sheet erosion, soil profile truncation, and root exposure often result.
4. Mechanical injury to most trees on heavily used areas is common.
5. Total elimination of trees in the younger age-classes, i.e., the seedlings and young saplings, may result from seedbed compaction and mechanical injury.
6. One of the first environmental indicators of heavy recreational impact is a reduction in the native ground-cover, both in amount and the number of species represented.
7. A number of investigators have observed that, following the first few seasons where the ground cover is reduced by recreation traffic to some low point, there is a recovery or adjustment in the vegetation ... There is a shift toward more recreation-tolerant species. However, the total number of species is reduced. Bluegrass *(Poa pratensis)* and path rush *(Juncus tenuis)* were the most commonly found species on heavily used areas along the Current and Jacks Fork Rivers in the Ozark National Scenic Riverways ... The rush is often an early indicator of heavy traffic along pathways. The grasses generally appear to be more resistant to trampling than the other, more herbaceous, ground-cover species.

An interesting aspect of the above-mentioned descriptions of environmental impacts resulting from recreational use of streams is that all of the impacts have at one time or another been attributed to livestock (Meehan and Platts 1978). The fact is that any use of rangelands or riparian ecosystems can cause the impacts described by Settergren (1977).

Fishermen walking along streams compact the soil, cause changes in the kind of vegetative cover, cause streambanks to cave-in and erode, and cause streams to become wider and shallower. Fishermen seldom, however, cause this retrogression process to continue to the point of eliminating trout because they tire of fishing poor, low-producing streams and move to another stream. But fishermen can have an impact.

Almost all campers prefer to camp near water. Campsites used for several days by one group, or use of the same site by different groups, cause all of the soil and vegetative changes mentioned above by Settergren (1977). If campers bring recreational vehicles or horses into the campsite the impact is likely to be much greater.

Off-road vehicle use has increased at a rapid rate since World War II. Anyone who has seen the tracks that one of these vehicles makes as its driver tries to climb a steep hill knows that these vehicles can have an impact on the environment. But few people realize the relationship of such activity to riparian and stream ecosystems and trout habitats. Basically, that relationship is one of the vehicle creating a bare track or rut on the side of a hill. Each of these ruts becomes a channel capable of concentrating surface flow and increasing its erosive power. Since all hills begin in a valley (often with a riparian and stream ecosystem present), any increased erosion resulting from off-road vehicle use ends up in the valley (and sooner or later in the stream).

Many off-road vehicle drivers never take their vehicles off of developed roads. In addition, many back-country roads are capable of being traveled in the family car, and the use of our rangelands for car-touring or car-sightseeing is increasing. Each car driving along a developed but unpaved back-country road causes its own mini-dust storm. How often have you been alerted that you were meeting another car on a mountain road by seeing a dust cloud before you see the car? The dust from each car settles on the road or surrounding vegetation, or in a stream if the road runs adjacent to a stream. This dust is then washed away by the next rainstorm and probably ends up in a stream.

The number of developed and improvised roads has greatly increased in most areas. Again, few people understand the relationship of roads to stream ecosystems and trout habitat conditions. The ditch that runs along a road is a long, linear conveyance system that picks up water and sediment throughout the length of the road. Such a system

carries a great amount of water following snowmelt or a thunderstorm because most of the water melting or falling on the road runs off. Because most ditches do not have a protective vegetative cover, the sediment load of this water is usually high. The ditches usually carry the water to some low point of the road and then release it through a culvert. This low point of release may well be adjacent to or directly into a stream. Thus, a stream ecosystem eventually collects most of the sediment generated by a road system.

In addition, the erosive power of water is concentrated by a culvert and a gully often forms. If you doubt this scenario, watch for an active gully the next time you travel a highway or improved back-country road. Chances are high that the gully will be downslope from the road and be caused by concentrated water released by a culvert. Once you have located a gully, look upslope from the road. Chances are good that a gully won't exist. Water concentrated by the road caused the gully. For me, this is adequate proof of the problems that road systems can cause to rangeland ecosystems.

Hopefully the historical descriptions, data, and arguments discussed above have convinced you that all rangeland uses (livestock, wildlife, off-road vehicles, fishermen, hunters, housing, roads, campers, backpackers) cause environmental impacts to the range environment. If we are to properly manage these lands and the riparian and stream ecosystems and trout habitats which occur throughout the West, we must address all of these uses. Hopefully range management (which by definition addresses all aspects of the range environment and not just livestock) can provide some answers.

