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PUBLIC RANGELANDS

Some Riparian Areas Restored but Widespread Improvement Will Be Slow

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The Honorable Morris K. Udall
Chairman, Committee on Interior
and Insular Affairs

The Honorable Bruce Vento
Chairman, Subcommittee on National
Parks and Public Lands,
Committee on Interior and
Insular Affairs
House of Representatives

This report is in response to your request that we examine federal efforts to restore degraded riparian areas on public rangelands. The report discusses the progress achieved to date and the extent of the problem that remains. It also assesses constraints that will impede more widespread progress in the future.

Copies of this report are being sent to the Secretary of Agriculture; the Secretary of the Interior; the Director, Office of Management and Budget; and other interested parties.

This work was performed under the direction of James Duffus III, Associate Director. Other major contributors are listed in appendix IV.

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Executive Summary

Purpose

Riparian areas—the narrow bands of green vegetation along the banks of rivers and streams and around springs, bogs, lakes, and ponds—are widely recognized as crucial to the overall ecological health of western rangelands. However, many of them are in degraded condition, largely as a result of poorly managed livestock grazing.

In recognition of the need to improve the condition of riparian areas on public lands in the West, the Chairman of the House Committee on Interior and Insular Affairs, and the Chairman of its Subcommittee on National Parks and Public Lands asked GAO to determine (1) whether degraded riparian areas can be successfully restored, (2) how any successful restorations were achieved, (3) whether the techniques used can be applied to the restoration of other riparian areas, and (4) the extent of riparian areas still needing improvement.

Background

Riparian areas represent only about 1 percent of the more than 250 million acres of federally owned rangeland. The areas, however, have ecological importance far beyond their relatively small acreage because they have a greater quantity and diversity of plant species than adjoining land. They provide food, water, shade, and cover for fish and wildlife, and forage for both wild and domestic grazing animals. They remove sediment from the water flowing through them, act as sponges to hold water in streambanks to provide a higher water table and a more stable stream flow, and help dissipate the energy of flood waters. The riparian areas also provide many recreational opportunities.

Livestock tend to congregate in the riparian areas for extended periods, eat most of the vegetation, and trample the streambanks. Such consumptive use can eliminate the benefits provided by the riparian areas to other users.

The Department of the Interior's Bureau of Land Management (BLM) and the U.S. Department of Agriculture's Forest Service are the agencies primarily responsible for managing federal rangelands.

Results in Brief

Over the last 20 years, BLM and the Forest Service have restored a number of degraded riparian areas on public rangelands in the West. The successes, achieved primarily by improving livestock management, demonstrate dramatically the extent of improvement that is possible. They also demonstrate that there are no technical barriers to improving

riparian areas and that the basic restoration approaches used on successful projects can essentially be applied to all riparian areas on federal rangelands.

While successes have been achieved, their number is very small compared with the areas still needing restoration. The pace of restoring the large number of degraded riparian areas that remain is likely to be very slow for two reasons. First, the number of skilled staff available to plan, implement, and monitor riparian improvements has been substantially reduced in recent years. Second, many of the field staff responsible for riparian improvement work, primarily in BLM, do not believe their work will be supported by agency management if it is opposed by ranchers using the public rangelands.

Principal Findings

Limited Number of Areas Have Been Restored

GAO reviewed 22 riparian areas spread throughout 10 western states that had been restored by BLM and the Forest Service. Although specific approaches to restoring riparian areas varied with the characteristics of the land, GAO noted that the overriding factor in achieving success was improving the management of livestock to give the native vegetation more opportunity to grow. In some cases, fences were built to keep the livestock out of the area, either permanently or until the vegetation had recovered and streambanks were stabilized. In others, livestock continued to graze in the area, but their use was restricted by herding, or fences, or a combination of both to a shorter period of time, a specific season, or only part of the area.

Because livestock management is the key to restoring riparian areas, the ranchers holding permits to graze their livestock on federal rangelands play an important role in the restoration process. In this connection, GAO found that while an increasing number of ranchers are coming to accept the benefits healthy riparian areas provide their ranching operations, many continue to oppose restoration initiatives.

The projects GAO examined demonstrate that no major technical impediments need to be overcome in order to improve riparian areas. They also show, however, that successful restoration involves specific solutions that take into account the type of ranching operation and such characteristics of the area as temperature, rainfall, and soil type. Developing

the specific solutions, carrying them out, and monitoring the results require the knowledge and skills of specialists such as wildlife and fisheries biologists, hydrologists, range conservationists, and soil scientists.

The number of successes is small compared with the area still needing restoration. BLM and the Forest Service do not have complete inventories of the amount and condition of riparian habitat. While the agencies have plans to develop such inventories, the partial information now available shows that there are many thousands of miles of riparian areas and that only a very small portion of the total is in good condition. (See ch. 2.)

Barriers to Further Success

While recognizing the successes of the past, GAO believes that widespread repetition of the successful riparian area improvements is not likely in the foreseeable future for two primary reasons. First, while BLM and the Forest Service have issued policy statements that endorse restoration of riparian areas, both agencies—because of budgetary restrictions—have substantially reduced the number of skilled staff essential to carrying out these policies. Second, some of the field staff, especially at BLM, believe that if their proposed actions for restoring riparian areas are opposed by ranchers, managers will not support the field staff. Until these staffing and institutional barriers are overcome, the pace of riparian area improvements is likely to be slow.

With respect to personnel shortages, staff positions and funding for activities related to riparian improvements have been substantially reduced over the past 8 years. During this period, for example, nationwide staffing levels of BLM wildlife biologists and fisheries biologists were reduced by 34 and 54 percent, respectively. The Forest Service had a 15-percent nationwide reduction in riparian-related staff positions from 1982 to 1987.

GAO found that management support could also affect the extent of restoration. In this respect, the differences between BLM and the Forest Service are considerable. According to most of the Forest Service field staff GAO visited, essentially all levels of management are willing to support them in making difficult riparian management decisions. This was not the case at BLM, however, where many of the field staff believed agency management does not support them in implementing decisions that are opposed by local ranchers. These staff members recounted specific instances where their riparian improvement initiatives were subsequently undercut by BLM headquarters and local management responding to ranchers' objections. This perception could inhibit or discourage

field staff from taking the actions necessary to restore riparian areas in cases where they face an uncooperative rancher or when tough decisions, such as reducing the level of authorized grazing use, may be needed. (See ch. 3.)

Recommendations

BLM and the Forest Service should take several steps to enhance their riparian area improvement efforts, including establishing measurable goals for miles of riparian areas to be restored and measuring progress made toward those goals. (See ch. 4.)

Agency Comments

The Forest Service endorsed the report's findings and conclusions and said it would implement GAO's recommendations. BLM agreed with the recommendations in principle and said the report should help improve its management efforts. However, it raised two basic concerns about GAO's review methodology. First, BLM said that the report's conclusion that widespread riparian improvements are unlikely was based on personal opinion rather than quantitative analysis. Second, BLM expressed surprise that field staff perceived a lack of management support for riparian initiatives and suggested that this conclusion was based on anecdotal information rather than on a scientific survey of agency staff.

GAO believes that its methodology was sound and its conclusions appropriate. With respect to BLM's first concern, the report notes that BLM has not developed the comprehensive inventories of riparian areas that would be necessary to perform the complex quantitative analysis it suggests. However, GAO's review of available partial inventories and staffing trends, its visits to many restored and degraded riparian areas, and its interviews with dozens of experienced BLM experts in the field makes it clear that an enormous amount of work remains to be done.

With respect to the second concern, GAO visited BLM installations in 10 states and conducted interviews with dozens of BLM staff. The depth and breadth of the opinions expressed to GAO indicates that the perception GAO reported is widespread. The views expressed were also consistent with those reported in a 1987 BLM study of its wildlife and fisheries biologists. (See ch. 4 and apps. II and III.)

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Abbreviations

AUM	animal unit month
BLM	Bureau of Land Management
GAO	U.S. General Accounting Office

Introduction

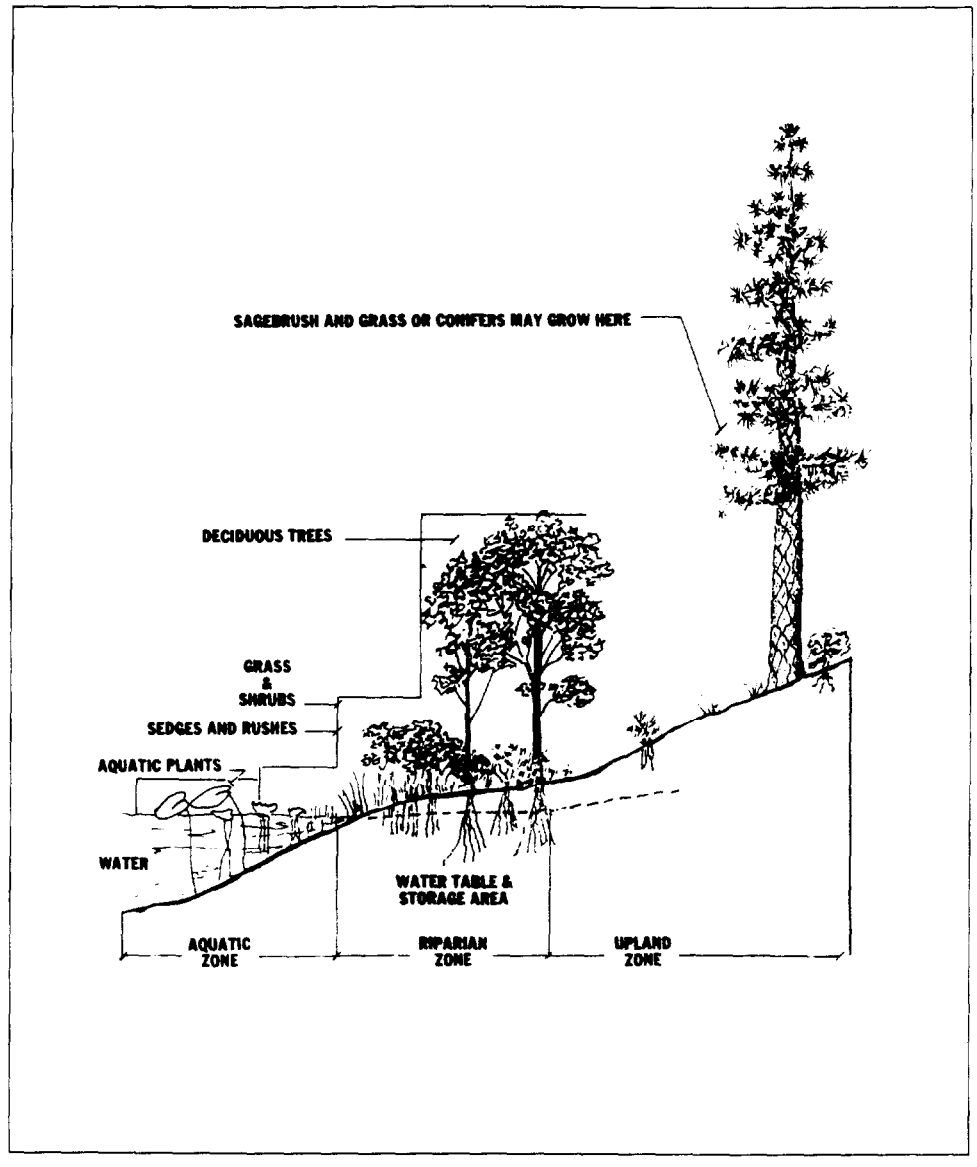
While scientific records on the condition of western rangelands in the early 1800s are not available, historical accounts suggest that much of the range was made up of productive, nutritious grasses that at the time were free for the taking. Recognizing the opportunities afforded by this apparent abundance, livestock growers brought herds of cattle and sheep in uncontrolled numbers to the public lands in the West. Some nineteenth century observers such as John Wesley Powell warned that, because of the arid climate, this rangeland was actually quite fragile and incapable of supporting excessive livestock grazing without severe damage. By the late 1880s, however, about 19 million cattle and sheep were grazing in the arid West. The resulting overgrazing, together with periodic droughts, permanently changed the face of these rangelands. By the early 1900s much of the once productive lands had been reduced to a desert-like state.

Since this period of rapid deterioration, the overall condition of western rangeland has stabilized and, in places, improved. One part of the rangeland, however—the riparian areas adjoining rivers and streams—has not fared as well. These areas, now widely recognized as crucial to the overall ecological health of the range, remain largely in degraded condition.

Significance of Riparian Areas

Riparian areas are the narrow bands of green vegetation along the banks of rivers and streams and around springs, bogs, lakes, and ponds. As figures 1.1 and 1.2 illustrate, a riparian zone is characterized by grasses, woody shrubs, trees, and other vegetation. According to estimates prepared by the two agencies primarily responsible for this federal land—the Bureau of Land Management (BLM) in the Department of the Interior and the Forest Service in the U.S. Department of Agriculture—riparian areas represent only about 1 percent of the more than 250 million acres of federally owned rangeland.

Figure 1.1: Drawing of Riparian Area



Source: Oregon Watershed Improvement Coalition.

Figure 1.2: Photograph of Riparian Area

Source: BLM

The areas, however, have ecological importance far beyond their relatively small acreage. They have a greater quantity and diversity of vegetation than adjoining land. These areas remove sediment from water as it moves through the vegetation, thus helping to purify the water and enrich the riparian zone. They also act as sponges by holding water in streambanks, thereby raising the water table in the surrounding area and providing a more stable stream flow. During floods, healthy riparian areas dissipate the energy of flood waters and reduce the flood peaks. Riparian areas provide food, water, shade, and cover for fish and wildlife, and forage for both wild and domestic grazing animals, as well as recreational opportunities.

Because of their importance to many users, riparian areas have sometimes become battlegrounds with livestock grazers on one side and conservation groups on the other. Ranchers use the riparian areas to provide water, shade, and forage for their livestock. However, since the riparian areas typically offer more plentiful vegetation than surrounding dry areas, the livestock tend to congregate in the riparian areas for extended periods. During these extended stays, they eat virtually all the grassy and young woody vegetation, and trample the streambanks.

Conservationists point out that such consumptive use can eliminate the value of and benefits provided by the riparian areas to other users.

Although the presence of water makes riparian zones more resilient than drier upland areas, livestock overgrazing can inflict severe and long-lasting damage. When trampled and stripped of vegetation, streambanks become highly susceptible to erosion. Such erosion reduces the banks' water retention capabilities, thereby lowering surrounding water tables, and often changes the whole character of the streams from perennially flowing to intermittent water courses that dry up in the summer months. When such streams do flow, they are often broad, shallow, and lacking in plant cover. In this condition, they are incapable of supporting many fish and wildlife species. Further, degraded areas will not adequately trap sediments during high runoff periods. As a result, silt is carried downstream where it can begin to fill up and reduce the capacity of reservoirs.

Although other activities such as mining, logging, road building, and off-road vehicle use can adversely affect riparian habitat, this report only addresses the effects that livestock grazing can have on riparian areas. Agency officials we contacted during the review and many studies on the subject indicate that poorly managed livestock grazing is the major cause of degraded riparian habitat on federal rangelands.

Managing Livestock on Federal Rangelands

Livestock grazing on federal rangelands is carried out under the authority of several laws that require BLM and the Forest Service to take into account the multiple uses of the land and, through their land use planning and management actions, provide for its continued productivity. For example:

- In the Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901), a law applicable to both agencies, the Congress states that it is establishing and reaffirming a national policy and commitment to manage, maintain, and improve the condition of the public rangelands so that they become as productive as possible for all rangeland values.
- The Federal Land Policy and Management Act of 1976 (43 U.S.C. 1712 and 1732) requires the Secretary of the Interior to develop, maintain, and revise land use plans for the public lands that use and observe the principles of multiple use and sustained yield.
- The Forest and Rangeland Renewable Resources Planning Act of 1974 (16 U.S.C. 1604) requires the Secretary of Agriculture to develop, maintain, and revise land and resource management plans for the national forests that provide for multiple-use and sustained-yield of the forests' products and services.

In addition to preparing the large-scale planning documents required by these acts, the agencies prepare permits and management plans that define how livestock grazing will be carried out on each grazing allotment.

Federal rangelands are divided into about 31,000 grazing allotments that average about 8,500 acres each. Grazing is allowed in an allotment with a permit issued to one or more permittees and is carried out under the conditions agreed to by the permittee and the agency.[1] In this regard, permits specify the number and type of livestock allowed, the time and duration of use, and the amount of forage to be eaten. Permits are valid for up to 10 years, and may be altered or suspended by the agency if range conditions are being degraded. The agencies collect a fee of $1.54 per animal unit month (AUM) from the permittees. An AUM is generally defined as the amount of forage needed to support a 1,000-pound cow or five sheep for 1 month. The agencies generally consider this to be between 800 to 1,000 pounds of forage.

The number of acres of rangeland required to provide 1 AUM varies from one area to another, but BLM's New Mexico State Office has estimated that, on average, 13.7 acres is required to support one animal for 1 month for all public lands within BLM grazing districts in the West. The estimates range from 6.1 acres in Montana to 21.8 acres in Nevada.

In consultation with the permittees, the agencies have also prepared individual allotment management plans for many of the grazing allotments. In addition to the basic conditions covered in the grazing permits, the allotment management plans describe in more detail how the grazing operations will be conducted in order to meet the multiple-use, sustained-yield, economic, and other objectives that the agencies wish to achieve on the land, such as forage production, fish and wildlife, watershed, and recreation. The plans also describe any range improvements, such as fences, water developments, and wildlife habitat structures, that are to be installed on the lands to meet the management objectives, and they define responsibility for construction and maintenance of such improvements.

