

## OVERVIEW OF RECENT RIPARIAN MANAGEMENT EFFORTS IN MODOC COUNTY

D.L. LANCASTER, Cooperative Extension, University of California, 202 West Fourth Street  
Alturas, CA 96101  
W. MICHAEL ROSS, U.S. Forest Service, Modoc National Forest, 441 North Main Street,  
Alturas, CA 96101

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**Abstract:** Since 1980, riparian management programs have increased on federal lands within Modoc County. These programs have been designed to correct problems associated with past grazing and logging practices. The major riparian habitat problems included: Widening/braiding of stream channels; depleted or lowered water tables; and reduced cover from overhanging banks and woody vegetation. These resulted in high water temperatures, increased siltation, lack of pools, intermittent stream flows, and the elimination of overhanging bank cover, instream structure, and woody vegetation. Riparian improvement efforts have centered on habitat for trout and Modoc suckers. These improvements have included: control and management of livestock grazing; installation of instream and bank stabilization structures; and establishment of woody vegetation. Riparian management on private lands has been limited by a lack of funding. One example of private efforts is the work on Canyon Creek through an Agricultural Stabilization and Conservation Service cost share program. This creek was improved by grade and bank stabilization structures, boulder and log weir placement, and fencing to control livestock grazing. It is too early to draw specific conclusions from the projects, but indications are that livestock management must be part of any riparian improvement project and must be designed to meet stated riparian objectives.

Modoc County has a history of overgrazing, improper logging and roading practices, stream channelization, and water diversion and riparian vegetation destruction for agricultural purposes. These have resulted in the alteration and degradation of most of the county's riparian areas. Although most of these activities have been reduced or brought under control by laws and regulations, grazing continues to have a significant impact on riparian areas throughout the county. Livestock numbers have been reduced, but until this decade, little effort was made to actively manage riparian areas for other resources.

Since the late 1970's federal land management agencies in the county have increased their emphasis on riparian area management. This has been due primarily to agency policies, laws, and an increased awareness by the agency and public about the value of healthy riparian zones. Prior to this time, riparian area improvements were aimed at stabilizing eroding banks or downcutting streams through construction of check dams, gabion deflectors and similar structures. These improvements were costly and almost totally ineffective because they did nothing to correct the basic problems caused by improper livestock management.

Current riparian improvement in the county varies from structural work to livestock control, with all combinations in between. However, emphasis is beginning to

shift, at least on federal lands, to management of livestock grazing as the basis for riparian improvement. Applied grazing strategies vary greatly from total exclusion to limited seasonal use.

Three examples of riparian management in Modoc County are presented in this paper. They represent examples of livestock management on federal lands administered by the Bureau of Land Management and Forest Service, and on private land. They also demonstrate the spectrum of management philosophy and strategies, including livestock exclusion, limited seasonal livestock grazing with structural improvements, and structural improvements with other livestock use.

#### FITZHUGH CREEK

Fitzhugh Creek is located nine miles south of Alturas. The creek starts at higher elevations on the West Slope of the Warner Mountains within the Modoc National Forest and runs into the South Fork of the Pit River just west of Highway 395. The portion of the creek which has received riparian enhancement is a two and one-half mile section on the lower portion of the stream where it crosses land administered by the Alturas Area Office, Susanville District, Bureau of Land Management. This portion of the creek lies within a canyon surrounded by lava escarpments and dry bunchgrass/sagebrush uplands. The creek has a well-defined, highly productive

floodplain and is a major source of water for the Tablelands Allotment. Because of the water supply and forage production, the area has been heavily used by cattle.

Years of livestock use resulted in eroded streambanks and a broad, shallow stream channel. Fish habitat capability was greatly reduced because of increased temperatures, decreased pools and elimination of cover. Woody riparian vegetation was eliminated by the combined use of beaver and cattle. The creek became populated with warm water species such as squaw fish, hardheads, suckers, and sculpin and the trout population was virtually eliminated.

In 1977, a habitat management plan was developed and riparian enhancement began. A two and one-half mile section of the canyon was fenced and livestock were excluded beginning in 1978. Fish barriers were installed below the project to prevent the upstream migration of warmwater fish and the fenced section of the stream was chemically treated to eliminate populations of these fish. Only minor stream improvements were made in addition to the fencing. A few rock-wing deflectors were used to divert water away from banks and boulders were placed in limited locations. Large clumps of willow were acquired during a highway maintenance operation and were used to stabilize one section of bank. The stream was restocked with rainbow and brown trout in 1980.

The riparian enhancement efforts on this stream have resulted in bank stabilization, stream channel narrowing and deepening, moderated water temperatures, and a significant increase in fish and terrestrial habitat capability. Livestock exclusion will be implemented on an additional two miles of the creek in 1987. Pre- and post-treatment fish population sampling was conducted by the California Department of Fish and Game, but results of the analysis are not yet available.