MANAGEMENT PRACTICES TO IMPROVE RIPARIAN AND STREAM ECOSYSTEM AND TROUT HABITAT CONDITIONS

Range management has four principles that are based on the biological and ecological characteristics of the land. These principles are:

1. Utilize the range with the proper kinds of use. Each area of range has soil, vegetation, topographic, and climatic characteristics which makes it suitable for some uses but unsuitable for others. Range suitability for each active or proposed use should be evaluated, and management based on that evaluation.
2. Utilize the range at the proper intensity. Each area of range has a level of use that cannot be exceeded without causing deterioration of the land. However, an area can withstand some degree of soil compaction, vegetation harvest, and other use impacts with deterioration. The use intensity of concern to range management is the total of all uses on the area, not just the Animal-Unit-Months of livestock forage harvested.
3. Utilize the range during the proper season. Soils and plants—two basic range resources—are more susceptible to damage during certain times of the year; i.e., soils are susceptible to compaction during and following the wet season. Use that will cause significant seasonal impacts should be scheduled during other times of the year. This prevents deterioration and may free the range for non-impacting uses during the critical season, thus separating possible conflicting uses in time. Rest from use for a full year is an approach to managing the season of use.
4. Distribute use to all suitable areas of the range. Moving use from an area of concentration to an unused or underused area is one appropriate way to meet use demands while improving the range. Use of the new area must meet the requirements of the first three principles; i.e., proper kind, intensity, and season of use.

These are the tools that have been used to bring livestock grazing under control on most areas. Intensity of grazing use has been reduced, as is evidenced in Table 3. Less Animal-Unit-Months of forage are being harvested today from Forest Service and Bureau of Land Management lands than at any previous time in this century. Also, less domestic animals are on the range causing soil compaction.

Management of the season of use is a common range-management practice. One of the first management changes the Forest Service implemented was "deferred" grazing, which means that the range was rested until the plants had accumulated enough growth so that their production could keep ahead of the grazing demands of the livestock. The Bureau of Land Management, charged with managing large acreages of desert range used for winter (dormant season) grazing, often uses the same technique by requiring that livestock be removed before or shortly after the growing season begins.

Distribution has been improved on many ranges by the development of water or salt sources to draw animals to areas not normally used. Herding of animals is also a useful tool to distribute animals to unused or underused areas.

The one range-management principle that has not been used to the degree needed is management of the kind of animal. Economic considerations have prevailed and we have allowed cattle to replace sheep on millions of acres of range. And despite what you may think of sheep (often called "range maggots"), they have some major advantages in range management. Sheep, for instance, can be herded much more easily than cattle. They also have a greater ability to graze steep topography. Either of these animal-related characteristics would help reduce the impact of livestock grazing on riparian and stream ecosystems—(1) we can herd the animals "up the hill" away from these ecosystems, and (2) herders can allow the sheep to water only at one or two watering areas. Better management of the kind of grazing animal won't solve all livestock, riparian and stream ecosystem, and trout-habitat conflicts, but it will help in some areas.

Grazing systems such as continuous, rest-rotation, or deferred-rotation methods combine several of the four principles into a long-range, planned approach to management. The theory behind rest-rotation is to graze an area (possibly at a heavy intensity to force some use of all species and reduce successional changes), and then rest the area to allow the soil and plant resource to recover. This approach seems to work well when precipitation exceeds 15-20 in. per year and is predictably distributed. Both of

these requirements are necessary to insure that the rest period will result in soil and vegetation recovery.

Deserts don't meet these requirements, since they generally receive less than 8-10 in. of annual precipitation and it is not predictably distributed. Disturbance to desert range caused by a season of heavy grazing may not be repaired by a season of rest. Deserts are well suited to grazing, but I do not recommend that deserts be grazed in such a way as to remove more than 50 percent of the current year's growth. Local situations (kind of vegetation, season of use, soil type, and other uses) may dictate that utilization be less than 50 percent, but that must be determined on a situation-by-situation basis. The reason for such careful management of deserts is the long time-period needed for recovery; remember that the U.S. Senate (1936) predicted it would require 100 years for the lands presently managed by the Bureau of Land Management to recover.

Grazing systems are a tool of good range management, and one should be used when it fits the need. But a system must be specifically designed for the land on which it will be used. Textbook formulas don't work.

Fencing livestock away from streams is one approach to solving problems of livestock and riparian/stream ecosystems that has been applied on some areas and recommended on others. This would probably work *if* funds were available to construct ($2,500-$5,000 per mile) and maintain the fences ($25-$250 per mile per year). We should note that to fence a stream from livestock, fence must be constructed along *both sides* of the stream, so these costs must be doubled for every mile of stream fenced. These would be fencing costs in addition to those necessary for "regular" management of pastures or allotments (boundary or division fences).

However, imaginative management planning might make fencing a more inexpensive and reasonable approach to managing ecosystems. Figure 1-A illustrates the typical approach to fencing allotments and pastures. Assuming that this area is grazed and rested in a 2-year rotation pattern, note that when the pasture is grazed all of the riparian and stream zone is used by livestock. Likewise, when the area is rested, all of the riparian and stream zone is rested. If several miles of riparian and stream zone are included in the fenced area, I doubt that the 1 year of rest is sufficient time for trout habitats to improve and for trout to restock the area. Rather, I tend to believe that this rest-rotation grazing scheme is maintaining the range, the riparian and stream ecosystems, and the trout habitat in a stable condition, which may or may not be the desired condition.

