



Feather River Coordinated Resource Management Group

BIG FLAT MEADOW RESTORATION PROJECT

Fact Sheet #6

October 1999

PROJECT LOCATION

The Big Flat Meadow restoration project was designed to restore a section of Cottonwood Creek, a small stream in Northeastern Plumas County. Big Flat Meadow is located in the Cottonwood Creek watershed two and a half miles upstream from the confluence with Last Chance Creek which drains into Indian Creek, a tributary to the East Branch North Fork Feather River (EBNFFR). The site is on public land administered by the Plumas National Forest in Northeastern California near Honey Lake, approximately 60 miles Northwest of Reno, Nevada and 25 miles South-west of Susanville, California.

PROJECT AREA HISTORY

Cottonwood Creek once kept Big Flat meadow watered as it flowed through on its way from the East side of the Sierra Nevada mountain range to join the Feather River. But the creek has eroded severely over the last 60 years, cutting down from it's former meadow height into a gullied channel, 15 feet deep in some places. As the creek eroded down through the meadow soil, it lowered the water table, allowing undesirable dry-site vegetation such as sagebrush to replace grasses and sedges which need more moisture.

A combination of livestock grazing, fire, and timber harvesting led to the channel's down cutting and lowering of the water table. The project area is part of the US Forest Service's Fitch Canyon grazing allotment, which has been grazed continuously since at least 1910 by cattle, sheep, and horses. The dark Fire in 1987 burned through 30% of the Cottonwood Creek watershed, although not through Big Flat Meadow. Harvesting of salvage timber has been carried out in the watershed since 1988.

These events combined have led to serious impacts on the watershed's meadows and streams. The lowered water table has led to the domination of sagebrush near the stream and the drying up of Cottonwood Creek for a longer period during the summer months.

PROJECT GOALS

The agencies and individuals involved in the Feather River Coordinated Resource Management group (CRM) worked cooperatively to address the watershed problems on Cottonwood Creek. They initiated the Big Flat Meadow re-watering project in order to restore Cottonwood Creek's original channel form into a stable narrow channel with meanders and a flood plain. The objectives of the project were to:

WATERSHED CHARACTERISTICS

Drainage area - 10,919 acres
Annual precipitation - 20 inches average
Altitude - 6,000 feet average
Water volume - approximately 11% of the Last Chance drainage
Size - fourth largest tributary to Last Chance Creek
Stream flow - seasonal, drying out between March and June
Cumulative watershed effects - 98% of the threshold of concern
Ownership - 4% private
Disturbance - fourth most disturbed of all east side Feather River watershed creeks

* *Reduce the amount of sediment produced or* downstream deposition and improve water quality,

* *Restore spawning and rearing habitat for rainbow trout by prolonging summer stream flows,*

* *Elevate meadow groundwater increasing production of moisture loving plants, and extending length of the season in which the stream is flowing, and*

* *Demonstrate an innovative stream restoration technology which can be applied to other degraded watersheds.*

CRM members hope that successful re-watering of the meadow will lengthen the season during which the creek flows. Increasing the meadow's water storage capability should allow stored up winter precipitation to release more slowly, allowing Cottonwood Creek to flow longer into the summer. This combined with reducing sediment deposition should improve fish habitat, increase the amount of moisture loving vegetation in the meadow increasing forage for wildlife and cattle.

GRAZING HISTORY

1910-1920: unknown number of cattle and sheep
1920-1935: allotment grazed by 75 horses
1935-present: allotment grazed by cattle, from 756 to 2,600 animals per year
1957 to present: grazing between 93% and 200% of allowable use
Average meadow forage production: down to 905 pounds/acre from 1,500 to 2,500 previously
Grazing season: Mid June to September
Current carrying capacity: 1266 animal unit months
1987: riparian pasture established with planned use of two weeks per season
1990: changed from seasonal grazing to two pasture deferred grazing system

SOURCE: USFS grazing allotment environmental assessment

PROJECT DESIGN

To re-water Big Flat meadow, the CRM designed a project which combines an innovative technique of stream and meadow restoration with changes in the grazing system of the Forest Service's grazing allotment. The project design consists of:

- * Abandonment of the creek's old incised gully. The channel was filled in and sections of it were converted into a series of seven ponds to create wildlife habitat.
- * Diversion of the creek into a new 4,050 foot long section of shallow channel on the meadow floor above. Rock step pools were created in the steepest sections of the new channel to protect against new head cutting in the channel.
- * Revegetation of project areas made bare by construction using transplants and reseeding to supplement natural recolonization. Sod removed from the meadow during construction was transplanted to the edges of the new channel.
- * Grazing management changes reducing the allowable grazing use of the riparian pasture from 2-3 weeks to 2-3 days per year, construction of three new upland pastures to spread grazing out over the allotment, and a small reduction in the numbers of cattle allowed to graze during the season.

The project channel changes were constructed in August 1995. Revegetation of the project channel will be completed in the spring of 1996.

