THE USE OF BEAVERS FOR RIPARIAN/AQUATIC HABITAT RESTORATION OF COLD DESERT, GULLY-CUT STREAM SYSTEMS IN SOUTHWESTERN WYOMING

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ABSTRACT

Several study projects have been initiated in the Rock Springs District to develop techniques for restoring and re-establishing degraded riparian and aquatic habitats. The major objective has been to utilize primarily "natural" systems to restore the habitat rather than use labor and capital-intensive artificial methods. One study area was fenced to exclude livestock grazing, one was left unfenced, and the other areas were fenced and placed under grazing management systems. The riparian vegetation was rested and beaver were reintroducted to the fenced study areas; the beaver returned on their own to the unfenced study area. Aspen trees were delivered to the sites of beaver activity because large materials for stable dam building were not present. The newly built beaver dams are trapping sediment, reducing stream velocity, locally elevating the water table, and reducing the effects of seasonally fluctuating water table levels. This process is helping to encourage the development of willow and other riparian plants in an expanded riparian zone, which is stabilizing the stream banks, and improving riparian and aquatic habitat.

INTRODUCTION

Riparian zones in the arid west, while representing less than 1% of the total land surface, are typically the focus of human activity, as well as being vital to the well-being of many wildlife and plant species. On land, the riparian or stream-associated vegetative community is probably the single most productive wildlife habitat type benefiting the greatest number of species (Winegar 1977), with the willow-grass community producing the greatest amount of total vegetative biomass (Hansen 1977) in the cold desert environment.

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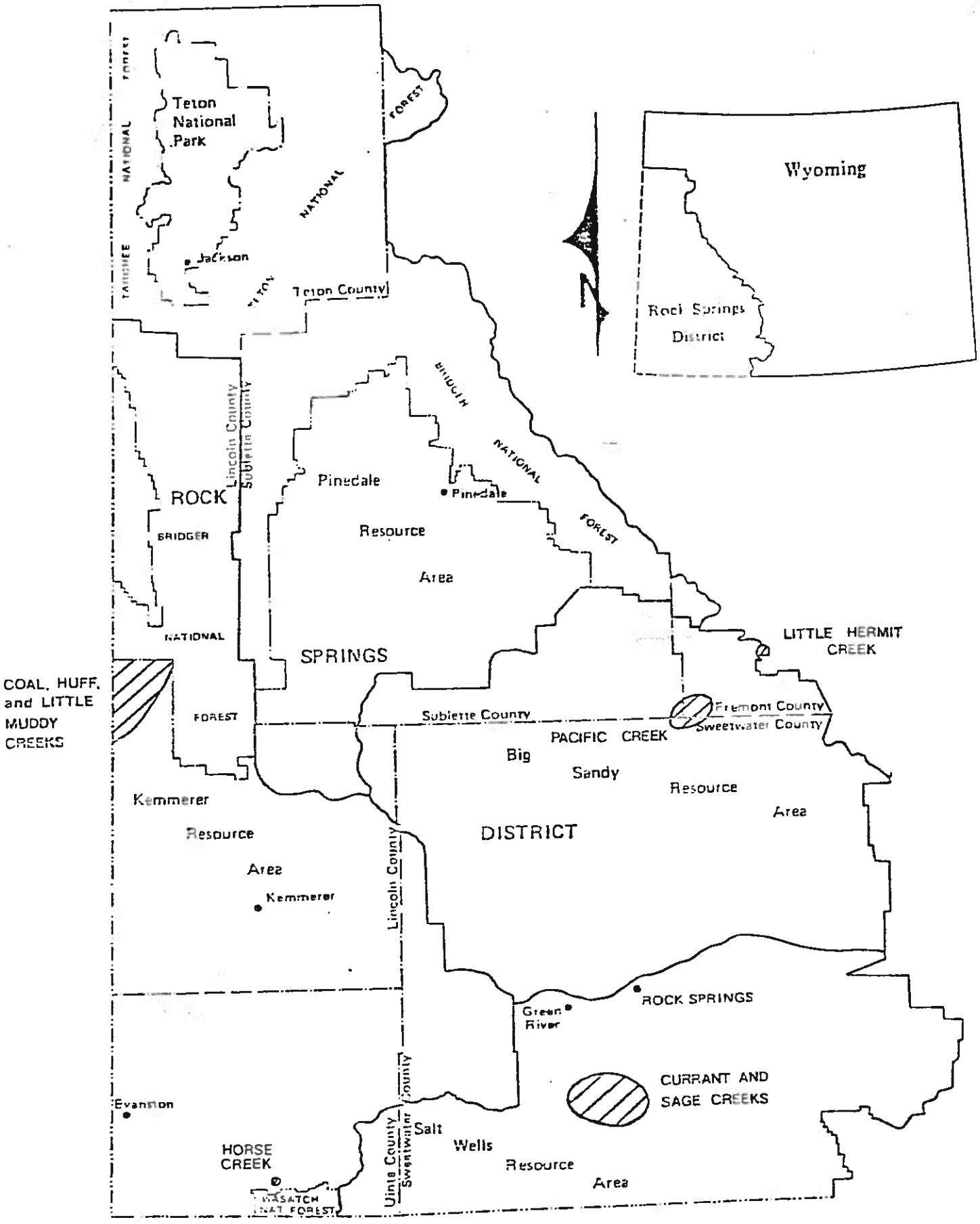