Figure 1-B illustrates a fencing approach that I believe would improve the riparian and stream ecosystems and allow trout to increase, but would also cause alterations in allotment or pasture boundaries. The advantage of this fencing approach is that rested areas occur throughout the length of the stream. I am not a fish biologist, but diversity is the ecological "spice of life." The fencing scheme illustrated in Figure 1-B would provide both rested and grazed areas of riparian and stream ecosystem and trout habitat scattered throughout the pasture or allotment every year. I repeat—I am not a fishery biologist, but I believe that the fencing scheme illustrated in Figure 1-B should be evaluated as a livestock-fish management tool.

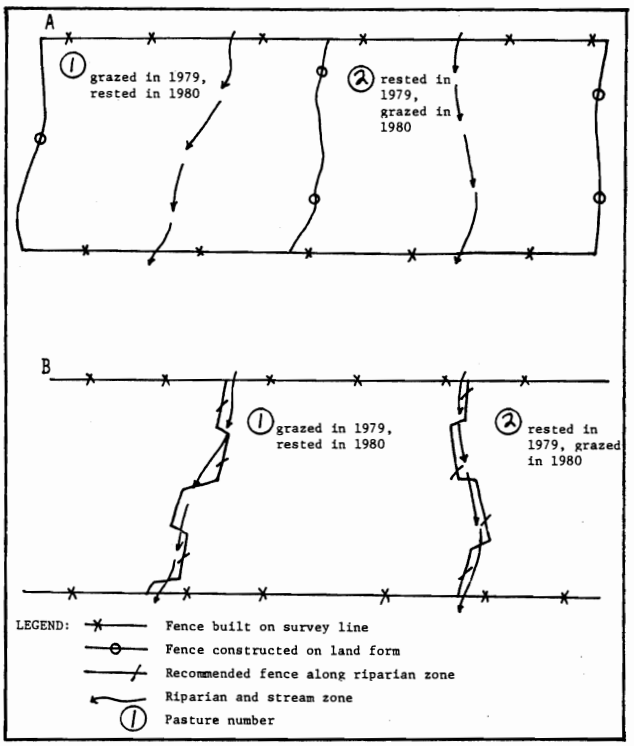

Figure 1. A (top)—Conventional arrangement of allotments or pasture boundaries based on survey lines or land forms; B (bottom)—Recommended arrangement of allotment or pasture boundaries based on the location of the riparian zone.

Livestock spend a considerable amount of time in the riparian zone of a pasture, seeking water, green feed, and possibly shade. Providing substitute sources of these animal needs away from the stream might reduce grazing and trampling use of the riparian zone.

Likewise, planting the riparian zone or streambanks with plants that would discourage livestock use (such as unpalatable or thorny species) might reduce the amount of time livestock could spend in the riparian zone.

None of the above management practices is applicable to all areas, nor are these practices restricted to livestock management. Control of the kinds, intensity, season, and distribution of other range uses can be achieved by applying some of the ideas discussed in this section. These and other innovative applications of traditional range-management practices can solve some of the multiple-use, riparian and stream ecosystems, and trout-habitat management problems. All that is needed is for all resource managers and users to work together.

SUMMARY AND RECOMMENDATIONS

I am sure this paper will be criticized because it reflects my professional opinions based on my training, reading, research, and experience. Other papers will reflect the opinions of their authors, and I may criticize them. But I believe that the only way we will ever solve any of the resource-management problems that were discussed at this symposium is to air our opinions for evaluation by others.

The major points of this presentation are: (1) poorly managed domestic livestock grazing between 1880 and

1935 caused considerable deterioration to most of the western range, (2) management by the Forest Service and Bureau of Land Management has improved much of the federal range to a fair or better condition, (3) most ranges are in a stabliized condition, (4) "single-issue finger pointing" continues to criticize livestock grazing as a detrimental range use, but a more reasonable approach would be to evaluate the impacts resulting from the sum of all uses occurring on an area, and (5) innovative application of traditional range-management practices might well provide solutions to problems presently considered "major conflicts."

My recommendations of needed actions include (1) complete inventory of all riparian and stream ecosystems and trout habitat conditions and trends, (2) classification of riparian and stream ecosystems and trout habitats in such a way that the high-quality resources can be identified and whatever management is needed can be applied, (3) increased coordination of resource-management activities among federal and state agencies and private landowners so all opportunities for compromises and trade-offs can be identified and accomplished, and finally, (4) interdisciplinary management programs to solve site-specific problems. Talk is great, but action solves problems.

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