PROJECT MONITORING

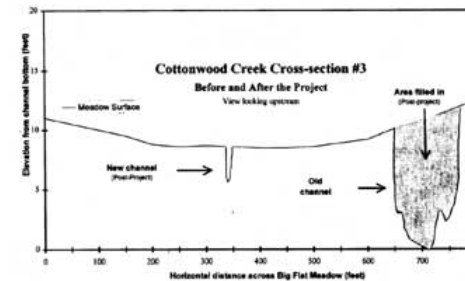
Feather River CRM members designed a monitoring plan to test the effectiveness of the project at restoring the Big Flat Meadow. Information was collected on stream and meadow characteristics in 1994 and 1995 to have a baseline against which to test the projects future success.



Cottonwood Creek in it's newly constructed channel after the February 1996 flood. The creek has overflowed the smaller channel and is watering the meadow.



Cottonwood creek as it crossed Big flat Meadow before the project.



CRM members are tracking changes in the stream's flow, groundwater level, channel stability and structure, and vegetation.

STREAM FLOW:

Changes in stream flow quantity and duration was begun in May 1994 by PG&E using gages on Cottonwood Creek upstream and downstream of the project reach.

GROUNDWATER:

Changes in ground water elevation in the meadow was begun in June 1994 by PG&E using wells placed in rows perpendicular to the direction of stream flow throughout the meadow area.

CHANNEL STABILITY AND STRUCTURE: Channel shape and position will be recorded one, three, five, and ten years after construction and in any year with runoff greater than 315 cubic feet per second using seven cross sectional profiles. Photos will be taken at four photo points every year during spring runoff through year five, and again at year ten.

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VEGETATION:

Revegetation success and changes in meadow vegetation will be tracked to see if vegetation changes as the water table rises in the meadow. Three 300 foot long transects across the meadow will be monitored every three years for a minimum of 10 years by the U.S. Forest Service.

PRELIMINARY RESULTS

The project performed as expected during its first winter season. Project designers calculate the greatest risk to the project's long term success to be the establishment of new head cuts which could erode the new channel back down to the level of the old channel. The danger of this

happening is the greatest during the first ten years of the project, before newly planted willows and sod have grown enough to anchor the creek's new banks.

To reduce this risk, rock step pools were installed at the downstream end of the project to dissipate the energy carried by flood waters. Calculations of the force of water on the channel showed that rock boulders three feet in diameter should withstand the scouring forces of a 100 year flood with a flow of 1200 cubic feet of water per second (CFS), and protect the channel from new head cuts.

The project was tested when a total of six inches of rain fell on the watershed in a sixty hour period during a storm in early February 1996. Water flow in the channel, which was designed to accommodate 40 CFS, was measured at 164 CFS. Water over-flowed the channel and spread out onto the meadow floor as desired. There was no erosion of the project's new channel and the seven ponds filled up with water as expected. Monitoring of the project over the next several years will show whether the project stays in place during bigger storm events.

PROJECT COOPERATORS

The project was accomplished by the cooperation, work and funding of several agencies and individuals:

U.S Forest Service, Plumas National Forest	
Construction funding	\$30,000
Design and assessment work	\$5,590
Rock - 350 three foot boulders	\$10,000
Aerial photo/mapping	\$13,000
Fencing	\$10,000
Pacific Gas & Electric Company	
Revegetation funding	\$13,000
Surface and ground-water monitoring	\$25,000
State Water Resources Control Board	
Construction funding (319 funds)	\$70,000
Fitch Canyon Allotment permittee	
Fencing	\$2,000



Cottonwood Creek as it crossed Big Flat Meadow before the project



Big Flat meadow after the project. The water has been diverted to the new channel on the other side of the meadow, and the old gully has been converted to ponds

Plumas County Community Development Commission	
Design	\$7,000
Project sponsor	
Plumas Corporation	
Construction coordination	
Total (funds and in-kind contributions)	\$185,590

Grazing Management Changes

	PRE-PROJECT	POST PROJECT
ALLOWED GRAZING	317 PAIR FOR 4 MONTHS	317 PAIR FOR 3 MONTHS & 167 PAIR FOR 1 MONTH
RIPARIAN PASTURE USE	2-3 WEEKS PER YEAR	2-3 DAYS PER YEAR
GRAZING SYSTEM	TWO PASTURE DEFERRED GRAZING	5 PASTURE ROTATION WITH 3 MILES NEW FENCE

REFERENCES

U.S.F.S., 1990. Cumulative Watershed Effect Study of the Last Chance Creek Watershed. Ken Cawley, Plumas National Forest, Quincy, California.

U.S.F.S., March 1993, Environmental Assessment, Fitch Canyon Allotment. Milford Ranger District, Plumas National Forest, Milford, California.

U.S.F.S., March 30, 1993. Decision Notice and Finding of No Significant Impact, Fitch Canyon Allotment. Jeff Withroe, District Ranger, Milford Ranger District, Plumas National Forest, Milford, California.

Plumas Corporation, 1992. East Branch North Fork Feather River, Spanish and Last Chance Creek Non-point Source Water Pollution Study. Section 205 (j) Clean Water Act. Funding by the California Water Resources Control Board, Sponsored by the Plumas County Community Development Commission, Quincy, California.

Feather River Coordinated Resources Management group, March 1993. Big Flat Restoration Project Risk Assessment. Jim Wilcox, Plumas Corporation - project designer. Terry Benoit, Plumas National Forest hydrologist, Quincy, California.

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