General Location Map of Beaver/Riparian
Habitat Areas in the Rock Springs District

It has been demonstrated in Oregon that riparian habitats can be significantly improved through natural, riparian system recovery processes, simply by resting the area from livestock use (Winegar 1977). We felt certain that habitat recovery would commence naturally in southwestern Wyoming if the riparian areas could be rested as well. We also wanted to determine whether this recovery process could be enhanced if we enlisted the services of the beaver, a natural element in our management scheme.

METHODS AND RESULTS

In the Rock Springs District of the Bureau of Land Management (BLM), the riparian habitat restoration program, using the talents of the beaver, began on a small scale in our Kemmerer Resource Area in 1976. The initial activity was actually the by-product of a forestry project. Rather than pile and burn some dog-hair aspen trees that had been thinned from an aspen stand, the trees were taken to a site on Horse Creek where beaver were attempting to build dams with available materials, such as, sagebrush, rabbitbrush, mud, and rocks. These dams would traditionally wash out with each year's spring runoff. Within a few days, the aspen was being extensively used in the building of these beaver dams.

This same concept of providing the limiting factor, in this case larger building materials, was applied to a number of other streams in the Kemmerer area. Over the next five years, beaver dam complexes were constructed on Coal Creek, Huff Creek, and Muddy Creek using this technique. As the use of the technique progressed, a new idea began to take shape. Would it be possible to deliver beavers as well as materials to a site in need of habitat improvements?

In the spring of 1981 a study project in riparian habitat restoration was initiated on two perennial streams, Currant Creek and Sage Creek in the Salt Wells Resource Area. In these project sites, we were faced with little overall remnant willow root stock, concentrated fall and winter livestock grazing, a general loss of streambank stability, and a severly lowered water table as compared with historical accounts of the area. Annual rest from livestock use was required for riparian community recovery.

Because of differences in stream profiles, we decided to handle the problem of resting the areas in different ways. Rest from livestock grazing use was accomplished on Currant Creek by constructing a 20-acre livestock exclosure using a 5,000 volt, solar powered electric fence, which has proven to be a very effective method for providing rest to both riparian and upland habitats. Rest from grazing at Sage Creek, on the other hand, was achieved in a curious and somewhat suprising manner. Sage Creek is a deep, gully-cut stream which presents many obstacles to gully stabilization efforts. The pools and mud bars which developed behind the beaver dams, which now stairstep the length of the study area, effectively blocked the traditional trailing of

livestock up and down the creek. Fencing was not necessary in this study area and may not be needed to rest other riparian areas with a gully profile similar to Sage Creek.

Therefore, with the study areas selected and the Currant Creek area fenced to provide grazing rest, the stage was set for riparian habitat recovery. Nuisance beaver were livetrapped on private lands several miles upstream from the exclosure on Currant Creek and relocated to specific sites within the exclosure in 1981 and 1982, (Apple 1982, 1983). Since beaver eat forbs, grasses, sedges, and other aquatic and riparian plants during the summer months (Northcott 1971, Lathi 1974), we were able to relocate the animals to the study area before complete willow recovery was achieved.

Several loads of 10-13 centimeter diameter aspen trees were delivered to Currant Creek. Initially, the aspen was delivered to a site which had been selected because it "appeared" to be a good location for a beaver dam, or a complex of dams. The aspen was placed either before the animals were released or coincidental with the release of the beaver(s). This practice involved much more guesswork than could be afforded, mainly in terms of time spent delivering materials to the wrong site. The beavers did not often build their dams where they were released, nor where the aspen was placed. Therefore, the practice was modified, and now the aspen is supplied in the late summer or early fall, only to sites which are actively being built or repaired.