The agencies' policies and procedures require them to update the plans periodically to meet overall management objectives. BLM and the Forest

[1] Use of BLM's rangeland is authorized by grazing leases under Section 15 of the Taylor Grazing Act (43 U.S.C. 315m) and by grazing permits under Section 3 of the act (43 U.S.C. 315b). For simplicity, we will use "permit" to describe both documents and "permittees" to describe the user of the grazing allotment whether it is leased or permitted.

Service are also required to monitor the performance of the permittees in carrying out the provisions of the permits and allotment management plans. The agencies and the permittees enter into an annual agreement that specifies the times of use, livestock numbers, and any changes needed to update the permit or allotment management plan.

The latest agency range management statistics available are for fiscal year 1986. Interior's "Public Land Statistics" showed that BLM had about 163 million acres in grazing permits or leases in 16 western states. About 20,000 operators were grazing about 4 million head of livestock under these permits and leases. They made use of about 10.5 million AUMs. Some of BLM's lands are interspersed with private lands in section-sized areas. This results in a "checkerboard" pattern that makes land management decisions especially difficult. The "Chief's Report" stated that the Forest Service had about 102 million acres in 10,387 range allotments in 36 states. The Forest Service administered 13,805 permits, and actual forage use was 8.6 million AUMs.

The U.S. Department of Agriculture estimated that federal lands produce 13 percent of the total AUMs of grazing nationwide. The Congressional Research Service estimated that in the West these lands supply about 17 percent of all livestock forage. Grazing on federal lands is generally seasonal and is integrated with grazing and feeding on private lands during part of the year to provide year-long forage. But in some areas, primarily in the desert southwest, grazing on federal lands is year-long.

Objectives, Scope, and Methodology

In recognition of the need to improve the condition of riparian areas on public lands in the West, the Chairman of the House Committee on Interior and Insular Affairs and the Chairman of its Subcommittee on National Parks and Public Lands asked us on October 25, 1986,[2] to

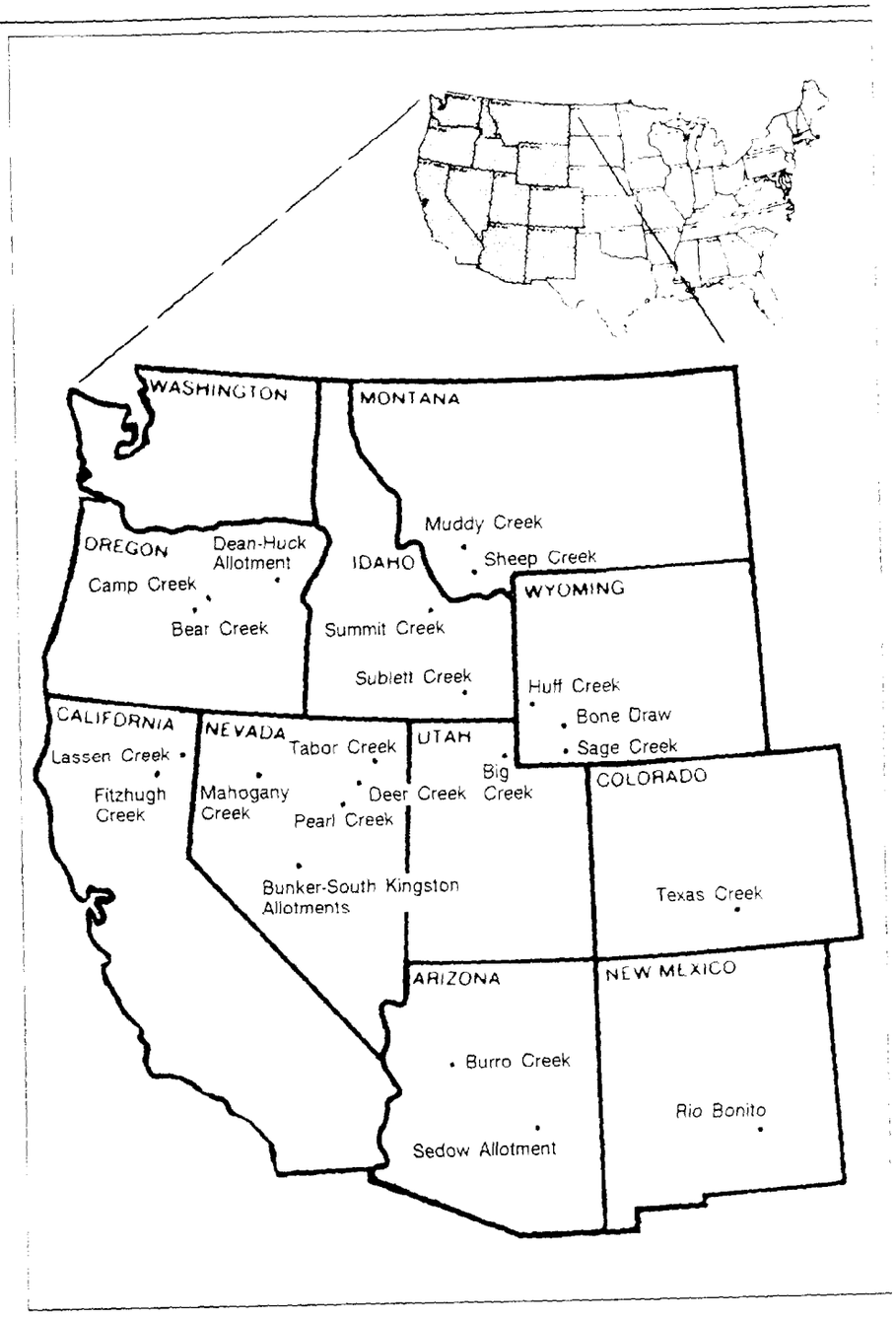
- identify specific examples of successful efforts to restore degraded riparian areas on public rangelands in the West;
- determine why these efforts are successful; and
- decide whether the management techniques used on these successful efforts can be applied to the restoration of riparian areas throughout the West.

[2]Concurrent with this request, the chairmen asked us to conduct a broad study on the overall condition of public rangelands. We are reporting separately on that request.

To help place such improvement efforts in perspective, we also subsequently agreed with the chairmen's offices to develop information on the scope of riparian areas needing improvement.

To address the first question, we identified successful riparian restoration efforts on BLM and Forest Service lands in the 10 western states shown in figure 1.3. We first requested lists of successful riparian management projects from BLM and Forest Service headquarters. They provided us with lists of 23 BLM and 12 Forest Service projects representing most of the projects underway. From the lists we selected 11 BLM and 4 Forest Service projects for detailed review. We also reviewed 6 additional BLM projects and 1 Forest Service project that agency staff brought to our attention during our field work, for a total of 22 projects. We selected projects that were spread throughout the 10 western states to include a wide range of climatic and geographic conditions and to illustrate several different techniques of riparian management.

Figure 1.3: Areas Covered in GAO Review



Source GAO from agency data

In responding to the second question—why the riparian restoration efforts were successful—we discussed the subject with a number of groups and individuals, including the following:

- BLM and Forest Service officials responsible for riparian management at their Washington, D.C., headquarters, and at 10 BLM state offices, 12 BLM district offices, 4 Forest Service regional offices, and 5 national forests;
- officials of 10 state cattlemen's associations;
- officials of the National Cattlemen's Association and the Public Lands Council;
- several environmental groups with an interest in the subject;
- a number of individual permittees affected by federal agency riparian restoration work; and
- several persons involved in research on riparian area management.

We also reviewed applicable BLM and Forest Service regulations, policies, and procedures for riparian management, and agency files and plans concerning riparian management in general, as well as those specifically related to the 22 projects we reviewed in detail. We also visited each of the examples of riparian restoration discussed in this report, as well as several other areas of federal rangeland.

With respect to the third question—the applicability of management techniques used in successful restoration efforts to the restoration of other riparian areas—we obtained the views of the BLM and Forest Service officials responsible for the successful riparian restoration projects, a number of permittees who were involved in the projects, and some individuals involved in research on the subject.

Concerning the scope of riparian areas needing improvement, we reviewed many studies and technical articles, and also asked BLM and Forest Service headquarters for information on this subject. However, we found that agencywide data on the amount of riparian areas and their condition were not available. Therefore, we obtained, whenever available, estimates of the amount and condition of riparian habitat on their lands from each agency location we visited. This information is also incomplete, as field offices generally do not have complete inventories of the riparian areas.

We obtained official comments on a draft of this report from the Forest Service and BLM. Their comments are included as appendixes II and III.

Our review was performed between February 1987 and January 1988 and was conducted in accordance with generally accepted government auditing standards.

Limited Number of Riparian Areas Have Been Restored

Damaged riparian areas can be restored. We found examples of successful restoration in a wide variety of locations administered by BLM and the Forest Service. The two agencies approached their riparian restoration efforts differently, but all the projects we reviewed shared the same basic technique—limiting the access of livestock to riparian areas. In some cases, for example, the area was fenced off; in others, the number of livestock was limited or their grazing was restricted to certain periods of the year. The projects we examined demonstrate that no major scientific or technical impediments need to be overcome in order to improve riparian areas. They also show, however, that no single solution is applicable to all sites. Rather, successful restoration involves specific solutions that take into account the type of ranching operation and such characteristics of the area as temperature, rainfall, and soil type.

While successes have been achieved, their number is small compared with the area still needing restoration. BLM and the Forest Service do not have complete inventories of the amount and condition of riparian habitat, but the partial information that is available shows that there are many thousands of miles of riparian areas that need restoration.

Examples of Successful Projects

BLM and the Forest Service have been able to dramatically restore a number of degraded riparian areas on public rangelands. The successes have been achieved largely as a result of the extraordinary personal commitment of individual BLM and Forest Service employees, often assisted by unpaid volunteers, serving at the project sites. In total, the projects demonstrate that with proper attention even severely damaged riparian areas can be brought back to life to provide more forage for livestock, better habitat for wildlife, and other watershed and recreational values. The 22 riparian restoration efforts that we reviewed in detail and the major actions taken by the agencies and the permittees are shown in table 2.1.

We discuss in this chapter the actions taken by the agencies and the permittees and the results of those actions for seven of the riparian restoration efforts we reviewed. We discuss these examples here because we believe they demonstrate the direct effect of management actions on the restoration of riparian areas, and because the agencies had maintained complete records of the areas' condition before and after the restoration. The remaining 15 projects we reviewed in detail are discussed in appendix I.

Table 2.1: Riparian Restoration Areas Reviewed in Detail

Riparian area	State	Major actions taken
BLM		
Burro Creek	Arizona	Livestock herded periodically. Fenced riparian areas and uplands into pastures. Planted trees.
Fitzhugh Creek	California	Fenced. Riprap[a] banks. In-stream structures. Planted trees and shrubs.
Texas Creek[b]	Colorado	Fenced. Livestock herded. Riprap banks. In-stream structures. Trees planted.
Summit Creek	Idaho	Fenced.
Muddy Creek	Montana	Fenced. Riprap banks. Livestock herded. Trees planted. In-stream structures.
Sheep Creek	Montana	Livestock herded periodically. Built additional pasture fences.
Deer Creek[b]	Nevada	Fenced. In-stream structures.
Mahogany Creek[b]	Nevada	Fenced. In-stream structures.
Pearl Creek	Nevada	Fenced.
Tabor Creek	Nevada	Partial enclosure fences. Partial livestock herding.
Rio Bonito	New Mexico	Fenced.
Bear Creek[b]	Oregon	Fenced until vegetation restored. Then livestock herding. Riprap banks with juniper.
Camp Creek	Oregon	Fenced. Planted grasses and trees.
Big Creek	Utah	Fenced. Planted trees. In-stream structures.
Bone Draw	Wyoming	Fenced. In-stream structures.
Huff Creek[b]	Wyoming	Fenced. In-stream structures. Riprap banks. Livestock herding.
Sage Creek	Wyoming	Beaver dams. Planted grass and other aquatic plants.
Forest Service		
Sedow Allotment[b]	Arizona	Reduced livestock numbers. Livestock herding. Pasture fences. Water developments.
Lassen Creek	California	Small test area fenced. Riprap banks with juniper and rock. In-stream structures. Planted trees. Stabilized eroded terraces and gullies in uplands.
Sublett Creek	Idaho	Changed time of grazing. Livestock herding. Extensive water developments in uplands—pumping station, pipeline, storage tank, troughs. Drift fences. In-stream structures. Bank protection. Brush control in uplands.
Bunker and South Kingston Allotments	Nevada	Changed from cattle to Kingston Allotments mostly sheep allotment. Planted grass.
Dean-Huck Allotment[b]	Oregon	Changed time of grazing. Livestock herding.

[a]A riprap structure is a foundation of stones piled on the bank to prevent erosion.

[b]Projects discussed in this chapter.

Source: GAO analysis based on BLM and Forest Service files.

Texas Creek, Colorado

Texas Creek flows through about 25 miles of BLM, Forest Service, and private land in south-central Colorado. In 1977, BLM began a riparian enhancement project along about 1/2-mile of the creek. The creek's riparian areas were in poor condition—they had unstable banks and a declining brown trout population, which local BLM officials said stemmed from unrestricted livestock grazing.

BLM divided the project's 20 acres into three equal segments, each with a different combination of livestock management techniques and structural changes. Segment 1 had a deferred livestock grazing program with no structural improvements. Segment 2 excluded livestock entirely and added intensive structural treatments. Segment 3 excluded livestock and had no structural improvements. BLM spent about $42,000 for the project.

All three segments improved between 1977 and 1987, but not to an equal degree. Segment 2 improved the most, going from a habitat rating of poor to a rating of excellent, and from 13 brown trout per 500 feet to 71 per 500 feet. Segment 1 improved from a rating of poor to a rating of good, and segment 3 improved from poor to fair. Trout population in segments 1 and 3 more than tripled. Figures 2.1 and 2.2 show the improvements.

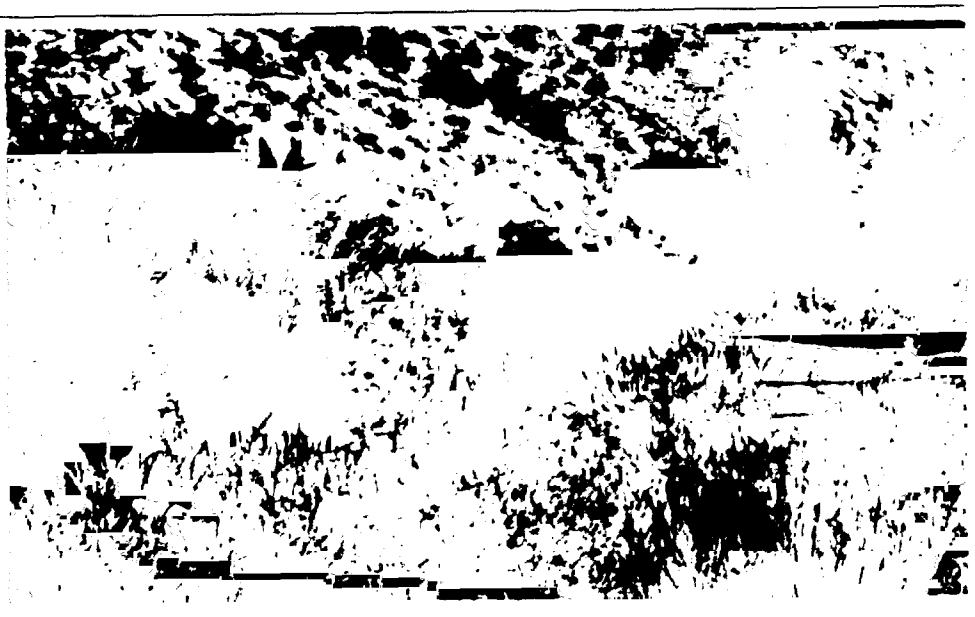
The study concluded that enhancement of riparian habitat can occur by implementing any of the three manipulated factors: managed/deferred livestock grazing, protective fencing, and habitat treatments. The study also concluded that successful solutions depend on the particular situation. In many cases, effectively managing the cattle may do as much as removing them completely from the area.

We visited the project in July 1987 and discussed it with BLM officials. They stated that initially it was difficult to gain permittee cooperation on the project. In 1981 a new permittee took over the area and has been cooperative because (1) AUMs were not reduced on the allotment, (2) forage and water is available in the uplands, and (3) the permittee has no real need to graze cattle in the project area.

Figure 2.1: Texas Creek in 1976 Before Start of Riparian Management

Source: BLM.

Figure 2.2: Texas Creek in 1987 With Riparian Management



Note: Increased water flow is obscured by dense vegetation
Source: GAO

Deer Creek (West Fork), Nevada

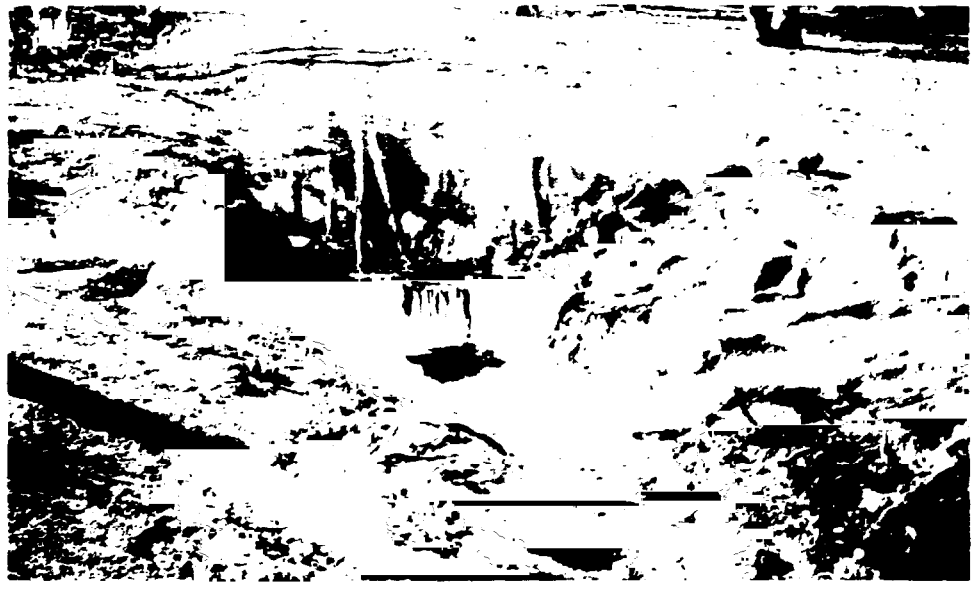
The West Fork of Deer Creek is a 7.8-mile stream on BLM and private land in northeastern Nevada. Officials in BLM's Elko District, which includes Deer Creek, surveyed the district's 118 streams and found that over 80 percent of the 1,036 miles inventoried were in poor or fair condition. BLM considered the West Fork of Deer Creek to be representative of these streams. In 1977, BLM began a study to determine the effects of fencing and structural improvements on the creek's riparian habitat.

