



**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:

- \* *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,*

**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

*\* 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% , 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.

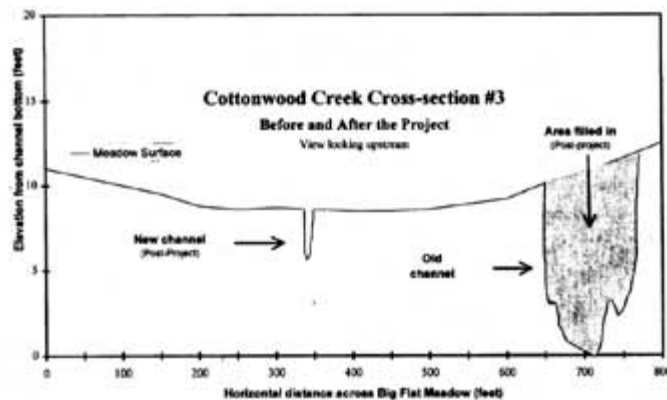
**PROJECT MONITORING**

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.