#### LASSEN CREEK

Lassen Creek is located in the north Warner Mountains near the Oregon-California border. The upper two-thirds of the stream is located within the Warner Ranger District of the Modoc National Forest. The stream is one of the only spawning streams still accessible to the Goose Lake redband trout.

Past grazing and logging practices have created stream conditions similar to those described for Fitzhugh Creek. However, timber related activities and past wildfires have had a greater influence on stream conditions within Lassen Creek. An

old lumber mill and reservoir were located near the meadow and skidding and water diversions contributed to existing conditions. Much of the timber in the upper watershed was destroyed by wildfire and this accounts for some of the increase in water temperatures.

The combined utilization of woody vegetation by beaver and cattle appears to have eliminated or significantly reduced aspen and willow within the project area. Beaver dams, coupled with downstream water diversions on private lands also prevented migration of spawning trout from Goose Lake into this portion of the drainage.

In 1984, after a field review of riparian restoration techniques used by Errol Claire of the Oregon Department of Fish and Wildlife on the John Day River system in eastern Oregon, the Forest decided to use Lassen Creek as a test area for these techniques. A section of stream about one mile in length was selected as an initial project site. The area is used as a fall (September-October) gathering pasture with about 350 cattle for two weeks. Within the meadow, the stream was downcut with eroded banks and lacked pools, shade, and instream structure. Water temperatures approached 80° F in summer with daily fluctuations of about 30° F.

Objectives for the project were to stabilize banks, increase pools and instream cover, develop shade from streamside vegetation, and moderate water temperatures. Based on these objectives, a plan was developed for the area and the location of all improvements were staked on the ground.

Using techniques described by Sheeter and Claire (1981), layered junipers were used to stabilize eroding banks. At some locations, rock-wing deflectors were used to divert the force of the water away from unstable banks. Behind these deflectors, junipers were placed top down and layered along the bank with the trunks anchored four feet back into the bank with a heavy wire attached to a buried steel fence post. In many locations where water velocities were lower, juniper was used alone without rock deflectors.

Log weirs were installed to increase pool ratios, stream diversity, and cover for trout. Sites with well defined banks were selected for weirs. The weirs were keyed into the banks ten feet to avoid undermining during high flows. Large rock was used as a base for the key and upstream side of the log. Dirt and rock were used as backfill to seal the backside of the log. Because of difficulties in placement, fiber mat was not used to seal the upstream

side of the log.

Two concrete meadow stabilization structures within the project were barriers to fish passage. These structures had originally been installed in the early 1960's to correct downcutting within the meadow. Although these structures were effective in stabilizing part of the meadow, fish passage was never considered in their design. As part of the current project, a series of log weirs were installed to provide fish passage by raising the water level and creating pools below the barriers.

Boulders were also placed in the stream to increase stream diversity and cover. Boulders were placed in clusters rather than randomly dispersed to increase cover benefits.

As part of the project evaluation, an enclosure was constructed within a portion of the meadow to determine if riparian objectives could be met by simply excluding livestock. The original proposal for this area was to eliminate livestock or change the season of use to spring. Since neither of these options could be implemented, an enclosure was built to assess long-term differences in riparian recovery and provide the basis for an economic assessment of future riparian improvement projects.

Trout population numbers and size distribution were assessed prior to project construction. Three sites representing various types of improvements were sampled within the project area with one site upstream from the project serving as a control. Data from two years sampling are not yet available. Periodic samples will be taken to monitor effects of the improvements on populations. Summer water temperatures are being monitored at six points within the watershed to determine how well project objectives are being met. Photos were also taken of each site within the project to monitor long-term changes.

In addition to work by the Forest Service, the California Department of Fish and Game is working on private lands on Lassen creek. Several beaver dams which were barriers to fish passage were removed and beaver populations were reduced. Removal of these beaver dams resulted in the first spawning runs of Goose Lake trout since the early to mid-1970's.

#### CANYON CREEK

Canyon Creek is located southwest of Alturas and flows into the Pit River. The entire creek is on private land with the upper portion of the creek flowing through a recreational subdivision and the lower

portion through agricultural lands.

In the early 1960's, the creek was channelized below County Road 71 to reduce flooding and siltation on downstream meadows. The stream in the channelized area and upstream from the county road is currently in a degraded and unstable condition. Streambanks are vertical and have little associated riparian vegetation.

The Mackey family fenced the portion of the creek below the county road in 1961 and eliminated grazing. However, 25 years of rest from grazing resulted in little improvement in the stream of riparian zone. Logging and roadbuilding, associated with the development of a subdivision in the upper watershed, are thought to have contributed to the unstable watershed condition. These factors, coupled with the fact that the stream above the county road was heavily grazed, have allowed excessive flows and increased erosion on the lower section of Canyon Creek.