BLM noted that the stream was important because it (1) provided new habitat for the Lahontan cutthroat trout, a fish on the federal government's threatened and endangered species list, (2) encompassed an area that provided habitat for a wide variety of birds and terrestrial wildlife, and (3) had the potential for providing a sport fishery. Deer Creek's deteriorated conditions were demonstrated by a lack of pools for fish habitat, depleted vegetation, unstable streambanks, and high summer water temperatures caused by low flows and lack of plant cover.

BLM fenced off 0.6 miles of the stream. In this section it added rock structures to deepen fish pools. Cattle were kept out of the fenced-off portion but were allowed to graze along the rest of the stream as before. As shown in figures 2.3 and 2.4, the Creek's condition improved dramatically after several years of rest from cattle grazing. By November 1981, BLM found the fenced-in portion of the creek had improved from poor to excellent condition, while the grazed areas outside the fence remained unchanged and in poor condition. Officials said the improvements significantly increased fish habitat, stabilized banks, decreased sedimentation, decreased summer water temperatures, and helped provide the Lahontan trout protection from severe winter conditions.

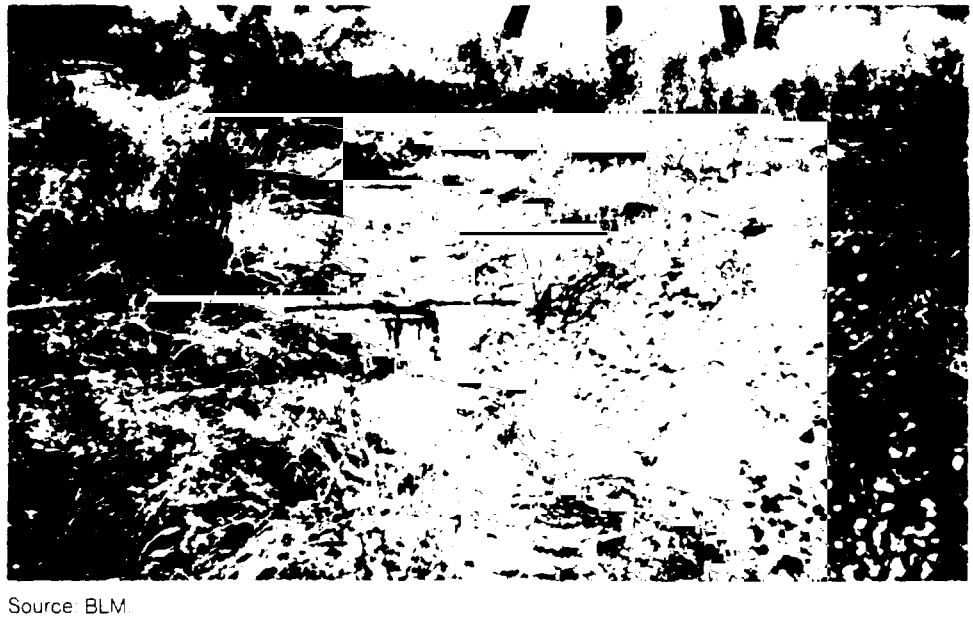
We visited the project with BLM officials in October 1987. They said the project cost about $12,400 to implement in 1977. In addition, the permittee, while not totally cooperative at the start, did not greatly object because his AUMs were not reduced and because BLM performed all maintenance on the fence. We noted that, based on available photographs of the area and discussions with the BLM officials, the project area had improved considerably even since 1981. The area is now characterized by dense tree and shrub growth that cover a deep, flowing stream.

Figure 2.3: Deer Creek (West Fork) **in 1977 Before Start of Riparian Management**



Source: BLM.

Figure 2.4: Deer Creek (West Fork) **in 1979 With Riparian Management**



Source: BLM.

Mahogany Creek, Nevada

Mahogany Creek flows through about 7 miles of BLM and Indian reservation land in northern Nevada. The watershed contains habitat for many species, but the area's primary value is as habitat for the Lahontan cutthroat trout. Mahogany Creek is one of only two areas where the trout naturally reproduce. The allotment encompassing Mahogany Creek had been grazed heavily for about 70 years. In 1974, BLM started a demonstration project, but between 1974 and 1976 a large amount of trespass grazing occurred in the project area. Therefore, in October 1976, during a period when the allotment was between permittees, BLM fenced most of the creek and much of the watershed to exclude livestock.

In 1976, BLM established study areas in the watershed to determine the effects of livestock exclusion on both the fish habitat and tree regeneration. In 1978, BLM's initial analyses of the project indicated that a number of habitat considerations had improved up to 27 percent over the 2-year period, including stream cover (shade), bank stability, spawning areas, and general vegetative growth and diversity. At that time, BLM concluded that significant riparian habitat improvements were made only after complete removal of livestock through fencing.

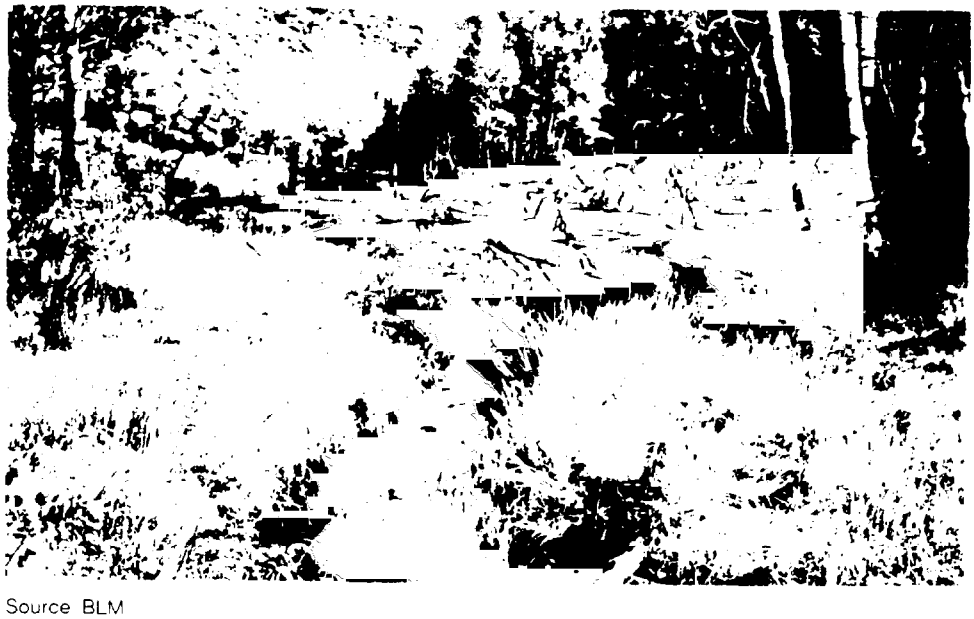
BLM again analyzed the effects of the project in 1986. At that time, BLM concluded that over the 10-year period (1) stream flow increased by 400 percent; (2) average stream depth increased by 50 percent; (3) the stream bottom improved significantly; and (4) some of the habitat improvement in the area could be attributed to placing structures, such as gabions and weirs, in the stream as well as to the effects of cattle exclusion.

We observed the Mahogany Creek project with BLM officials in May 1987. We found that, compared with pre-project pictures of the area, the improvements were dramatic. Areas that had been stripped of vegetation and contained old, decaying aspen trees were replaced with a relative abundance of different grasses and a major regeneration of aspen. The stream banks were stable, and the water flowed fast and deep. The BLM officials stated that, more importantly, the threatened trout had staged a significant recovery in the stream as a direct result of the cattle exclosure. In fact, we observed about a dozen large trout in one small stretch of the stream. Figures 2.5 and 2.6 show the improvements to the riparian area.

Figure 2.5: Mahogany Creek in 1975 Before Start of Riparian Management

Source: BLM.

Figure 2.6: Mahogany Creek in 1985 With Riparian Management



Source: BLM

Bear Creek, Oregon

Bear Creek flows over 26 miles on BLM, Forest Service, and private land in central Oregon. In 1976, BLM established 5.5 miles of Bear Creek as a riparian improvement demonstration project. At that time, the creek's riparian areas were heavily overgrazed, causing the creek to dry up in the summer.

During the first few years of the project, BLM excluded livestock grazing by fencing off the area. By 1982, vegetation was better established. BLM and the permittee then jointly proposed reintroducing cattle to the area under a system in which cattle would be managed and allowed to graze the area in short-term intervals. The new cattle management system proved successful: the riparian area continued its steady major improvement, and the permittee stated that he cut his yearly feed costs by $10,000 as his AUMs were eventually increased to 313 in 1987—a level four times higher than before the project began.

We visited Bear Creek and discussed the project with BLM officials and the permittee in May 1987. The improvements, as figures 2.7 and 2.8 help show, include (1) streambanks stabilized by vegetation; (2) a stream channel narrowed and deepened; and (3) well-established vegetation with increased grass, willow, and other species. The permittee stated that while he was initially skeptical about the project, the benefits are readily apparent. He said the benefits to him include a more than fourfold increase in AUMs, a year-long water supply on the creek, and a healthier, heavier herd because it spends less time grazing in the riparian area and more time in the uplands where the forage has a lower water content and more feed value.

The BLM official who managed the project said other benefits included increased wildlife, a trout fishery that had not existed for generations, cleaner water in the stream all year, and the riparian area's improved ability to capture sediment during high flows. For example, he documented that during a recent major flood on the creek the improved riparian area vegetation essentially "captured" about 24,000 cubic yards of sediment, which helped rebuild the banks of the creek. If the sediment had not been captured, it would have continued downstream, decreasing the capacity of a federal reservoir.

Figure 2.7: Bear Creek in 1976 Before Start of Riparian Management

Source: BLM.

Figure 2.8: Bear Creek in 1986 With Riparian Management

Source: BLM.

Huff Creek, Wyoming

Huff Creek is located in western Wyoming, where it forms part of the Thomas Fork drainage of the Bear River. The stream is about 5.5 miles long, about 3.85 miles of which is on public land. When the restoration project began, Bear River cutthroat trout, a rare species, inhabited the Thomas Fork drainage, but in dwindling numbers. The Wyoming Game and Fish Department estimated that the trout population had dropped from 222 per mile in 1958 to 93 per mile by 1978. A BLM study showed that excessive livestock grazing and herbicide use had degraded the trout's habitat.

Together with the Wyoming Game and Fish Department, BLM began work on a habitat management plan for the Thomas Fork Drainage in 1976. On Huff Creek, a 2-acre fenced study area was started in 1976, and a larger 1.3-mile (38-acre) area was started in 1979. In the larger area, structures of rock, wood, and wire were placed in the stream to raise the water table, alter the stream flow, and create pools. Rock rip-rap was placed on the banks to stop erosion. The Wyoming Game and Fish Department estimated that these efforts cost about $21,000.

The project required the cooperation of the permittee, the Smith's Fork Grazing Association. The Association agreed to defer grazing of cattle along all of Huff Creek until August each year and employed a range rider to control the herd to reduce grazing in its riparian area.

As a result of these actions, the trout habitat improved in several ways. A 1986 Wyoming study concluded that fish food had improved, cover for trout had increased by 214 percent, the amount of pool area increased markedly, bank stability was better at all but one site, and the average trout population had increased 377 percent, to 444 trout per mile in 1984. The study noted that careful control of the cattle herd by the permittee and its range rider was essential for success. When we visited the site in August 1987, BLM officials told us that the range rider's efforts had improved the riparian vegetation and stream bank stability along the whole length of the stream. Figure 2.9 demonstrates the importance and value of this active cattle management. By keeping the cattle moving, the conditions both within and outside the fenced area were virtually the same.

Figure 2.9: Huff Creek in 1986 With Riparian Management

Source: BLM.

Sedow Allotment, Arizona

The Sedow allotment, 41,000 acres in the Tonto National Forest in east-central Arizona, contains riparian areas of two river basins. In 1978, the Audubon Society threatened to sue over grazing policies in the allotment. The Society said overgrazing prohibited the regeneration of cottonwood trees critically needed as nesting sites for endangered bald eagles.

Because of the threatened legal action and its own evaluation, the Forest Service developed a plan that, through the Allotment Management Plan process, reduced the number of AUMs from 11,125 to 6,000. The allotment was divided into four pastures (later divided further into six), and cattle were managed and rotated from pasture to pasture instead of being allowed to graze without restriction.

The Forest Service began implementing the plan in 1979 and, as of October 1987, considers its work essentially complete. It has spent $72,000, mostly for water developments and reconstruction of fences. The permittee has spent about $6,000, mostly to upgrade fences. Where management actions have been in effect all 9 years, the Forest Service considers the riparian area to be dramatically improved. For example, the estimated number of cottonwood trees per acre has increased from 17 in 1978 to 439 in 1987 in a portion of the allotment.

The Forest Service has concluded that the allotment now has the capacity to graze about 9,000 AUMs, and plans to allow the permittee to graze this higher number. This higher level of use will require various additional range improvements, including additional fencing to increase the number of pastures from six to nine. The additional fencing will cost about $14,000. The Service expects the permittee to provide about $12,000 of this amount because the permittee will be able to increase the number of cattle that he can graze.

The permittee told us that he has been on the allotment for more than 50 years and that prior to the project the riparian areas had "always looked bad." When we toured the riparian areas with him and Forest Service officials in October 1987, he said areas that now have flowing water, large amounts of vegetation, and evidence of a variety of wildlife had been nothing but sandy draws for decades. Figures 2.10 and 2.11 illustrate the improvements. The permittee said that although he was displeased with the initial grazing reduction, improvements are now allowing increases. He believed that additional increases will be allowed if improvements continue.

Figure 2.10: Riparian Area on Sedow Allotment in 1986 Before Riparian Management

Source Forest Service

Figure 2.11: Riparian Area on Sedow Allotment in 1987 With Riparian Management

Note The stream's flowing water is obscured by the dense vegetation
Source GAO

Dean-Huck Allotment, Oregon

The Dean-Huck Allotment, 52,000 acres of the Wallowa-Whitman National Forest in eastern Oregon, contains about nine streams and related tributaries that flow for a total of 60 miles. Riparian areas in the allotment had been grazed since the 1870s. In 1975, the Forest Service put the allotment under a specific management plan designed to improve various degraded conditions resulting from logging, mining, grazing, and other activities. Improving riparian areas was part of the plan.

Before the plan, up to 560 head of cattle had grazed in the allotment. The plan required the permittee to reduce the herd to 427 in 1979 and to rotate them in a 4-pasture system. No riparian fencing was used. In 1982, the Service determined that the allotment's overall condition had improved significantly. The Service increased the allowable herd to 600 under the condition that the number of pastures be increased to 5.

The Service official who dealt with the permittee and monitored permit compliance over this period stated that prior to the 1975 management plan the allotment in general and the riparian areas in particular were in poor condition. He said the entire area has essentially recovered from decades of abuse. This was accomplished, he said, not by fencing cattle out of riparian areas but by active cattle management and an effective rest-and-rotation grazing system.

We visited the allotment and discussed the issue of riparian management with the permittee in July 1987. The permittee, who both owns his own land and uses federal land on a permit basis, said that prior to the 1975 management plan he had looked at various ways of effectively managing the land. With the new plan and a reduced number of cattle on federal land, however, he said he decided to make a more concerted effort. He said cattle are a resource that when properly managed actually help the land increase available forage, water, and wildlife by loosening soils and helping spread seeds naturally for future growth. He noted that this was exemplified over the past 10 years by a higher water table, by deer and elk populations on the allotment, and, most importantly to a rancher, by increased AUMs. Moreover, he stated that cattle management also resulted in a healthier herd and a substantially improved calving rate. Figures 2.12 and 2.13 show the changes that have occurred.

Figure 2.12: Riparian Area on Dean-Huck Allotment in 1974 Before Riparian Management

Source: Forest Service.

Figure 2.13: Riparian Area on Dean-Huck Allotment in 1987 With Riparian Management

Source: Forest Service

Characteristics of Successful Projects Reviewed

As these examples show, there have been some dramatic successes in restoring riparian areas. Starting with badly degraded streams that showed such problems as unstable and eroding banks, little vegetation along the streambank, and intermittent water flow, the agencies and permittees took actions that stabilized the streambanks, increased the amount and types of vegetation, improved the wildlife habitat, and returned the stream to natural year-round water flow. Similar improvements have been made around some springs, meadows, and other types of riparian areas.

The examples described here and in appendix I demonstrate that a wide variety of techniques can be applied to restoration efforts. Agencies and permittees took such actions as changing the season or the length of time that livestock could graze in the area, or excluding livestock from the area by fencing or herding. Agency staff also sometimes built in-stream structures such as rock gabions or log weirs to raise water levels or provide improved habitat for fish, and used rock and other materials to stabilize streambanks. The specific techniques for restoring riparian areas vary considerably from location to location. The riparian areas we reviewed varied in terms of their size, stream flow, climate, soil, types of native vegetation, and other on-the-ground features. Because of this, the techniques applied to the riparian areas—whether they involved management of the livestock, construction of structures, or both—had to be specifically tailored to each site's characteristics and to the type of ranching operation involved. Such specific planning required input and cooperation from a wide range of resource specialists, including wildlife and fisheries biologists, hydrologists, range conservationists, and soil scientists with the knowledge and skills needed to plan, implement, and monitor the restoration efforts.