In 1981 and 1982 a total of seven beavers were trapped on upper Currant Creek and relocated to the study area on lower Currant Creek. They made complete use of the aspen that was supplied although they had to drag the materials to the locations they had selected for their dams. By the end of 1982, three major beaver dam complexes had been built within the exclosure, raising the water table behind the dams from 0.3 to 1.0 meters. Stream flow energies at these sites are now being dissipated laterally across the dams, developing subirrigated meadows, rather than being concentrated vertically into a box-shapped, gully-cut channel (Smith 1983).

Unusually heavy runoff from snow melt in the spring of 1983 washed out unreinforced dams in the downstream-most complex, but not before several mud bars had been deposited behind the dams. By the end of the third year, full riparian recovery was underway in those areas with elevated water tables resulting from beaver activity. Willow regrowth and resprouting averaged 1.6 to 2.0 meters in height in three years of rest. In downstream areas within the exclosure, where very limited willow root stock was present, where beaver activity was absent, and where the water table fluctuated throughout the year, willow recovery was negligible. While willow recovery may eventually result from rest alone, the added influence of an elevated, stable water table, resulting from beaver activity, may be a key to accelerated riparian habitat recovery.

Riparian habitat recovery at Sage Creek occurred in spite of winterlong livestock grazing use. This second study area is unfenced and has traditionally been totally available for livestock use. In years past, beaver had attempted to colonize Sage Creek, but had failed because their dams and consistently washed out as a result of high spring flows. No beaver were initially relocated to this area as a part of the study project, but by early fall 1981, beaver activity was noted. In order for their dams to successfully withstand high spring flows, we felt that structural reinforcement was needed. Therefore, in an effort to dispel the misconception that we were simply "feeding" aspen trees to these animals in the project areas, we applied the same basic principles of the aspen structural stabilization concept in an entirely different manner. Rather than provide aspen alone, as was done on Currant Creek, truck tires were wired together and staked across small active, blowout-prone beaver dams. The beaver have built these dams at least 0.6 meters higher than was possible before, impounding three to four times more water, which filled with sediment within a year's time. These dams have subsequently withstood the normal runoff events in 1982, and the unusually heavy runoff in 1983, and have formed major mud terraces. The mud bars which have developed behind these dams are providing excellent sites for vegetation establishment and riparian recovery, and hopefully, will lead to a more permanently stabilized gully and stream channel.

In early 1982, after the ponds behind the beaver dams on Sage Creek became fully silted-in the beaver activity shifted .4 kilometer upstream from these sites. The first active dam in 1981 became inactive in 1982. In early September of 1983, the beaver had returned to this site and had repaired and rebuilt the dam. Consequently, at this site, another attempt was made to reinforce the dam from spring runoff events. This dam is being used to test whether net wire reinforcement will increase the effectiveness of the dam to hold the soil in place upstream from the site. After beaver activity was noted at this site, net wire was placed over the upstream and downstream faces of the dam, staked to the bank on either side of the creek, and wired repeatedly to the dam. A week later a load of aspen trees was placed on the bank near the site and within days, this material was quickly incorporated into the structure of the dam. Along with the aspen, sagebrush and other available materials were used in the construction of this dam. We will continue to monitor beaver activity at this location to determine the effectiveness of this technique.

In 1983, two beavers were relocated to a site on Sage Creek, about 3.2 kilometers upstream from the major areas of activity in 1981 and 1982. A new dam was in place, less than one hundred meters from the release site within one week after the release of the first beaver. A second dam was built two weeks later, approximately one hundred meters upstream from the first dam. Because of time and personnel limitations, neither of these dams were reinforced with net wire as was originally planned. If this technique appears to be effective, it will be expanded to include these and other dams in 1984.

Presently, the livetrapping and relocating technique is also being attempted in the Kemmerer and Big Sandy Resource Areas. Two beavers were live-trapped during late summer 1983 in the Kemmerer area on Pine Creek and relocated to Little Muddy Creek, approximately 32 air kilometers away. Both animals, a male and female, were fitted with tail-mounted radio transmitters, and released at a site on Little Muddy Creek where aspen had been placed. A day later both had traveled upstream about 1.6 kilometers. The following day, neither animal could be located with the truck-mounted receiver. After unsuccessfully attempting to locate the beavers for the next week, an aerial reconnaissance located the female's radio on Stoner Creek about five stream kilometers from the release site on Little Muddy Creek. The male beaver was not located and its whereabouts remains unknown.