Since exclusion of livestock did not achieve the desired improvement in stream and riparian condition, the Mackey family sought aid from the Soil Conservation Service. SCS engineers evaluated the stream and suggested construction of a series of grade stabilization structures. These structures were designed to withstand peak flows in the watershed. They consist of a base of large boulders keyed into the banks with graded material on top. After construction, the structures were seeded with sod-forming grasses. Willow slips from resident willow populations were transplanted along the stream banks. The project was funded by Mr. Mackey under a long-term agreement with the Agricultural Stabilization and Conservation under which he will be reimbursed at the rate of \$3,500 per year until 70% of the project cost has been refunded.

Since construction of the instream structures, two family groups of beavers have moved into the area. They have built on the top of the five structures and have raised water levels 18 inches or more behind three of the structures.

#### CONCLUSIONS

Three examples of riparian improvement projects in Modoc County have been described, but these do not cover all of the variations of management strategies currently being used. It is difficult to draw specific conclusions about which strategy is the best because of the lack of local data currently available on these projects. Although the principles used in these projects are based on the work of Platts, Claire and others, physical,

social, and economic factors strongly influence what management strategies are used and how well individual projects meet riparian objectives.

However, some general observations, conclusions, or projections can be made on these three projects. On Fitzhugh Creek, as on other streams in the area, total rest from livestock grazing is, by itself, effective in achieving stream and riparian objectives. Five years of rest have met riparian objectives for bank stability and narrowing and deepening of the stream channel on smaller streams with minimal downcutting. On streams that are deeply downcut, channels have stabilized and the bottoms of these cuts are rising, but it will be decades before water tables are high enough to improve riparian conditions on the associated floodplains. It is also estimated that it will take 20 to 30 years for riparian vegetation to reach full potential, even on the less degraded streams.

The structures in Lassen Creek have been found to be a suitable, cost effective method of improving fish habitat and bank stability. These structures will not, however, improve total riparian condition or meet all objectives without associated livestock management. Fall grazing, at least as currently practiced on this stream, will not meet all objectives.

Although fall grazing appears to work in some areas, spring grazing seems to show the most promise for riparian improvement on streams in this area under current management strategies. Spring or early season grazing allows for some regrowth of vegetation which is important for bank stability and catching sediment for rebuilding stream channels. Under fall grazing, there is less margin for error and only a few days of overutilization by livestock can seriously reduce the amount of vegetative cover on an area going into the wet season. Also, unless properly timed, woody vegetation recovery may be significantly hampered due to fall utilization of these plants by livestock.

On channelized streams, such as Canyon Creek, rest from livestock grazing alone may not meet improvement objectives. Large, costly structural improvements may provide a method for more rapid recovery of these streams. After their initial installation, these structures provided excellent ponding basins and sediment traps and appear to be working as designed. However, the longterm success of this type of project in this area cannot yet be evaluated.

Canyon Creek is an example of stream and riparian improvement work on private

lands, but it is unlikely that many such projects will occur. The Canyon Creek project was costly and required a high degree of commitment by the land owner. Other riparian measures, which are less costly, can be implemented on private lands, but owners must either realize some economic benefit or have an altruistic regard for riparian resources. Without education or additional incentives, few landowners will initiate these types of improvements on their own.

Our presentation on the impacts of beaver on riparian areas tends to contradict current studies on beaver. Our observations in Modoc County indicate that, in streams and associated riparian zones that are in good condition with sufficient stands of riparian hardwoods, beaver may be beneficial. However, in areas in poorer condition with limited associated hardwoods, beaver may aggravate or further degrade conditions.

On Fitzhugh, Lassen and numerous other streams, beaver occupancy appears to follow a cycle which may result in short term benefits, but long term problems, including the following scenario. Beaver move into a reach of stream and eventually cut down all mature hardwoods. Combined beaver and cattle use on aspen or willow sprouts eliminates all woody vegetation within the area. With the supply of hardwoods depleted, beaver leave the area abandoning the dam. During spring runoff, the dam washes out resulting in severe downstream scouring and sedimentation.

Under these circumstances, beaver contribute to the removal of woody vegetation and further damage to the stream. Beaver dams on the lower drainage of Lassen Creek were barriers to migrating Goose Lake trout and eliminated major portions of the stream as spawning habitat. In these instances, detrimental effects of beaver far outweighed any positive benefits. In good condition streams or streams under proper livestock management, such problems may not occur.

Author's note: After this paper was presented, two major storms (estimated as 50-year events) occurred in February and March 1986. All structures in Canyon Creek were destroyed.

#### LITERATURE CITED

- SHEETER, G.R., and E.W. CLAIRE. 1981. Use of juniper trees to stabilize eroding streambanks on the South Fork John Day River. U.S. Bureau of Land Management, Oregon State Office, Tech. Note OR-1-6763.