The examples we reviewed also showed that extensive construction activity did not appear necessary to restore many of the areas. BLM and Forest Service officials generally agreed that structures should be planned very carefully and used only when absolutely necessary to achieve the recovery objectives for the area. They said that in many cases a riparian area will restore itself if given the proper amount of rest from livestock grazing; furthermore, structures can be costly to construct and maintain and often will fail during high-water runoff events if not properly designed.

In some cases, improvements were also made in areas away from the streams in the uplands in order to provide water for livestock, lessen grazing pressure on the riparian areas, and improve the water runoff

into the streams. Some of these improvements included building water storage tanks and troughs with water piped to them from the stream or a spring; blasting potholes to collect water; burning unwanted vegetation to encourage growth of grass; and making improvements to springs to increase their flow.

Although specific techniques varied, the success in every location had a common theme: effective management of the livestock. In each case we reviewed, restoration primarily depended on managing livestock so that the native vegetation had more opportunity to grow and regenerate.

Since improved livestock management is the key factor in restoring riparian areas, obtaining the cooperation of ranchers holding grazing permits on the allotments involved—either voluntarily or by regulation—has been an important step in the restoration process. As we saw, failure to keep livestock out of recovery areas long enough for vegetation to establish itself can ruin the progress made by months of effort and effectively doom projects to failure. On most BLM projects, staff worked long and hard to convince the ranchers that healthy riparian zones would benefit their ranching operations and thereby obtain their voluntary cooperation. While actively seeking voluntary rancher cooperation, Forest Service staff also invoked regulatory requirements to mandate rancher compliance with restoration requirements when voluntary cooperation could not be obtained.

Successes Represent Only a Small Amount of Riparian Area

The successes achieved on the projects to date need to be measured against the backdrop of work that remains to be done. Although no comprehensive inventory of riparian areas currently exists, the available information shows clearly that only a small fraction of the degraded riparian area has been restored. The restoration remaining is likely to total many thousands of miles of streams.

Existing Inventories of Riparian Areas Are Incomplete

BLM and the Forest Service do not have complete inventories of the amount and condition of riparian habitat on their lands. Agency officials told us that, in the past, they had gathered this information for only some parts of the country. They said complete inventories had not been done because inventorying is a labor-intensive, time-consuming task, and sufficient resources could not be allocated.

Agency plans now call for developing such inventories. BLM intends to gather information on the location, amount, and condition of riparian

areas for each state. A similar effort is under way in the Forest Service. Agency officials indicated that a complete inventory would probably not be available for many years.

Existing Information Shows Work Needed on Thousands of Miles of Streams

To gain at least some perspective on the amount of work that remains to be done, we obtained available inventory information from BLM and the Forest Service. For BLM, this information covered estimates for all or part of 10 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming). For the Forest Service, this information covered one national forest in each of three states (Arizona, California, and Idaho), and one ranger district in each of two others (Nevada and Oregon). While this information was not comprehensive enough to provide an accurate estimate of the total amount of riparian habitat still needing restoration, it was sufficient to indicate the likely magnitude of the remaining problem.

Only 3 of BLM's 10 estimates contained a statewide assessment of the condition of riparian areas. Colorado's was the most specific: it stated that 51 percent of the area along its 5,300 miles of perennial streams was in poor condition, 39 percent was in fair condition, and 10 percent was in good condition. Arizona's assessment stated that its riparian areas were "generally less than satisfactory," and Idaho's assessment stated that about 80 percent of the riparian area along its 11,867 miles of streams was in some stage of a degraded condition.

The remaining BLM estimates provided information on conditions of, at best, only a portion of BLM land in the states. Several estimates provided no specific information on conditions. The information that was available, however, generally showed problems with the condition of riparian habitat. For example, we found the following:

- In Nevada, two BLM districts supplied evaluations of conditions. One estimated that in two of its resource areas 93 percent of its riparian habitat in one and 86 percent in the other were in only poor to fair condition. The other reported that in two of its resource areas, 86 percent of the riparian habitat in one and 68 percent in the other were in poor to fair condition.
- New Mexico, whose inventory estimate covered just one BLM district, provided the only exception to the generally negative assessment of conditions. It reported that the riparian area in its Roswell District, which includes about 150 stream miles, was 85-percent satisfactory along streams and 50-percent satisfactory around springs.

- In Utah, one BLM district supplied an evaluation of conditions. It estimated that 84 percent of the streams it had surveyed were in poor or fair condition.

Assessments provided by the Forest Service also generally showed that most of the riparian areas assessed were in need of restoration. Five Forest Service assessments showed the following:

- In Arizona, an estimated 80 to 90 percent of the stream riparian areas in the Tonto National Forest were in unsatisfactory condition.
- In California, an estimated 78 percent of all riparian areas in the Modoc National Forest were in poor or fair condition.
- In Idaho, 162 miles of riparian habitat had been inventoried in the Sawtooth National Forest. Of that amount, 37.3 percent were in poor condition, 30.4 percent were in good condition, and 32.3 percent were in excellent condition.
- In Nevada, an estimated 90 percent of riparian areas in the Austin Ranger District were in unsatisfactory condition.
- In Oregon, the Baker Ranger District estimated its riparian areas along 300 miles of streams as (1) poor condition, 15 percent; (2) fair, 45 percent; (3) between fair and good, 20 percent; and (4) good, 20 percent.

The available information is too incomplete for an estimate of how many miles of streams on BLM and Forest Service land are in less than satisfactory condition. It seems likely, however, from the partial estimates above, that the number of miles easily runs into tens of thousands. In addition, many other types of riparian areas, such as springs and meadows, may also need work.

The magnitude of the task remaining can be seen when comparing this need with the mileage covered in the successful projects we reviewed. These projects generally covered only a few miles each. Our review did not include every successful project, but it is clear to us from our review of agency plans and discussions with agency officials that the restored areas represent only a very small fraction of the identified need.

Barriers to Further Successes: Limitations in Resources and Agency Commitment

Under current circumstances, widespread repetition of the successful riparian area improvements we observed is not likely in the foreseeable future. BLM and the Forest Service have issued policy statements supporting riparian area management and guidance to the field offices to give riparian area management a high priority in land-use planning and management activities. At the same time, however, both agencies have substantially reduced the number of skilled staff essential to carrying out these policies.

Over the past 6 years, staff levels for critical positions, such as wildlife biologists, fisheries biologists, and range conservationists, have been substantially reduced. These cuts mean that remaining staff must deal with an expanded work load of other tasks and will likely have less time to deal with restoration of riparian areas. Moreover, some of the field staff, especially at BLM, believe that if their proposed actions for restoring riparian areas are opposed by permittees, managers will not support the field staff, and needed restoration steps will not take place. Until these staffing and institutional barriers are overcome, the pace of riparian area improvements are likely to be slow.

BLM and the Forest Service Have Policies That Endorse Restoration of Riparian Areas

Both BLM and the Forest Service have established riparian management policies that direct the agencies to restore degraded riparian areas on public lands. Both emphasize that riparian area management, which was once considered to be essentially a fish and wildlife concern, is a broader issue that cuts across various agency functions, including not only fish and wildlife but also range management, watershed management, and soil management. Both agencies direct field staff to implement reasonable riparian management procedures on their lands, and both state that all levels of agency management will work with them in meeting riparian management objectives.

BLM Policy and Initiatives

The BLM policy statement on riparian area management was issued by the Director in January 1987. It stresses the value of riparian area management for the multiple uses of land rather than emphasizing only the value to fish and wildlife habitat, which had received the most attention in past years. For example, the policy requires that BLM managers recognize the value of riparian areas and initiate management programs to maintain, restore, or improve them. This effort is to be implemented when managers prepare new resource management plans or other related plans for a specific activity, such as livestock grazing, or when

they revise existing plans. The new policy also requires that BLM managers give special attention to monitoring and evaluating management activities in riparian areas and revise management practices where site-specific objectives are not being met.

In addition to issuing the policy statement, BLM has taken other actions to demonstrate the importance of riparian habitat. It has

- established management of riparian and wetland areas as one of the highest priorities in its fish and wildlife, watershed, and range programs in its annual work planning documents for fiscal years 1986 to 1988;
- instructed the state directors to select at least one "evaluation and demonstration" riparian area in each district by the end of fiscal year 1987;
- instructed its Denver Service Center to assist headquarters in developing guidelines for inventory, management, and monitoring of riparian areas; and
- directed each state director to develop a statewide riparian area management strategy during fiscal year 1986 to outline the effort needed, including target dates and projected costs for (1) inventorying the miles and condition of riparian areas, (2) completing and implementing plans containing riparian objectives and actions needed to meet those objectives, and (3) monitoring progress in meeting the objectives.

BLM has also encouraged its field offices to be more active in working with and educating users of their lands and the public in general on the benefits of riparian management. Most of the district offices we reviewed were active in providing riparian management education to a variety of participants, including state and federal agencies, ranchers, and environmental groups. BLM was also active in working with such groups on cooperative riparian improvement projects.

Some of the BLM education and cooperative efforts that began before the current emphasis, as well as other more recent efforts, have helped make the various audiences more aware of what riparian improvements can mean to them. For example:

- In Oregon, ranchers, BLM and Forest Service staff, and environmental groups have joined together to form the Oregon Watershed Improvement Coalition. The Coalition recognizes the benefits of proper management of riparian areas, and its goal is to assure the long-term benefits of riparian systems by providing information that will help improve riparian areas, consistent with the multiple-use concept. The Oregon Cattlemen's Association has a leadership role in the Coalition. In this regard, the

Association approved a resolution in November 1987 to recognize riparian area improvement as a key issue in overall rangeland improvement and to go on record as supporting the goals of the BLM Oregon State Office riparian enhancement plan.

- In Montana, BLM has joined with the University of Montana, other state and federal agencies, and conservation groups to form the Montana Riparian Association. The objectives of the Association include (1) developing riparian inventories, classified by ecological and vegetative types; (2) promoting the development of information on the management of riparian areas; and (3) providing training and continuing education in riparian management.
- The BLM Alturas Resource Area has formed a Resource Area Riparian Steering Committee made up of local ranchers, representatives of conservation and recreation organizations, state and local government agencies, and the Soil Conservation Service. The area manager said the purpose of the Committee is to foster public involvement and participation in planning and carrying out the enhancement of the area's riparian resources. The Committee will function as a technical review team to resolve riparian-related issues that may arise during BLM's implementation of its riparian management plan.
- The Public Lands Restoration Task Force of the Izaak Walton League of America started a program in March 1987 to form volunteer riparian enhancement teams. The teams are to include employees of BLM, the Forest Service, and state fish and wildlife departments; members of youth organizations such as the Boy Scouts; users of the public land; members of conservation groups; and the general public. The teams will provide work parties to build and maintain improvements in riparian areas.

Forest Service Policy and Initiatives

The Forest Service has put similar but less formal emphasis on riparian improvements on national forest lands. Forest Service standards and policy statements on riparian and related issues are contained in the Forest Service Manual and were last amended in March 1986. The standards are specific to several land management functions, including watershed management, wildlife, fish, and sensitive plant habitat management. For example, part of the riparian policy stated in the watershed management section of the manual requires that the Forest Service "manage riparian areas under the principles of multiple-use and sustained-yield, while emphasizing protection and improvement of soil, water, vegetation, and fish and wildlife resources." The manual states that the Forest Service will give preferential consideration to riparian-dependent resources when conflicts among land use activities occur.

Like BLM, the Forest Service has taken additional steps to put these policies into action. It is difficult to provide a list of the Forest Service's steps, however, because the Forest Service has not developed a program aimed specifically at riparian improvement. Rather, the Forest Service's approach is to merge its riparian actions more closely with other activities related to national forest land. We found such steps in the Forest Service's planning process, in its forest plans, and in its management reviews of progress in implementing these plans.

Budget Restrictions Have Meant That Fewer Skilled Staff Are Available

While their agencies have issued policy statements that endorse riparian area improvement, field staff at BLM and the Forest Service told us that neither agency has provided the necessary staff and financial resources at the field level to implement a quality and timely riparian improvement program. Staff positions and funding for activities that relate to riparian improvements have, because of budgetary restrictions, been substantially reduced over the past 8 years. These technical and professional staff positions are critical to riparian improvements because the best approach to restoration varies considerably from area to area.

The results of staff and funding cuts have been twofold. First, the quality of the riparian effort has been hurt as resource-related field staff presently trying to make riparian improvements are essentially "stretched thin" because their work load in other areas has increased. Second, the time frames estimated by BLM and the Forest Service for riparian improvements are unrealistic. Field staff believe that with the present levels of resources, many improvements will take decades longer to complete than is now projected.

Staff Reductions at BLM

BLM's riparian management efforts to implement the Director's policy regarding riparian improvements have been affected by a lack of staff and resources at the field level. For example, many technical staff positions needed to implement the program were greatly reduced between 1980 and 1988. During that period, nationwide staffing levels of both wildlife and fisheries biologists were reduced by 34 and 55 percent, respectively.

The remaining specialists we interviewed told us they cannot give enough effort to riparian management because of other competing demands for their time. Moreover, most BLM staff we interviewed at the state office and district levels stated that without more adequate staff and funding they are likely to make very little progress in correcting

problems that cover thousands of stream miles on public lands. For example:

- At one state office, officials told us that from 1980 to 1987 range conservationists positions were cut by 48 percent; the range management budget was cut by 40 percent; fish and wildlife staff and work months were cut by 80 percent; and all but one of the fisheries biologist positions had been eliminated. The officials noted that implementing the objectives of the riparian policy would be difficult even at the 1980 resource levels. With the cuts, they said, a successful program is unlikely.
- At another state office, officials stated that cuts similar in magnitude to those described in the previous example have resulted in substantially diminished riparian-related activities, such as monitoring effectiveness, inventorying riparian areas, enforcing grazing permit conditions, educating the public on riparian benefits, and dealing with permittees regarding riparian management. As a result, they stated that many agency claims of riparian improvements are illusions that look good on paper but do not represent substantive improvement.
- Staff at a district office said the general lack of management support is best exemplified by major resource reductions. Hundreds of miles of streams that have a clear potential to flow year-round, they said, remain intermittent streams because of a lack of resources. Further, compliance with the state office strategy for riparian improvements will take much longer than stated.
- Staff at another district office told us that riparian-related positions have been cut by over 50 percent. They said that while staff and funding resources have decreased, actual work loads have increased. This results in staff effort being diluted by competing demands for time. While the state office's official riparian improvement strategy predicts that major riparian accomplishments will be achieved in 20 years, they do not believe it will ever be accomplished with the present resources.
- At yet another district office, staff estimated that 95 to 99 percent of their allotments are not under effective management because of a combination of factors, including a lack of funding and staff. For example, while work demands have increased, staff needed to implement riparian management have been reduced by 51 percent statewide. One effect of this reduction, they said, was an inability to monitor riparian areas and make basic improvements. While the state office's riparian strategy estimates that most riparian improvements will be accomplished in 30 years, they said they can realistically make improvements on only 10 of the 1,100 stream miles each year with the present level of resources.

- At still another district office, staff stated that lack of resources has clearly contributed to degraded riparian conditions. In addition, the district presently has about half the staff needed to implement a quality riparian management program and work with more than 350 permittees on solutions to longstanding problems. Moreover, they stated that the state office's riparian improvement strategy is unrealistic because major improvements will never happen with the present level of resources. At best, they said, there will be very slow improvements from poor to fair condition overall.
- At another district office, staff said the state office's riparian strategy cannot be implemented with the present level of resources. Further, the Director's policy statement on the one hand and riparian-related staff cuts on the other are inconsistent, and as a result there is very little long-term hope for the program. For example, they said, one county has 16 streams with a stated high priority for riparian and wildlife improvements. However, the office cannot perform work there because it lacks staff and financial resources. Any new projects are implemented with a "bare bones" approach that leaves nothing available for maintenance of the improvements.

Of all the comments we received, those of officials at one BLM district best capture the level of frustration currently being experienced. These officials told us the following:

- Severe reductions in full-time staff and the elimination of summer employees have had major detrimental effects on the riparian program. When they first experienced resource cuts, the staff felt BLM management wanted them to accomplish more with less. However, considering how sustained the cuts have been, they said they now believe management simply wants to achieve less with less. For example, they stated that while the state office's riparian strategy calls for completion of the riparian program in about 10 years, only 5 percent of the program will be done by then, at the present level of resources.

These types of comments, which occurred often in the interviews we conducted, indicate that BLM's ability to achieve the goals of its riparian plan is highly questionable. State office strategies call for making major riparian improvements over various periods of time as great as 30 years. Many BLM field staff believe these time frames are unrealistic. Without adequate resources, they believe these strategies are misleading as to when and how improvements will actually be made.