In July 1983, the concept of riparian habitat recovery utilizing beaver was expanded to the Big Sandy Resource Area. Four female beavers were trapped and relocated to Pacific Creek and Little Hermit Creek in the Big Sandy Resource Area. One animal was fitted with a tail-mounted radio transmitter and all four were tail-tagged. Aspen trees had been brought to the site prior to the release. Subsequent monitoring indicated that the radioed animal was still present through October, as probably was the other beaver. One major dam was constructed and another smaller one was built before winter conditions precluded further monitoring. The aspen was completely and unhesitatingly used whenever it was available at this study site.

DISCUSSION AND RECOMMENDATIONS

The use of beavers to revitalize and stabilize degraded riparian habitats appears to be a valuable tool in riparian habitat management. Although this technique is not a cure-all, it does appear to be a promising method, applicable in many dry, cool-desert situations. In the Rock Springs District, this technique has been very successful on Sage Creek and Currant Creek. Nine beavers have been relocated to these two creeks and an unknown number of beavers have colonized Sage Creek on their own. This riparian habitat has improved significantly due to beaver activity. Coupled with rest from livestock grazing, which provided for accelerated willow regrowth, the system has become self-supporting in only two to three years.

The process, stated simply and briefly, is this: beaver activity typically reduces the ability of the stream to transport sediment by reducing the effective slope of the stream channel. A series of beaver dams/ponds step-down the flow velocities, thereby reducing the erosion potential of the moving water. The carrying power of the stream is reduced, leading to accelerated deposition rather than erosion. The ultimate objective is to vegetatively stabilize the beaver dam and the soil that is deposited behind the dam thereby reestablishing the riparian community.

It is not always necessary to relocate beavers in order to take advantage of their activities. If beavers are attempting to colonize an area which hasn't had beaver activity for a number of years, their efforts can be aided by providing them with aspen or other more stable materials, as was done at the start of our riparian habitat improvement program. In order to conserve effort and save time, aspen or other reinforcing materials should be delivered to or placed on the dam after beaver activity has commenced, unless you are planning to relocate beavers to a new location. Then aspen may help persuade the animals(s) to stay at or near the site long enough to build a dam. Monitoring beaver activity and then providing supplemental building materials as described in this paper can effectively initiate riparian habitat improvement.

If relocating beavers is anticipated, then a number of hints might be worth considering. For best results, provide for grazing rest to achieve rapid vegetative recovery and stabilization, either with fencing or through a grazing management system. Because most dam-building activity does not begin until late summer or early fall, live-trapping and relocating of beaver, or providing aspen or other reinforcement should be done at this time. Providing aspen or other means of reinforcing beaver dams is also most effective when done at an already active site. When using aspen, place the trees on the bank near the active beaver dam, rather than in the water. Our experience indicates that beavers more readily use aspen when it is on dry land. Our experience also indicates that in most cases, beavers accept artifical reinforcement, such as net wire or a layer of truck tires, and will continue to build available materials into the structure of the dam. Fortunately, they are very adaptable animals.

An important feature of the study is to determine the response of wildlife to the improved habitat conditions at the study locations. The bulk of the monitoring work to date has occurred at the Currant Creek area. Bird transects, fish surveys and wildlife observations indicate that the overall response to the improved habitat conditions resulting from beaver activity and rest from livestock grazing has been quite significant. Avian species richness has increased by approximately 20%, mallards and marsh hawks are nesting within the study areas, deer are fawning and rearing young in the heavy riparian vegetation, and brown and rainbow trout have moved into the study area from Flaming Gorge Reservoir.

In summary, I would like to stress several points. Probably the most serious threat to any wildlife population is the loss of its habitat. Healthy riparian and wetland habitats are crucial to the life cycles of a great diversity of wildlife and plant species, and this is especially true in the arid western United States, where water is a precious commodity. Improving or restoring these riparian habitats is not an easy task. The use of beaver to

help accomplish this end is not a panacea, and may not be applicable in all situations., However, a beaver management program designed to solve a specific habitat problem should be considered in any riparian habitat management strategy.

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(Note: This is a slide presentation and may be obtained on a loan basis from the Rock Springs District Manager, Bureau of Land Management, P. O. Box 1869, Rock Springs, Wyoming 82901).

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