Staff Reductions at the Forest Service

The Forest Service's efforts to implement its riparian management policy have also been decreased by staff reductions. Nationwide, riparian-related staff positions, which consisted of range conservationists, ecologists, hydrologists, soil scientists, and fisheries and wildlife biologists, were reduced by 15 percent from 1982 to 1987. Comparable, and in some cases more severe, reductions were made in the western Forest Service regions. Although some of the Forest Service regional office or field staff we interviewed are optimistic about the potential for restoring riparian areas, most believe that such accomplishments are unlikely in view of the resource constraints that have hurt their riparian management efforts. For example:

- As a result of the major staffing and funding cuts over the last 8 years, staff in one regional office stated that they are trying to do much more with much less but the results are questionable. Furthermore, because of the cuts, staff spend less time on existing or planned riparian work, resulting in scaled-down projects. Also, some riparian-related positions in the region have been reduced by up to 43 percent, and regional requests to field offices for inventory data are often refused for lack of resources.
- Staff in another regional office said the region's riparian plans cannot be correctly implemented because of resource constraints. In addition, while official policy statements make riparian management a priority, the program is likely to fail for lack of commitment of critical resources. Staff said that needed monitoring and enforcement activities cannot be accomplished by field staff who have not only been reduced by about 50 percent but have also been assigned other duties.
- In another regional office, staff stated that major resource cuts in recent years, such as a 50-percent cut in range and wildlife staff, have made any major riparian improvements impossible. They pointed out that riparian-related staff in some forests have been reduced by about 66 percent, and the region does not have enough resources to start a quality riparian program.
- Staff in one ranger district stated that various problems have hurt the riparian management effort. For example, because riparian-related staff who leave their positions are not replaced, the district has few staff on board to perform basic riparian-related activities. As a result, they said most monitoring and inventory work has been eliminated.
- In one forest, staff said it is optimistic to think that even the priority riparian areas can be restored in 15 to 20 years; reductions in resources mean that staff simply do not have the time to perform needed work.

Perceived Lack of Support Could Inhibit Efforts by Field Staff

In our discussions with field-level staff, we found that the issue of support by agency management could also play an important part in the extent to which riparian areas are restored. In that respect, the differences between BLM and the Forest Service are considerable. Most of the field staff in Forest Service locations we visited said they believed that essentially all levels of upper management are willing to support them in making difficult riparian management decisions that may adversely affect livestock grazing interests in the short-term. This was not the case at BLM, where many of the field staff said they believed agency management does not support them in implementing decisions that are not favored by local permittees.

Support From Forest Service Management Generally Perceived to Be Strong

Most of the Forest Service field-level officials we interviewed said that although the agency management has occasionally resisted riparian management improvements in the past, support in recent years has generally improved significantly. For example, they said, Forest Service management has demonstrated that it will support field-level decisions that require reductions in grazing AUMs to maintain or improve riparian areas.

The following are typical staff comments on the quality of management support:

- While their previous district ranger did not support riparian efforts, staff in one ranger district said that the present level of support and cooperation within the agency is excellent. Managers in the regional office have established riparian management as a priority, and all allotment management plans in the region will specify riparian management as an objective.
- At one national forest, staff said field-level personnel have received support from all levels of management in implementing riparian management decisions, even those decisions with which the majority of permittees disagreed. Such decisions included making major cuts in grazing AUMs on some allotments, even though permittees affected by the cuts had considerable political influence. The staff believe that these pockets of permittee resistance to riparian improvements are slowly shrinking and that management encourages decisions that protect the resource, regardless of permittee resistance. In November 1987, for example, the Forest Supervisor cancelled one permittee's grazing permit because he did not manage his cattle in accordance with terms of the Allotment Management Plan. The Forest Supervisor determined that the permittee's unmanaged cattle had damaged sections of the allotment,

including riparian areas, to the detriment of recreation and other interests.

- In one ranger district, the Resource Assistant stated that while management support for riparian management had been lacking in the past, this has changed in recent years. Further, if the present level of solid management support had existed in past years, most areas in the district would be under a sound management program and in relatively good condition. He said that, while quantified riparian management goals are not a specific part of his job expectations, most staff "on the ground" think it is a major part of their jobs and believe that management at all levels will support their efforts. For example, he said, when he was in the forest monitoring range conditions in 1987, he was physically threatened by a permittee who questioned his authority. Service management took decisive action to confront the permittee, defuse the potentially dangerous situation, and assure that the permittee would comply with conditions of the Allotment Management Plan.

We did find a few instances in which field staff said that agency management could better demonstrate its commitment to riparian management. For example, the staff in one forest stated that the Service in that region has shown some lack of support for riparian-related decisions. In addition, although support has generally improved in recent years, the regional office has not consistently supported field-level decisions that are unpopular with the local ranching community, which is politically powerful. They believe that because regional officials do not want to "rock the boat" in this area, there is a need to establish specific goals for managers at all levels, including the region, and make them specifically accountable for riparian improvements.

Support From BLM Management Generally Perceived to Be Weak

At BLM, many of the field staff we interviewed did not echo this same general sense of management support for riparian improvements opposed by permittees. Some BLM field staff we contacted stated they are reluctant to go "too far" with riparian management programs. They said management has taken reprisals against staff who tried to implement riparian management programs in areas with politically powerful permittees. These permittees can overturn field-level decisions through contacts with higher levels of management. The following are examples of the kinds of comments we received:

- In one district, the staff told us that the district essentially is directed by headquarters and the state office to make no decisions opposed by permittees. Further, BLM is not managing the permittees; rather, permittees

are managing BLM. They gave many examples to document this situation. For instance, an area manager confronted a rancher he found cutting trees without authorization in a riparian area on BLM land and demanded that the rancher halt the cutting. Soon after, the area manager was told by his district manager that word of the incident had gotten back to him as a result of the rancher's political connections. The area manager was told to apologize to the permittee and deliver the wood to his ranch. In another instance, an area manager documented numerous instances of riparian area trespass and fence-cutting by a permittee. The area manager said that when he asked the district manager to act on the matter, the district manager stated that he "would not be a martyr for riparian."

Area managers and other field staff in this district told us that it is common knowledge in BLM that management has taken adverse action against staff for trying to implement formal policy. The staff stated that without more specific BLM support from top to bottom for their efforts, it is very doubtful that any worthwhile riparian policy will ever be in place in the state.

- A biologist responsible for riparian programs in a field office told us that although BLM should be able to expect permittee compliance on riparian management issues, the opposite is often the case. He stated—and produced documentation to support his statement—that he has tried on many occasions to implement riparian management programs, especially by enforcing penalties for cattle trespass in riparian areas and by providing input to the allotment management plans. He stated that he has not been too successful, and he has been "advised" by his area and district managers that they would not support his recommendations for trespass penalties or specific riparian improvements if they involved a conflict with permittee interests. For example, he documented one case involving a frequent trespass problem in an allotment between June 1979 and December 1985. He stated that BLM management has not taken strong action on this and many other compliance problems because they fear the political power wielded by certain permittees. He stated that, as a result, riparian areas remain in generally poor condition, and staff hesitate to take action. His concerns are based on his personal knowledge of many examples of field staff who try to implement riparian programs against the wishes of local permittees and are harassed or transferred by management as a result.
- Field staff in another state told us that BLM management at all levels is unwilling to make tough riparian management decisions that adversely affect permittees. Although they did not have documentation on the

problem, they believe it is demonstrated by (1) management's unwillin ness to make recommended reductions in AUMs in overgrazed and abu areas; (2) management's responses to congressional inquiries about BI activities that most often conclude the permittees' position on land m agement is correct and the BLM staff position is wrong; (3) field staff's fear of management reprisals if they make decisions opposed by pern tees because some staff have been transferred for making such decisions; and (4) staff's fear of the political power of some permittees w in effect, manage BLM.

Views comparable with those we received were also expressed in an October 1987 BLM management study of agency fisheries and wildlife biologists. This study found that more than half of those responding they were not working at their full potential. The reason most often cited was lack of management support. Many respondents who had either moved into non-biologist jobs with BLM or had left the agency cited lack of management support as a reason for leaving their biolo positions. They said the lack of management support was evidenced (1) failure to act upon or consider wildlife recommendations as equa other program recommendations, (2) wildlife biologist positions not as necessary or not utilized effectively, and (3) lack of implementati of wildlife policy, regulations, and laws. Over half of those who had BLM said they would return if management were to improve, legal an regulatory policies were more consistently applied, and the princip multiple-use was applied more equitably.

Some of the biologists responding to the study said they felt they w in an adversarial role within the agency. The reason most often cit the nearly 20 percent of respondents who said they had low job sat tion was a perceived lack of management support for the wildlife p gram. They felt that district and resource area wildlife programs w not considered as important as other BLM programs but instead wer often viewed as a support program or as an obstacle to commodity- ented programs.

The livestock industry's political power and ability to influence BL decisions has been documented in general studies. For example, th Audubon Wildlife Report stated that the livestock industry intimid BLM into transferring, demoting, or firing field staff who take acti that upset local interests. The study also states that the industry a pressure to have decisions by BLM field staff overturned at upper a levels. It concluded that such tactics not only result in the policy changes sought by the industry, but can also cause BLM personnel

wary about making tough land management decisions. Although most of the district staff said they thought this situation had been slowly improving over the last several years, we found this attitude to exist at many of the BLM field locations we visited.

From our discussions with livestock industry representatives, it is apparent that an increasing number of ranchers are coming to accept the benefits healthy riparian areas can bring to their operations. It is also apparent that many more ranchers remain unconvinced about the value of riparian improvement initiatives. Some BLM staff we spoke with, while recognizing that progress in changing attitudes is being achieved, generally believe that many of the permittees with the highest potential for participating actively in restoration efforts are already involved. Future progress will therefore have to be won on allotments where permittees may not voluntarily cooperate. This will probably require a greater willingness to mandate cooperation as a condition for continued use of the land.

Although most of the BLM field staff we interviewed felt BLM management support for riparian improvements was weak, some did not agree and said they had received very clear direction to improve management of riparian areas from all levels of upper management. For example:

- In one district, staff said they receive strong support from both the state office and headquarters in their riparian management efforts. According to the staff, the support is best demonstrated by the state office's establishing riparian improvements as a line item in its annual work plan as well as in other planning documents. They said upper levels of management have backed them in decisions with adverse short-term effects on some permittees.
- Staff in one area office stated that although their area manager was moved out of the area a few years ago because of pressure from livestock interests, there has been no recent opposition to their riparian management efforts. The state office has provided a generally high amount of support in recent years.
- Staff in one BLM district said the state director made all levels of management and staff in the state accountable for riparian management by placing specific performance requirements in the personnel appraisal system.

We did not, as part of our review, attempt to validate claims made by many BLM staff that top BLM management will not support riparian improvement efforts when those efforts are opposed by ranchers.

Therefore, we take no position on the accuracy of the claims we heard. However, the widespread acceptance of these claims by BLM field staff is without doubt affecting the decisions of many who are responsible for administering riparian areas. Within BLM, this perception stands as another obstacle to making substantial progress on restoring riparian areas.

Conclusions and Recommendations

Conclusions

BLM and the Forest Service know how to restore riparian areas. There are no major technical or scientific obstacles to overcome. The projects we reviewed dramatically demonstrate the level of improvement that can be made in riparian areas to provide more forage for livestock, better habitat for wildlife, and other watershed and recreational values. The projects also demonstrate the considerable dedication that many BLM and Forest Service staff in the field bring to the task and how important that dedication has been to making projects successful. Many successful projects, in fact, resulted directly from a staff person's willingness to show special initiative, ingenuity, diplomacy, and perseverance, and to give many hours beyond the normal workweek.

Although specific approaches to restoring riparian areas vary with characteristics of the land, in each case we reviewed the primary technique was a change in the management of livestock to give the native vegetation more opportunity to grow. In some cases, fences were built to keep the livestock out of the area, either permanently or until the vegetation had recovered and streambanks were stabilized. In others, livestock continued to graze in the area, but in a more limited fashion—for a shorter period of time, for example, or in only part of the area.

Because improved livestock management is the key to restoring damaged riparian areas, obtaining the cooperation of ranchers holding grazing permits or requiring the rancher to improve livestock control is an important step in the restoration process. Permittees who do not keep their livestock out of recovery areas long enough for vegetation to establish itself can doom restoration efforts to failure. On the projects we visited, most permittees came to embrace the view that healthy riparian areas were beneficial to their ranching operations and, as a result, accepted the responsibility of more intensive livestock management.

Surprisingly, however, considering that the lands involved are federal not private, obtaining comparable cooperation or enforcement in other locations has not been achieved. In these instances, ranchers question the value of riparian improvement efforts and effectively oppose any restrictions on their livestock's access to riparian areas. In this connection, some agency staff we spoke with believe that many of the permittees with the highest potential for accepting riparian improvement initiatives and contributing actively to project success are already participating in the process. Further successes will, therefore, increasingly have to be achieved on allotments with permittees who do not currently support the restoration efforts.

Successes have been achieved but much remains to be done. Thousands of miles of riparian areas remain in degraded condition and in need of attention. At the current pace, it will probably take several decades, and in some places even longer, before most riparian areas are restored to good condition.

Moreover, we are not optimistic about speeding up the current slow progress. We expect that the pace of restoring riparian areas will likely remain very slow for two main reasons. The first problem is one of resources: cutbacks in the biologist, soil scientist, hydrologist, and conservationist positions that are essential to developing site-specific restoration strategies. As remaining staffs are stretched thinner and thinner, it is difficult to expect much improvement. It may be difficult enough to sustain the slow progress that has been made to date.

The second problem is one of will. Many staff, largely but not exclusively in BLM, believe that agency management does not support them when actions to improve management of riparian areas are opposed by permittees. The perception that top agency management is not serious about implementing riparian improvement policies is a barrier that can inhibit or discourage field staff from taking the actions essential to restoring riparian areas.

Restoration of riparian areas is only one of many activities competing for scarce resources in this time of budget cutbacks. Making more progress requires, in large part, a decision that riparian restoration should receive priority equal to other activities. Until BLM and the Forest Service are willing to make adequate staff resources available and then support their staff when tough decisions have to be made, the future o riparian improvement will not be bright.

Recommendations

To advance the progress being made in restoring critically important riparian areas we recommend that the Secretaries of the Interior and Agriculture take several steps. With respect to the issue of staffing, th Secretaries should direct the Director, BLM, and the Chief, U.S. Forest Service, to review the staffing support provided to riparian improvement efforts in the context of all program activities, and determine whether appropriate staffing levels are being provided. In a related action, the Secretaries should, as part of their annual budget submissions, report on the extent of riparian improvement that can be expec with the level of staffing they recommend.

With respect to the question of commitment to achieving broader riparian improvement, the Secretaries should direct the Director, BLM, and the Chief, U.S. Forest Service, to reemphasize and reiterate the agencies' commitment. As part of this effort, the Director and the Chief should

- establish finite, measurable goals in terms of miles of riparian areas to be targeted for restoration;
- annually measure and document the specific progress being made to achieve those goals; and
- document and justify instances where restoration steps needed to achieve established goals are seriously thwarted or rejected.

Agency Comments and GAO Response

The Forest Service supported the report's findings and conclusions and agreed to implement the recommendations. BLM, while stating that the report should help improve its riparian management efforts and agreeing in principle with the recommendations, raised two basic concerns.

First, BLM said there was not adequate quantitative analysis to support our conclusion that inadequate staffing, funding, and commitment make widespread riparian improvements unlikely. Instead, it said the conclusion was based on personal opinion and casual observation.

We disagree. The methodology used to prepare this report was sound and the conclusions appropriate. As the report points out, BLM has not developed the comprehensive inventories of riparian areas needing restoration that would be required to perform a more complex quantitative analysis. Lacking these inventories, we examined the partial inventory data that were available, researched staffing trends, visited more than 20 project sites in 10 states, and obtained qualitative information from dozens of BLM field experts who are responsible for implementing BLM's riparian initiatives and have, in some cases, spent more than a decade improving riparian areas.

This work was more than sufficient to indicate the enormity of the restoration work remaining and provided an adequate basis for concluding that future progress is not likely to be substantial. A complex quantitative analysis is not essential: many thousands of stream miles still need to be restored; levels of staff that BLM admits are essential to conducting restoration efforts have been cut in half; and dozens of the most experienced remaining staff members almost unanimously believe that BLM management is not seriously committed to riparian area improvement. Moreover, given the obvious nature of the problems remaining, we

believe it would be inappropriate to delay corrective action until the data needed to perform such analysis become available.

BLM also said that we did not use a scientific survey of BLM field staff in developing our conclusion that these staff perceive a lack of management support for riparian management initiatives. BLM said it was surprised that staff could hold this view, considering the emphasis the agency has placed on riparian areas. Further, it acknowledged that a perceived lack of management support could slow riparian improvement efforts and that communication between staff and managers must be improved.

Given the consistency of the opinions expressed during our interviews with dozens of BLM field staff throughout the West, there is no doubt that the perception of inadequate management support is real. The views we encountered were quite similar to those reported in BLM's October 1987 study of the agency's fisheries and wildlife biologists. While we take no position on whether the perception was justified, we were provided with many specific examples of actions by BLM managers that served to solidify the staff's perception. The contrast between BLM and the Forest Service on this matter is also instructive. Forest Service staff we spoke with said their managers have demonstrated their support for riparian improvement efforts by cutting AUMs, cancelling grazing permits, or taking other actions when necessary. We identified no similar actions by BLM, and field staff in many locations said such action in the current BLM environment would be unthinkable.

We agree that an improvement in communications channels between field staff and top BLM managers is needed. Changing the atmosphere to permit a freer airing of staff views could only be helpful.

However, we do not believe that improved communications or a restatement of supportive policies gets to the heart of the skepticism that currently exists. If BLM is serious about more widespread riparian restoration, it will have to demonstrate its seriousness with concrete actions such as cutting AUMs or citing known trespass or other permit violations, when such actions are necessary.

BLM made several other comments on specific matters in the report. These comments are addressed individually in appendix III.

Other Projects Visited

Big Creek, Utah

Big Creek flows through about 15 miles of private and BLM land in northeastern Utah. In 1970 and 1971, BLM established part of the area as a riparian demonstration project. The project's main objective was to evaluate opportunities for rehabilitating the stream and its riparian area by eliminating livestock grazing. BLM built an enclosure fence along about one-half mile of the stream and placed structures in the stream to improve fish habitat. The enclosure did not completely prevent livestock grazing because heavy trespass use occurred in 1974 and less extensively in 1979 and 1981. However, compared with adjacent areas, the areas within the enclosure received considerable rest.

In 1984, BLM's preliminary evaluation concluded that several specific improvements had taken place in the enclosure area. These included a stream channel that was much narrower and deeper, a streambank that was considerably more stable, a stream with more shade and cooler water, and vegetation that was significantly more abundant.

In 1985, BLM concluded from the project that degraded riparian and fishery habitat can be rehabilitated with grazing rest because the ungrazed section of Big Creek had improved dramatically. BLM also concluded, however, that if managers fence stream corridors as a rehabilitation option, they need to fence sufficient lengths of stream to reduce the influence of upstream degradation. Fish populations improved but were limited because of negative influences on the stream by upstream factors, such as unmanaged grazing along the entire creek. In-stream structures improved fish habitat by establishing desired pools, but they also trapped large amounts of sediment from upstream erosion. BLM also stated that other limiting factors, such as cattle trespass inside the enclosures, would need to be controlled and that management agencies and permittees must work together more closely if such projects are to be effective.

We observed the project with BLM officials and a permittee in August 1987. We found that, when compared with both pre-project pictures and to areas outside the enclosure, the project demonstrated substantial improvement. The permittee said that his grazing AUMs were not reduced as a result of the project, and he was willing to continue his cooperation with BLM in keeping his cattle out of the enclosed area. He also said that long-term riparian improvements can be made only through a high degree of mutual cooperation between federal agencies and permittees. However, he stressed that BLM should demonstrate its commitment to riparian management by giving him more assistance in

making upland improvements, such as the development of water sources, to help keep cattle out of riparian areas.

Bone Draw, Wyoming

Bone Draw is a small tributary of the Big Sandy River that flows through BLM land in southwestern Wyoming. Most of the flow in the creek originates as seasonal irrigation return flow from a nearby irrigation project.

BLM biologists found no evidence of trout in Bone Draw or nearby in the Big Sandy River when they investigated in 1976. In addition, they noted the area had received intensive livestock trampling from season-long grazing. With this in mind, BLM selected Bone Draw in 1978 as a riparian and stream habitat recovery demonstration project, with a related objective of promoting public information and education about riparian habitat management. Potential benefits included riparian habitat enhancement for fisheries, waterfowl, and upland game, and recreation development. The project essentially consisted of (1) fencing four riparian study pastures to provide rest from livestock grazing and enhance vegetative streambank stabilization; (2) placing habitat development structures in the stream; and (3) developing the fishery through a cooperative trout hatching effort with four other organizations—the Wyoming Game and Fish Department, the Izaak Walton League, the Sweetwater County Wildlife Association, and Trout Unlimited.

In 1984, BLM documented preliminary yet clearly positive project results. The project benefits included an expansion of the riparian zone, streambank water recharge and stabilization, extension of perennial water flows, and improved sage grouse, antelope, and waterfowl habitat. Also, as a result of the project, trout weighing up to 4 pounds were making an annual spring run of up to 100 miles of the Big Sandy and Green Rivers and into Bone Draw.

We observed the Bone Draw project with BLM officials in August 1987. Compared with pre-project photographs, we found major riparian and wildlife improvements. The area that had been almost without vegetation was changed to one having a relative abundance of plant life. More importantly, the area that had previously flowed mainly with a small amount of irrigation return water now had a clear, deep stream that supported a trout-spawning and nursery area.

Bunker and South Kingston Allotments, Nevada

The Bunker and South Kingston allotments are located in central Nevada in the Toiyabe National Forest. These allotments, which are adjacent to each other, have similar characteristics and a combined area of about 53,300 acres. Forest Service documents show that the allotments have historically been used by large numbers of cattle and sheep. In recent years the allotments have been grazed primarily by sheep, which, from 1943 to the present, were reduced from 4,000 to 2,500 head. The grazing season runs from July 1 to October 31. In addition, 150 head of cattle graze in the Bunker allotment for 1 month each year. The allotments are important habitats for a variety of fish and wildlife species, including mule deer, sage grouse, and brown and rainbow trout. Additionally, the area provides recreational benefits for fishing, hunting, and camping.

A Forest Service official said that since the mid-1960s the agency has taken some actions in the area to correct problems caused by overgrazing along the creeks, including reducing the number of livestock, building some in-stream structures, and stabilizing streambanks. However, he said that the recovery has occurred over a long period and not all as a direct result of actions taken by the Forest Service. He stated that the improved conditions mainly occurred as a result of circumstances that led to a change in livestock type in the area from cattle to sheep, and improved livestock management.

In 1964, a fire swept through a large portion of the Bunker allotment that had been used for cattle grazing. The area was reseeded and closed to all grazing until 1982. In the South Kingston allotment, the state purchased some private land along a creek in order to have land to construct a reservoir, which resulted in cattle being removed from the allotment.

The Bunker and South Kingston allotments are now both primarily sheep allotments. The Forest Service official said they prefer sheep grazing in the area because these allotments are on very steep terrain. On such terrain, cattle tend to stay in the riparian areas much longer than sheep. He said sheep do not stay in riparian areas as long because they prefer hillside, rather than creek bottom, grazing. Also, sheep are more intensively herded than cattle in this area and are moved away from the creeks.

We observed the allotments with a Forest Service official in October 1987. We found that, compared with the old black-and-white photographs, riparian area improvements were noticeable, particularly the increased growth of grasses in formerly overgrazed areas.

Burro Creek, Arizona

Burro Creek flows through about 10 miles of BLM, state, and private land in the Burro Creek allotment in west-central Arizona. BLM considers the Burro Creek allotment area to be unique because it has one of the few perennial streams in the desert southwest, and it provides habitat for a variety of plant and animal species. Wildlife species supported by the Burro Creek habitat include the bald eagle, peregrine falcon, Mexican blackhawk, desert tortoise, and Gila monster. In 1979 and 1980, BLM gathered vegetative and wildlife inventory data for various planning documents, such as a Management Framework Plan, a Habitat Management Plan, and a Grazing Environmental Impact Statement. The inventory showed that, primarily as a result of major floods and livestock overgrazing, the Burro Creek area had been devastated and stripped of vegetation.

With the completion of the habitat inventory, BLM initiated further land-use planning efforts that included meetings and public comment on multiple uses in the watershed. Although BLM proposed changes in grazing, recreation, wildlife, and other uses of the area, many public comments questioned why BLM was not more actively proposing increased riparian and wildlife habitat improvements and decreased cattle grazing. The permittees became concerned about the BLM proposals and public comments and agreed to cooperate in making the BLM proposal work. BLM did not require any overall grazing AUM reductions. Riparian improvements were to be made primarily through controlling, rather than eliminating, cattle grazing in the allotment.

In 1983, BLM began to implement a riparian management program in the watershed as part of the new allotment management plan. The plan provides for a seven-pasture grazing system that operates on a 5-year rotation. Each riparian pasture receives a minimum of 18 months continuous rest in each rotation. The pastures were established with the permittee performing fence-building and repairs, while BLM constructed three creek fence crossings designed to withstand floods. The project cost BLM about $31,000. Other fence repair costs were borne by the permittees.

Some additional habitat inventory data have been collected since the initial effort, and BLM took some photographs of the area between 1982

and 1986. On the basis of these observations, BLM concluded in 1986 that more forage was produced in Burro Creek's riparian areas, specifically because of the rest-rotation grazing system. Also, livestock made more use of the uplands because they were concentrated in smaller pastures and forced to move on a scheduled basis. While there had been no major change in upland conditions, BLM found a great deal of positive change in the riparian areas where, for example, bermuda grass had increased greatly and other riparian vegetative species, such as cottonwoods and willows, had regenerated and grown out of reach of the cattle.

We observed the project with BLM officials in March 1987 and discussed it in more detail with them and a permittee in October 1987. Compared with pre-project photographs, we found major improvements from riparian management. For example, many tree species had been reestablished and a variety of grasses were relatively abundant. The BLM officials stated that, although major improvements have been realized, much more progress could have been made in the area. However, a lack of about $70,000 in range improvement funds, which could be used for water storage, fence construction, and grass planting in the uplands, will slow the recovery.

The permittee stated that he had some initial difficulties with BLM in implementing the project plan, and he has had to bear some additional costs for the project, including hiring a rider to herd cattle and fence maintenance. However, he stated that the project has had some positive benefits, such as (1) generally healthier cows because he more actively manages them; (2) better and more even utilization of forage in the allotment because cattle are systematically herded; and (3) overall improvement of the condition of the land.

Camp Creek, Oregon

Camp Creek flows through about 35 miles of BLM, Forest Service, and private land in central Oregon. In 1966 BLM and the Oregon Department of Fish and Wildlife established a demonstration project on part of the creek to determine the extent to which the effects of major problems with the creek's riparian and adjacent upland areas could be reversed. The problems in the area included accelerated upland erosion, instability of stream channels, poor water quality and stopped flows in summer months, and reduced vegetation in riparian areas. The primary causes of the degraded conditions included historic overgrazing, upland fires, intensive road building and logging in upland areas, and generally unstable soil conditions.

Between 1966 and 1974, BLM constructed three fenced enclosures over 6.1 miles of the creek. It also seeded the area for grass and planted willow and olive trees. The project cost about $25,000.

In 1978, BLM began a series of intensive stream surveys and monitoring of plant and animal life in the area to determine the effects of the project. The survey and monitoring data plus photographic evidence showed that although riparian recovery has been slow, primarily because of highly erodible soil along the creek, major watershed improvements have been made. For example, (1) riparian vegetation was reestablished in all areas where livestock were excluded; (2) the regenerated vegetation trapped and filtered sediments and silt along the channel, especially during high flows; (3) the stream channel was raised by more than 6 feet; and (4) the protected areas acted as a giant "sponge" to hold water all year and provide an abundance of wildlife habitat.

We observed the project with BLM officials and a permittee in May 1987. Although the fine clay soil had continued to erode in much of the project area, we saw many major improvements. The riparian area had expanded significantly because the improved water table helped spread vegetation across the entire width of the project. Moreover, while year-round stream flow does not occur outside of the project area, the recovered section has continuous flow, even during drought conditions.

BLM officials stated that although the project demonstrates major improvements that can be made in riparian areas, the many years of abuse in the area and the highly erodible soil mean that it may take another 30 years to reach the creek's potential riparian conditions. The permittee said the project demonstrates what effective riparian management can accomplish in severely degraded areas and expressed his desire to continue working with BLM to continue the success. As evidence of his commitment, he stated that he personally monitors and maintains the enclosure fence to prevent trespass.

Fitzhugh Creek, California

Fitzhugh Creek flows through about 6 miles of BLM lands in northern California. BLM had recognized for many years that the Fitzhugh Creek area was in a degraded condition, primarily as a result of historic livestock overgrazing. Degraded conditions were evidenced by eroded streambanks; a broad, shallow stream channel; and the elimination of a trout population. In 1977 BLM completed a Habitat Management Plan for the area that called for a number of habitat improvements, mostly

related to increasing the creek's fishery potential, as well as specific changes to be made in the creek's riparian areas.

BLM tried to gain permittees' cooperation on riparian improvements by holding meetings with them to explain the riparian process and potential benefits. Although BLM agreed not to reduce grazing AUMs as part of the riparian improvement project, only one of five affected permittees felt the project would be beneficial. However, in 1978 BLM began implementing the project by requiring major alterations in the riparian areas. The improvements included (1) fencing 2.75 miles of the creek in 1978 to exclude cattle; (2) stocking the stream with trout in 1980 after applying a chemical treatment to eliminate unwanted fish species in 1979; (3) placing rock at 32 sites in 1982; (4) placing cattle gates in 1983; and (5) planting 1,000 willow and 100 aspen trees, and 1,800 bitterbrush seedlings between 1980 and 1986. Project costs totaled about $13,000.

BLM officials stated they experienced a variety of trespass incidents early in the project's history that slowed improvement. Such incidents included cattle gates that were not closed, cut fences, and cattle eating about 800 willow plants—all of which delayed recovery in the project area by about 1 year. BLM officials said fencing was necessary in this project to allow the riparian area to recover.

In 1986 BLM concluded that, although some trespass still occurred, the project had made substantial progress. For example, the project resulted in stabilized banks, stream channel narrowing and deepening, moderated water temperatures, and a significant increase in fish and wildlife habitat.

We observed the Fitzhugh Creek project with BLM officials and discussed it with two permittees in July 1987. Compared with pre-project photographs of the area, we found that many significant improvements, such as increased grasses, shrubs, and trees, were made to the riparian area on the creek. The BLM officials stated that because of their success with relatively simple riparian techniques, they had extended the project an additional 2 miles. This extension was completed in the fall of 1987 with the installation of five floating gates to prevent livestock movement along the riparian zone. Also, in the near future, they will have more definitive data on the project's positive impacts on the reestablished trout fishery. BLM has also acquired an additional 160 acres of riparian habitat on Fitzhugh Creek through a three-way exchange involving the Trust for Public Lands.

One of the permittees stated that the project actually resulted in better cattle management for him, and as a result he now has a healthier herd with an improved calving rate. Another permittee stated that the project also had some positive benefits for him. However, he stated that BLM should not rely so heavily on fencing as a means for achieving riparian success. He stated that the need for enclosure fencing could be reduced by improved water developments and forage in upland areas, which would take cattle pressure away from riparian areas.

Lassen Creek, California

Lassen Creek flows through Forest Service and private land in northern California. Lassen and adjacent creeks have historically been spawning areas for the Goose Lake redband trout. However, Forest Service evaluations of the area determined that wildfires, livestock grazing, and logging practices created degraded stream conditions on the creek, as evidenced by eroded streambanks and a broad, shallow channel. All of these factors resulted in poor riparian habitat in general and poor habitat for trout populations.

In 1984 the Forest Service selected about 2.5 miles of Lassen Creek and about 1 mile of adjacent Cold Creek as a test site to determine the effects of using various riparian and trout habitat restoration techniques. The objectives of the project were to stabilize banks, increase pools and in-stream cover, develop shade from streamside vegetation, and moderate water temperatures. On the basis of these objectives, a plan was developed to achieve and document riparian improvements.

Some of the techniques used to achieve project objectives included (1) layered junipers on bank areas to stabilize erosion; (2) rock deflectors to divert the force of water away from eroded banks; and (3) in-stream log weirs and boulders to increase pools, stream diversity, and cover for trout. Also, as part of the project, an enclosure fence was constructed within a portion of the area to determine if riparian objectives could be met simply by excluding livestock. Other changes in grazing strategies are to take place in 1989. Project costs totaled $29,000 for Forest Service materials and labor, plus an estimated $7,000 in work by the California Department of Fish and Game, and $30,000 in estimated contributed labor from the California Conservation Corps.

We observed the project with Forest Service officials in July 1987. The officials stated that some significant improvements have been made in a short time, and more will be accomplished in the next few years. They said that although the project has resulted in an improved riparian area,

including new willow growth, 3 miles of bank stabilization, and improved fish habitat, the reduced water temperatures are still too high and fluctuating to provide a healthy trout habitat. They projected that complete recovery would take another 10 to 20 years after a new grazing system, which will not reduce AUMs on the allotment, is implemented in about 1989.

Muddy Creek, Montana

Muddy Creek flows through about 16 miles of BLM and private land in southwestern Montana. Its watershed has long been recognized as having high values for fish, wildlife, recreation, and cultural resources. However, the area also has a combination of frail and highly erosive soils and had been subjected to years of overgrazing. These factors led to severely degraded riparian conditions and a general reduction in resource values in the watershed. BLM said the area was eroding badly and producing excessive sediment. Sedimentation was reducing brown trout growth and adversely affecting the habitat of rainbow trout. Because of existing and potential impacts of Muddy Creek on downstream fisheries, BLM has considered its entire watershed as a crucial habitat area.

BLM initiated a grazing management system with pasture fences in the area in 1967, and in 1978 it began experimental riparian improvements on six streambanks. The improvements consisted of planting grasses and willows in the area and treating eroded banks with light rock riprap. In 1980 BLM found that these efforts had begun to stabilize banks and establish vegetation. In 1984, following the area's habitat management plan, BLM made additional riparian improvements by (1) establishing a grazing system based on actual forage conditions, which change from year to year; (2) planting more grasses and trees; and (3) using heavy rock riprap to stabilize deeply eroded and unstable banks. The fences and structural improvements on Muddy Creek cost BLM about $60,000. BLM did not reduce grazing AUMs in the allotment.

We observed the Muddy Creek area with the BLM project biologist in August 1987. Compared with 1967, 1978, and 1982 pictures, the area clearly showed major and continuous improvements. The BLM biologist stated that the project represents the benefits of applying a straightforward riparian improvement prescription with a permittee who is willing to recognize the potential improvements in his allotment. In this case, the prescription involved (1) fenced pastures; (2) cattle management through rest-rotation grazing; and (3) plantings and minor structural stream improvements. Because of the natural conditions that contribute

to erosion along the stream, the biologist stated that improvements will be slow but certain. However, he stated that as a result of the project banks are significantly more stable in the project area, the stream is deeper and cleaner, and the downstream fishery has been improved.

Pearl Creek, Nevada

Pearl Creek flows through about 6 miles of Forest Service, BLM, and private land in northeastern Nevada. In 1985 BLM selected a 0.8 mile section of Pearl Creek as a demonstration area for riparian improvement with the objective of improving habitat for a species native to the stream, the endangered Lahontan cutthroat trout. The project consisted of a $7,400 enclosure fence designed to exclude cattle and improve overgrazed conditions that existed over essentially all of the allotment.

BLM officials stated they encountered some initial problems with the permittee because of his general reluctance to have a fence erected on his allotment. BLM officials told him that the small amount of fence on the 1,485-acre allotment would have no real effect on his cattle operation and that his grazing AUMs would not be reduced. Although the permittee still did not agree with the idea, BLM erected the enclosure fence.

According to BLM officials, about one-half of the fence wire and posts were stolen soon after the project was constructed. They said they could not determine who was responsible for the theft. After BLM reconstructed the project, the permittee complained that the new fence was about 200 feet longer than the original and that it would have to be shortened by that amount. BLM complied with his request, and the fence remained essentially intact, although a number of instances of fence-cutting and cattle trespass occurred over a 2-year period. According to BLM inventory data, the creek's riparian condition was actually more degraded in 1986 than it was prior to the project, and it remained in poor condition. BLM officials stated that the primary cause of continued degradation was the consistent trespass problem.

We observed the project with BLM officials in October 1987. The areas outside of the enclosure were generally bare of vegetation while some areas inside the project were in relatively better condition. We noted some regeneration of grasses, shrubs, and willow trees in some areas of the project, but other areas showed evidence of cattle trespass and degraded riparian conditions. The BLM officials stated that with their present level of range staff it is very difficult for them to consistently monitor the area to document permittee compliance in keeping cattle out

of the project area. However, they stated they would again contact the permittee to bring the matter to his attention.

Rio Bonito Creek, New Mexico

Rio Bonito Creek flows through BLM, state, and private land for about 35 miles in southeastern New Mexico. In 1983 BLM, in cooperation with New Mexico State University, established a riparian demonstration and evaluation project on the creek at the Fort Stanton state facility and experimental range. BLM determined that the Rio Bonito at Fort Stanton is typical of southwestern streams: it is subject to periodic flooding, beaver influences, complete cessation of water flow during the summer, and livestock grazing pressures. Therefore, BLM established the project with long-term goals of (1) showing the capability of riparian areas to respond to management, (2) demonstrating a variety of benefits and values associated with healthy and productive riparian areas, and (3) determining baseline information for studies of riparian ecosystems.

Prior to the project, riparian area damage was primarily the result of livestock overgrazing that did not allow for regeneration of vegetation. Other relatively minor damage was caused by beavers removing trees and periodic flooding. As part of the project, BLM built three separate riparian enclosures in the project: one in a beaver-damaged area, one in an area with heavy livestock use, and a third in a campground area that received heavy recreational use. BLM also established a number of photographic monitoring stations to document results of the project.

A comparison of BLM photographs taken before and after the $1,000 project was completed show that dramatic improvements in the protected areas have occurred over 4 years. Major improvements include more stabilized stream banks, increased grass vegetation in and along the stream, regenerated willow trees, and increased wildlife habitat. We observed the project with BLM officials in October 1987, and the positive changes in the riparian areas were clear.

The BLM official's primary concern at the project was that beavers were too active in cutting some of the newly regenerated willow trees, and therefore they planned to ask the state to help remove the beavers before more tree damage occurred. They stated that they would perform a more detailed analysis of the effects of the project in 1988.

Sage Creek, Wyoming

Sage Creek is a deep, gully-cut stream that flows through BLM land in southwestern Wyoming. Although beaver will cut down trees in riparian

areas, BLM found at Sage Creek that they can also be used to restore a degraded area. The area had little remnant willow root stock, concentrated fall and winter livestock grazing, a general loss of streambank stability, and a severely lowered water table compared with historical accounts of the area. BLM determined that periodic rest from livestock grazing was needed for recovery of the riparian area.

BLM selected 3 miles of Sage Creek as a riparian recovery area in 1981 to demonstrate gully stabilization, erosion control, and riparian recovery through beaver habitat management. The concept of recovery through the use of beaver as a management tool is that beaver activity typically reduces the ability of a stream to transport sediment by reducing the effective slope of the stream channel. Through a series of beaver dams and ponds, the flow velocity and sediment carrying power of a stream is reduced, leading to accelerated sediment deposits, as opposed to erosion. The study area was essentially unfenced and parts of it were available for livestock use. However, the pools and mud bars that developed behind the beaver dams effectively blocked the traditional trailing of livestock up and down the entire creek. The project was implemented between 1981 and 1983 and included (1) fencing springs close to the creek; (2) reinforcing five beaver dams with truck tires and wire to prevent washout during high spring flows; (3) relocating two beavers into the creek; (4) delivering aspen trees to active beaver areas for dam material; and (5) seeding some areas with grasses and bullrush. BLM said that the permittee also helped in reinforcing the beaver dams and keeping cattle out of the riparian area.

In 1984 a BLM study stated that riparian habitat recovery at Sage Creek had occurred in spite of winter-long livestock grazing. Moreover, the study concluded that the use of beavers to revitalize and stabilize degraded riparian habitats appeared to be a viable tool in riparian habitat management. The study also concluded that although the beaver management technique is not a cure-all for riparian problems, it appeared to be a promising method, applicable in many dry, cool-desert situations.

We observed the project with BLM officials in August 1987. They said that the project, which is still continuing, demonstrates major improvements as a result of using beavers as a riparian management tool. The beaver dams are trapping sediment, reducing stream velocity, and elevating the water table. The result of this, compared with pre-project photographs, is a reestablishment of willow and other riparian plants in an expanded riparian zone. This has stabilized the streambanks and

improved the aquatic habitat. Stabilization of the lower 3 miles of this formerly eroding gully has also helped to reduce the amount of sediment and nutrients flowing into the Flaming Gorge Reservoir, helping to reduce sedimentation and eutrophication of the reservoir.

Sheep Creek, Montana

Sheep Creek is a relatively large perennial stream flowing through about 19 miles of BLM and private land in southwestern Montana. Most of the public and private land in the 2,000-acre allotment of the watershed has been reduced to bare ground, primarily through overgrazing by sheep and cattle. After initial efforts in 1969 to manage cattle on the allotment with a four-pasture fencing project, BLM established a riparian improvement project on 1.5 miles of the creek in 1974. The objective was to determine whether a rest-rotation grazing system, with limited fencing of small pastures and active cattle management, would help restore the severely degraded riparian areas.

The BLM project biologist said the project has been effective primarily because of the establishment of a rest-rotation grazing system that allowed no summer use and required complete rest every 3 years. Unmanaged cattle grazing on the stream outside the project has had some negative impacts, such as siltation washing into the project area and reducing fish habitat. The BLM biologist said that the permittee's total grazing AUMs over the whole allotment were not cut, although cattle allowed in the project area itself were reduced from 800 to 200. The permittee agreed to maintain the fences; BLM provided labor and about $23,000 in materials to build them.

BLM determined that the area within the project had improved from a bad condition in 1974 to a good condition in early 1986. Also, an important trout habitat has been reestablished. Moreover, BLM documented that the project area had withstood major flood events that had essentially destroyed riparian areas both upstream and downstream through massive erosion. For example, in 1984 the area experienced a major 100- to 150-year flood event that caused major flooding about 60 miles downstream in Dillon, Montana, for the first time in its recorded history. Although the riparian area just outside the project suffered extreme erosion as a result of the flood, the project area not only withstood the event but also "captured" sediment being washed through it. This not only helped rebuild bank areas within the project, but it also saved about 118,000 cubic feet of silt from washing downstream into a federal reservoir. Moreover, the BLM biologist said the project resulted in one of the most productive trout fisheries in southwestern Montana.

We observed the project with the BLM project biologist in August 1987. Compared with pre-project pictures and riparian areas on each side of the project, the riparian area showed dramatic improvements, especially in terms of differences in bank stability, stream width, and water clarity. The BLM biologist concluded that the differences basically reflect poor riparian management outside the project area versus a reasonable riparian management system implemented inside the project area and acceptable to the permittee.

Sublett Allotment, Idaho

The Sublett allotment is located in the Sawtooth National Forest in southeastern Idaho. The major creek in the allotment is Sublett Creek, which is spring-fed and about 3 miles long. By the late 1940s and early 1950s, the Forest Service had recognized that livestock concentration on the streams had deteriorated the riparian areas. It decided to make several changes in the management of the area.

In the early 1950s, the Forest Service reduced the allowable number of livestock in the area and the season of use from 4-1/2 to 2 months. In 1959 the permittees started a water-hauling program to provide water in the uplands and hired a full-time range rider to herd the livestock. During the 1960s and early 1970s, the Forest Service had the permittees use a rotation grazing system in which the cattle were rotated through five or six grazing units. During this time, the Forest Service and the permittees also built fences, developed water sources, and continued hauling water to the uplands to obtain better distribution of the cattle. Over the years, the grazing season was gradually increased to 3 months, and the grazing system was changed to rotate cattle through four grazing units with each unit rested 1 year out of 4.

Even with the changes to the grazing system, the Forest Service determined that the riparian areas were still being used too heavily and the stream banks were not healing as expected. Therefore, a new allotment management plan was started in 1983 and is still operating. It calls for four grazing units, with the cattle rotated between units on a 5-year cycle. The unit that has major portions of the stream is rested from grazing 3 years out of 5 and is grazed in the spring only. This reduces the concentration of cattle in the riparian areas because in the spring green forage is available away from the stream. Also, it gives the riparian plants a chance to grow and become established during the summer and fall. Forest Service officials told us they had also built 19 bank protection structures—either a log fence to keep cattle from trampling the edges of streambanks or wire with fir boughs woven in—to protect

damaged banks from further erosion; modified a culvert to allow fish passage; and with the permittees, begun installing a system to provide water to the uplands to replace the water hauling. They said the first one-third of the water system is complete and consists of a 30,000-gallon storage tank, eight troughs, a pumping station, and about 4 miles of pipeline to carry water from the pumping station on the creek to the storage tank. The system is then gravity-fed from the storage tank to the troughs. Two fences were also built to keep cattle from drifting down the canyons and back to the creek.

We visited the area in October 1987 with Forest Service officials. A comparison of photographs taken in 1980 and earlier years with current conditions illustrated significant improvements in the condition of the stream. Forest Service officials said the permittees are doing a good job of keeping the cattle in the proper units and are using the placement of the water troughs and salt to get good distribution of the cattle over an entire unit. They estimated that the in-stream improvements had cost the agency about $5,700, and that the water system had cost the agency about $8,000 and the permittees about $17,000. Because conditions improved, the Forest Service increased the grazing season to 3-1/2 months in 1986.

Summit Creek, Idaho

Summit Creek flows through about 27 miles of BLM land in east-central Idaho. The creek is spring-fed and has a constant year-long flow. In 1975, BLM determined that, although most of the creek had been severely degraded through uncontrolled cattle grazing, some of the creek could be restored, and fish habitat and population could be improved through riparian management. Therefore, BLM fenced 2.5 miles of Summit Creek—except for three water gaps—to exclude cattle and to allow natural restoration in the area.

The project has been evaluated in detail on three occasions since 1975. Such factors as fish habitat conditions, water depth, bank stability, and response from cattle damage were measured. The evaluations demonstrated that all conditions within the fence had improved, but conditions outside remain unchanged and in poor condition. For example, the project demonstrated that the amount of protection given to a stream's riparian zone favorably affects the number, size, and kind of fish available. In addition, beaver moved into the protected area of Summit Creek, and the resulting beaver ponds also provided increased habitat for trout and waterfowl.

BLM concluded that fencing is not the solution to all riparian problems. On streams with moderate fisheries value, fencing could be used to create pastures in a riparian area that, after a recovery period, could be grazed at a level equal to annual forage production. For streams such as Summit Creek with a high fisheries potential, however, BLM concluded that fencing can be a useful management tool to improve habitat and increase populations.

We observed the project and discussed it with BLM officials in October 1987. The improvements in the project area, which we determined by comparison with both pre-project pictures and the current condition of areas outside the project, demonstrated a marked difference. However, we noticed a number of cattle trespassing in the project area. The BLM officials stated that when the project began the permittee on the allotment was very cooperative with them and helped make the project work, and he was given no reduction in grazing AUMs. However, they stated that the original permittee died about 3 years ago. Since then, the new permittee has not cooperated with them, as demonstrated by frequent incidences of trespass and by his refusal to maintain frequently cut or broken fences. They stated that without more permittee cooperation the project may be in jeopardy and it will not fully achieve potential habitat improvements.

Tabor Creek, Nevada

Tabor Creek flows for about 38 miles through BLM and private lands in northeastern Nevada. The Tabor Creek riparian project was established as an intensive effort to evaluate the effects of various grazing strategies, including rest-rotation systems and enclosure, on aquatic and riparian habitat and related fish populations. Forest Service technicians from the Intermountain Forest and Range Experiment Station established the project evaluation plan and analyzed its results. BLM officials provided the project location, materials, and field staff.

In 1968 BLM constructed a fenced livestock enclosure on portions of Tabor Creek to protect sage grouse habitat from livestock damage. Prior to 1976, however, the enclosure gates were often left open and grazing was essentially unrestricted. Since 1976, BLM has made more of an effort to try to control grazing in the project area. In 1982 it completed construction of additional enclosures to have a total of three comparative evaluation sites. Each enclosed site was on 600 feet of stream, two with complete rest from grazing, and one with a grazing rotation system. The cost of materials and maintenance was about $21,300.

Results of the study are presently inconclusive, primarily because of severe rain and runoff experienced in the area in 1983 and 1984. The study noted that these climatic conditions have apparently intensified in recent years, leading to some of the most dramatic changes in the watershed's history. However, preliminary study results stated that some positive trends can be recognized and that Tabor Creek has responded well to these recent fluctuations. As of mid-1987, BLM said the project's riparian condition had improved from poor to fair inside the enclosure but remained in poor condition outside the enclosure.

We observed the project with BLM officials in October 1987. Before we reached the site, they said the project recently had begun to show even more dramatic improvements in vegetative growth and streambank stability. They considered the project essentially a "showcase" demonstration area for visitor tours, the most recent of which was given about 2 weeks prior to our visit. However, when we arrived at the site we found that a large number of cattle had broken the enclosure fence and grazed the previously protected area to a desert-like condition. Essentially all of the regenerated grass in the area was eaten or trampled and most of the area was reduced to dust. The BLM officials expressed their surprise and dismay with the trespass. They stated, however, that such trespass is not uncommon and they would try to work more closely with the permittee to gain assurance that the incident would not be repeated.

Comments From the U.S. Department of Agriculture

United States Department of Agriculture | Forest Service | Washington Office | 12th & Independence SW
P.O. Box 96090
Washington, DC 20090-6090

Reply To: 1420

Date: MAR 24 1988

Mr. J. Dexter Peach
Assistant Comptroller General
Resources, Community, and Economic
Development Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Peach:

We have reviewed your draft report "PUBLIC RANGELANDS: Some Riparian Areas Restored but Widespread Improvement Will Be Slow" (GAO/RCED-88-105). Your report confirms the value of improving riparian areas through better management and identifies some key workforce and budget factors that will control the rate of improvement. The report shows that the technology is available to make significant improvements that benefit everyone in the long run.

The Forest Service will continue to make riparian area improvements and implement the needed changes that you recommended regarding goals and targets for restoration. We will also include the annual measures and documentation with our budget requests to Congress.

Thank you for the opportunity to respond to your report.

Sincerely,

F. Dale Robertson

F. DALE ROBERTSON
Chief

Caring for the Land and Serving People

FS-6200-28b (7/86)

Comments From the Department of the Interior

Note GAO comments supplementing those in the report text appear at the end of this appendix.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

APR 11 1988

Mr. James Duffus III
Associate Director, Resources, Community
and Economic Development Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Duffus:

We have reviewed the draft report entitled Public Rangelands: Some Riparian Areas Restored but Widespread Improvement will be Slow (GAO/RCED-88-105), as requested. The Bureau of Land Management (BLM) recognizes that the General Accounting Office has incorporated many of the comments that BLM staff gave to you verbally on February 25, 1988. As you will recall, we objected to some of the broad generalizations that were drawn because we did not feel that your study methodology, level of sampling, data gathering, and quantification allowed for such generalized observations. We are pleased to note that some of these concerns have been corrected to more accurately reflect the true situation.

We also are pleased that you acknowledge the extraordinary efforts and dedication of BLM employees in using innovative approaches to enhance and protect riparian areas. An outstanding example is Wayne Elmore of the BLM Prineville District who has just won a nationwide Chevron Conservation Award for his efforts to restore riparian ecosystems. GAO should also acknowledge that the BLM has recently focused more attention and commitment on a multi-discipline approach. We are involving Range, Forestry, Lands and others as well as the traditional programs of Wildlife and Fisheries and Watershed Management in riparian improvement.

We have two basic concerns with the report. First, the finding that BLM has inadequate staffing, funding, and commitment to make significant progress toward improving riparian areas is not supported by quantitative analysis. In fact, the conclusions appear based mostly on personal opinion and casual observation. We see nothing to indicate that GAO has developed the quantitative relationship between staffing and funding resources, riparian site potential, and total improvement needed that is required to draw a definitive conclusion in this report. The report fails to note improvements that could occur in the future as a result of BLM's current riparian initiatives. In some areas, it could take years before all the results of riparian restoration efforts become evident (e.g., increases in water tables). It may well be that BLM may need more funds and staffing to accelerate the riparian effort but this conclusion must be based on far more quantitative data than are now presented.

Although we agree that increased funding and staffing may reduce the time needed to restore some riparian areas, the fiscal restraints placed on budgets Government wide require the Bureau to place greater emphasis on achieving restoration through incorporating riparian management into overall range management strategies. We anticipate that the improvement of riparian areas will accelerate significantly even at existing funding and staffing levels as field offices implement the Bureau's riparian initiative through Resource Management Plans and site-specific activity plans (wildlife habitat management plans, grazing allotment management plans, etc.) that include riparian area management objectives.

Our second concern relates to the GAO assessment that some Bureau employees perceive that BLM management lacks commitment to move forward with riparian management efforts. Frankly, this is a surprise, as we have placed considerable emphasis at all management levels on the importance of riparian areas. From the report, it is difficult to determine whether this is a pervasive perception in the BLM or whether it involves only certain resource specialists and managers. This is of serious concern and it would have been better had GAO assessed this through a more comprehensive scientific survey process. Bureau management would be in a much better position to address these issues had GAO used more than just anecdotal information. We recognize, however, that this perception (justified or not) could significantly slow achievement of the Bureau's riparian management goals and that communication between management and specialists must be improved. The Bureau will continue to emphasize the multi-discipline approach to riparian management in annual work plan directives, riparian workshops and training courses, as well as in guidance to field managers that reinforces the Director's commitment to sound riparian management practices.

In summary, even though this report has limitations, it should help improve and focus our ongoing riparian management efforts. We appreciate this opportunity to comment on the draft as well as the cooperation and interest shown by your staff in conducting this study. Additional comments are provided in the enclosure.

Sincerely,

Michael A. Poling

Acting Assistant Secretary - Land and Minerals Management

Enclosure

BUREAU OF LAND MANAGEMENT (BLM) RESPONSE TO THE UNITED STATES GENERAL ACCOUNTING OFFICE (GAO) DRAFT REPORT: PUBLIC RANGELANDS: SOME RIPARIAN AREAS RESTORED BUT WIDESPREAD IMPROVEMENT WILL BE SLOW

We have carefully reviewed the draft report prepared by the GAO pertaining to riparian area management on Federal lands in the Western U.S. Briefly stated, the draft report addresses four objectives while recognizing the need to improve riparian areas on public lands:

1. Identify specific examples of successful efforts to restore degraded riparian areas on public rangelands in the West;

2. Determine why those efforts are successful;

3. Decide whether the management techniques used on these successful efforts can be applied to the restoration of riparian areas throughout the West; and

4. Develop information on the scope of riparian areas needing improvement.

This GAO draft report is based on information acquired from three types of sources: (1) review of 22 successful riparian management areas in 10 Western States; (2) discussion with Federal agency personnel, grazing permittees, and researchers; and (3) review of literature, such as technical articles, land use plans, and guidance documents. The draft report includes an Executive Summary, GAO's findings in Chapters 1 and 2, and concludes with a number of recommendations.

In summary, the findings are:

1. An overriding factor in achieving success in restoring riparian areas is improving management of livestock to give native vegetation more opportunity to grow;

2. Ranchers holding permits to graze their livestock on Federal rangelands play an important role in the riparian area restoration process;

3. No major technical impediments need to be overcome in order to improve riparian areas;

4. The number of successes is small compared with the area still needing riparian area restoration; and

5. The pace of restoring riparian areas will likely remain very slow for two main reasons:

A. Agencies have substantially reduced the number of skilled staff essential to carrying out their riparian area management policies; and

B. Field staff believe that if their proposed actions for restoring riparian areas are opposed by ranchers, managers will not support the field staff.

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In summary, GAO's recommendations to the Secretaries of Agriculture and Interior are:

1. To review staffing support being provided to riparian improvement efforts and, as part of their annual budget submissions, report on the extent of riparian improvement that can be expected with the level of staffing they recommend;

2. To reemphasize and reiterate the agencies' commitment to achieving riparian improvement by:

o establishing finite, measurable goals in terms of miles of riparian areas to be targeted for restoration;

o annually measuring and documenting the specific progress being made to achieve those goals; and

o documenting and justifying instances where restoration steps needed to achieve established goals are seriously thwarted or rejected.

Comments Specific to Objectives

In recent years, the BLM has made significant progress in riparian area management. Therefore, the BLM welcomed GAO's independent assessment of successful riparian area restoration projects and the determination of whether these successful techniques are transferable to other riparian areas (i.e., Objectives 1,2, and 3).

However, Objective 4 was not clearly stated in early discussions which outlined the GAO study proposal. As a result, BLM staff supplied GAO with information pertaining to riparian demonstration areas, but did not attempt to provide comprehensive information for evaluating the scope of riparian areas needing improvement. This problem raises serious questions about GAO's methodology for achieving this study objective, a concern that is further supported by the statement found on page 19 of the draft report: "We found that agency-wide data on the amount of riparian area and its condition were not available." To properly respond to GAO's fourth objective, a thorough review of land use plans and accompanying monitoring reports should have been part of the study methodology. Additionally, investigators should have established consistent definitions that address riparian site conditions and potential.

See comment 1

Comments on Specific Findings

Finding 1. We agree with GAO's assessment that improving livestock management is a key to restoring riparian areas on public rangelands. There is, however, a problem with the concept of native vegetation as reported. Under Chapter 1, Introduction (page 10), the first paragraph reads: "According to available historical accounts, western rangelands in the early 1800's were rich native grasslands . . . ." This is simply not true. A wealth of historical

See comment 2

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information indicates that native western rangelands were not unlike the ecological setting today. In addition to grasslands, there were vast areas of sagebrush, pinion juniper, and other brush-dominated rangeland communities. These communities were in a variety of successional stages, with fire playing an important role in this mix of grasslands, brushlands, and woodlands. Large numbers of ungulates, such as bison, elk, and antelope also affected these successional communities.

Peter Skene Ogden, brigade leader of a Hudson's Bay trapper party traveling from Spokane to Fort Hall (Pocatello, Idaho) made this observation as he was traveling across the Snake River Plain in 1819: "It is the most monotonous landscape imaginable, nothing but wormwood [sagebrush] as far as the eye can see." Many more examples recorded in the early 1800's can be cited.

See comment 3.

In addition, other activities such as mining, road construction, timber harvest, and recreation should not be overlooked when determining the factors impacting riparian areas and developing land management alternatives.

See comment 4.

Finding 2. The BLM also recognizes the crucial role that livestock operators play in the restoration of riparian areas on public lands. GAO should acknowledge the complex land pattern that exists in many riparian areas where BLM is involved. In some situations, cooperation of the livestock operator must be gained not only with livestock use on public lands, but also with his/her private land holdings. For this reason, public information materials on riparian management, including fact sheets, videos, slide shows, and displays, have been distributed to field offices. In addition, the BLM Director has required that each District Office develop at least one riparian demonstration area, where best management practices and instream habitat improvement work have been or will be implemented. These areas will illustrate the benefits and resiliency of riparian systems to BLM resource specialists and managers, livestock operators, conservation groups and other public land users.

Finding 3. Although we agree that there are no major technical impediments to improving many riparian areas, it should not be assumed that restoring streamside habitats will be a simple, straightforward task. For example, the extent and condition of riparian areas on public lands are not well defined. Also, many past riparian inventories did not assess potential for improvement. Without an understanding of riparian site potential, a great deal of money and effort could be expended attempting to rehabilitate riparian areas which have little or no potential to respond to management. In addition, a knowledge of riparian site potential is the cornerstone of monitoring because successes or failures of livestock grazing management cannot be determined without it. Because of this, the BLM is devoting a significant portion of our internal research efforts to develop standard methods for defining riparian site potential on public lands.

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While there may not be major technical impediments to overcome, this is really not the issue. The issue is that sound riparian management decisions require complex assessment of costs, multiple-use demands, priorities for funding, and the best mix of management and other treatments needed to meet established objectives. Costs for construction and maintenance, for example, may render fencing some riparian areas impractical. GAO needs to recognize that livestock grazing can be compatible with proper riparian management. BLM managers are increasingly turning to grazing strategies that consider the needs of livestock and the requirements for healthy riparian systems. Resource specialists work with livestock operators to design grazing systems that reduce or eliminate livestock use from riparian pastures during the hot summer months, when most damage occurs. By allowing livestock into riparian pastures primarily during the early spring, late fall, or winter, better utilization and protection of the area can be achieved. However, our experience with this riparian pasture concept is still limited to a few regions and localities. We are attempting to educate manager and livestock operators on the grazing options through workshops and technical references, but it will take time to incorporate riparian management objectives into grazing allotment management plans throughout the Bureau.

See comment 5.

Finding 4. The finding that riparian successes are small compared to needs appears to be based largely on subjective judgment. Until there are better standards for measuring success and for identifying needs and riparian site potential, it is difficult to make any quantitative statement regarding this relationship Bureauwide. Also, GAO should not be too quick to make this subjective judgment on the basis of one-time casual observations. The results of some riparian restoration efforts, such as raised water tables and stream channel stabilization, may take years to become evident. Also, GAO should recognize that efforts to date have provided valuable models which will help accelerate rehabilitation of other areas as the Bureau's riparian initiative is further implemented.

See comment 6.

Finding 5. When citing as a finding the perception that BLM has inadequate staffing (5A.) to make significant progress towards improving riparian areas, no consideration was given the long-term, positive impact of the Bureau's current riparian initiative. We anticipate that the restoration of riparian areas will accelerate significantly even at existing funding and staffing levels, as the field offices implement the Bureau's riparian initiative through Resource Management Plans and site-specific activity plans.

See comment 7

The perception (5B.) of some Bureau employees that BLM management lacks commitment to move forward with riparian management efforts surprises us. We have placed a high level of emphasis at all management levels on the importance of riparian areas. We recognize that if this perception truly exists, it could significantly slow achievement of the Bureau's riparian management goals.

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Although the findings in 5A. and 5B. are matters of concern, progress in restoring riparian areas involves factors other than merely staffing and managerial support. For example:

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1. Riparian area problem identification and solutions must be based on a watershed analysis. The extensive mixed landownership patterns in most watersheds make it extremely important for BLM to seek full participation from all landowners when assessing and proposing riparian improvement plans. This may sometimes give the perception that permittee cooperation is necessary in each and every riparian management project. Experience has shown that riparian enhancement efforts are much more cost-effective and successful if carried out in cooperation with livestock operators. The BLM has sponsored numerous workshops, field tours, and training courses to educate all users of the public lands and adjoining private landowners in developing a better understanding and consensus of riparian values. This is accelerating progress toward restoring riparian areas.

2. The BLM has completed 137 grazing environmental impact statements (EIS) through FY 1987. Five remain to be completed by the end of FY 1988. This effort has tremendously slowed progress in accomplishing improvements to public rangelands because of the associated funding and staffing commitment and requirements. These EIS's, however, have resulted in a stronger multi-resource approach to grazing management. When the EIS's are completed, BLM will fully resume development and implementation of range improvement projects and treatments, including those in riparian areas.

3. Actual progress to date is difficult to establish because of the shift toward more integrated approaches and the relative newness of this initiative. Funding levels and accomplishments related to riparian restoration are reported under several Bureau programs, making cost accounting difficult. However, riparian-related expenditures and accomplishments have increased substantially in recent years.

Comments Specific To Recommendations

The BLM and the Department of the Interior agree in principle with the recommendations put forth by the GAO in this draft report. The BLM has developed a national strategy (Appendix, Riparian Management Initiative - Status and Update) which addressed many of the same concerns identified in the recommendations. In brief, the strategy reviews accomplishments to date and describes actions to be taken in FY 1988 and FY 1989. These actions include (1) incorporating the BLM's riparian policy into appropriate manuals to ensure long-term management commitment; (2) conducting seminars and training courses to teach recognition of riparian values and restoration techniques and options; (3) improving BLM State strategies to include measurable goals and staffing support; and (4) developing standardized riparian descriptions needed for inventory and monitoring information.

Developing measurable riparian goals will require a significant effort because of the diversity of values associated with riparian areas from location to location. Each riparian area has an unique combination of channel morphology, streamside vegetation, hydrology, geology, soils, and so forth. It is not a simple task to establish finite, measurable goals for these diverse riparian areas, nor is it easy to measure and monitor progress in meeting them.

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See comment 9.

In development of the program management approach to riparian improvement, we must all recognize that this effort is not a program in itself, but an integral part of all Bureau programs. GAO would do well to recognize this in its draft report recommendations.

Appendix
1/27/88

RIPARIAN MANAGEMENT INITIATIVE:
Status and Update

Background

In FY 1985, the Bureau of Land Management undertook a riparian area initiative to focus appropriate attention and commitment on interdisciplinary management of riparian areas administered by BLM. Because of the many values and benefits of healthy riparian systems, the initiative emphasized a multi-discipline approach to riparian management, involving the traditional program such wildlife, watershed and soil management, but also range, forestry, lands, and recreation. To set the initiative in motion, an action plan was prepared that outlined specific activities for FY's 85, 86 and 87.

The purpose of this paper is to (1) review progress in achieving the FY 85 action plan and (2) propose actions for FY 88, 89, and 90.

1985 Riparian Action Plan Progress

Activity	Lead	Date Completed
Prepare Draft Policy Statement	WO	6/30/85
Draft Policy review (Federal Register and Field Offices)	WO	10/85
Task Force organized to evaluate and describe riparian classific., inventory and monitoring, and management techniques	DSC	8/85
FY 86 AWP Directives on riparian objectives	WO	10/85
Analysis of Draft Policy comments	WO	2/86
State riparian strategies submitted	SD's	2/86
Demonstration areas established	SD's	7/86
Final Riparian Policy issued	WO	1/87
Public information package (display, slide show, brochure, video) issued	WO	2/87
Task Force reports completed and reviewed by WO	WO	3/87
Distribute Riparian Task Force Report to FO's for review and comment. Issue "Grazing Techniques" section as Draft Technical Reference.	DSC	4/87

RIPARIAN MANAGEMENT INITIATIVE:
Proposed Action Plan for FY's 88 & 89

Action

- Prepare Riparian Manual Section 1737 that incorporates the Bureau Riparian Policy.
  Target Date: September 1988 Lead Responsibility: 220/240

- Encourage field offices to conduct "riparian seminars" that teach BLM employees, livestock operators, SCS, State fish and wildlife agencies, conservation groups etc. to "recognize" the values of riparian systems and assist the group in developing management plans for specific riparian areas.
  Target Date: Ongoing Lead Responsibility: 220/240/SD's

- Work with Phoenix Training Center to develop a "Concepts in Riparian Management" course, including classroom instruction, and training modules related to data collection, monitoring techniques, and management practices for riparian areas.
  Target Date: October 1988 Lead Responsibility: WO/PTC

- Continue to emphasize riparian initiative, especially on-the-ground improvement of riparian ecosystems, as high priority in AWP directives in both General and Program Specific Advises.
  Target Date: Ongoing Lead Responsibility: 220/240

- Conduct a workshop with State and District Riparian Coordinators to discussion common issues; share information between states; and assure consistent implementation of the riparian initiative Bureauwide.
  Target Date: Sept./Oct. 1988 Lead Responsibility: WO/SO/DSC

- WO review and provide feedback to States on adequacy of their Riparian Strategies. This would provide a basis for States' internal review and evaluation of their progress toward meeting riparian policy and objectives.
  Target Date: May 1988 Lead Responsibility: 220/240

- Identify (through I.M.) DSC Riparian Coordinator as focal point to disseminate information concerning symposia, workshops, training, etc.
  Target Date: March 1988 Lead Responsibility: WO 220/DSC

- Develop a BLM Technical Reference on how to evaluate and provide examples of the economic benefits (e.g. livestock industry, water quality and quantity, fisheries) of properly managed riparian areas.
  Target Date: 1989 Lead Responsibility: 200/DSC

- Initiate a project to: (1) supplement existing ecological site inventories and interpretation procedures to include riparian sites, and (2) document through prototype site descriptions the effectiveness of riparian management measures and techniques. Core project team includes DSC, NSRT, and ID SO.
  Target Date: 1989 Lead Responsibility: 220/240/DSC

GAO Comments

1. We believe the methodology used during our review was sufficient to establish the magnitude of the riparian areas needing improvement. Since BLM and the Forest Service have not prepared comprehensive inventories of riparian areas, the kind of analysis suggested by BLM is not possible. Accordingly, we reviewed the inventories that were available, visited numerous restored and degraded riparian areas, and discussed the extent of remaining degraded riparian areas with dozens of expert BLM field staff who are responsible for implementing BLM's restoration efforts. While not giving us the capability to determine exactly how much riparian area remains in degraded condition, our work provides more than sufficient basis for concluding that only a small fraction of the thousands of miles of degraded riparian areas have been restored to date.

2. We have made changes in the report to reflect BLM's opinions.

3. On page 11 we note that the activities identified by BLM can adversely affect riparian areas. On the basis of our work, however, it is apparent that poorly managed livestock grazing is the primary cause of riparian degradation.

4. We agree that BLM's land management task is made more difficult when its public lands are interspersed with private lands in a "checkerboard" pattern. We have modified the report to reflect this difficulty.

5. This comment endorses our position. While our report states that there are no major technical obstacles to overcome, it points out that site-specific treatments must be devised to restore degraded riparian areas. These treatments require, as BLM points out, a great deal of localized knowledge and specialized skills to design optimum solutions. Absent technical impediments, we continue to believe that impetus and adequate staffing are required to carry out riparian area restoration.

6. Our finding is not based on one-time casual observations but rather on available partial inventories as well as the judgments of dozens of BLM field experts who in some cases have spent more than a decade working to restore riparian areas. We believe that the difference between the riparian areas improved to date and the remaining areas needing improvement is so large that more precision at this point is unnecessary: the job remaining is enormous.

7. During our review we found no basis for the optimism expressed in BLM's comment. A good policy statement is a starting point. However,

unless this policy is backed up with resources and the demonstrated organizational commitment to make the hard decisions necessary to implement the policy, we do not believe it is realistic to expect more than the isolated accomplishments achieved to date.

8. The depth and breadth of the feelings we found during our review indicates the perception we reported is widespread. Accordingly, improved communications are required. While important, we believe that better communication alone will not be enough to change the perception. Only when BLM management demonstrates a greater willingness to support its staff when permittees object to their proposed actions will the perceptions be changed.

9. As reflected in BLM's policy statement, riparian areas are vital to the overall ecological health of rangelands. Accordingly, we believe that riparian restoration efforts deserve heightened focus by BLM. Whether these efforts are managed as a separate program or as part of overall range improvement initiatives is not crucial. The important thing is that the agency back up its policy with action.

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