USA: New Mexico: Restoration of Bluewater Creek

Overview

Bluewater Creek, in the Cibola National Forest of northwestern New Mexico, is one of two primary drainages feeding Bluewater Lake. Extensive logging around the turn of the last century began a process of degradation that continued into the 1980s with intensive livestock grazing, uncontrolled fires and mining activity. In 1984, the USDA Forest Service began collecting and analyzing data about the creek's watershed in order to better understand its hydrologic functions and the variables driving ecosystem processes. With this preliminary analysis complete, practitioners began implementing a range of channel treatments and interventions to affect flow regimes, channel stability, and water quality. Subsequent monitoring activities suggest that in-channel features are functioning as expected, and hydrologic conditions are creating habitat more favorable for wildlife. Adaptive management of this project will continue, and a complementary project to restore and enhance forested stands within the larger Bluewater Watershed is currently in the planning stage.

Quick Facts

Project Location:
Bluewater Creek, New Mexico, USA, 35.29672459999999, -108.0657976

Geographic Region:
North America

Country or Territory:
United States of America

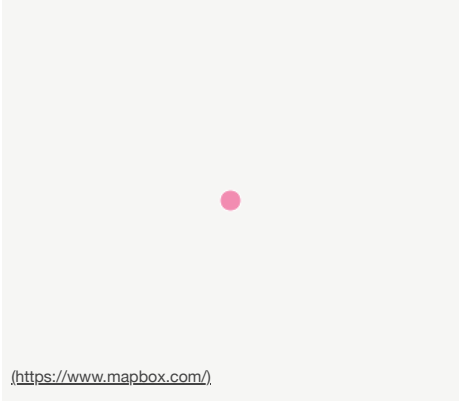
Biome:
Freshwater

Ecosystem:
Freshwater Rivers & Streams

Project Lead:
USDA Forest Service

Organization Type:
Governmental Body

Location



TIMEFRAME

Project Stage:
Implementation

Start Date:
1984-08-28

End Date:
1984-08-28

DEFINING THE PROBLEM

Primary Causes of Degradation

Agriculture & Livestock, Mining & Resource Extraction, Urbanization, Transportation & Industry

Degradation Description

Between 1890 and 1940, extensive logging using narrow-gauge railroad technology cut over much of the Bluewater watershed. Extensive grazing of livestock, uncontrolled fires, and some mining activity also occurred. Following logging by private enterprises, large portions of the watershed were sold to the USDA Forest Service in the early 1940s. Grazing, some logging, extensive road building, and increased recreational use continued in the watershed.

PLANNING AND DESIGN

Reference Ecosystem Description

Avian species commonly found within riparian habitats in the Bluewater Watershed include: the mallard duck (Anas platyrhynchos), Virginia rail (Rallus limicola), violet-green swallow (Tachycineta thalassina), mourning dove (Zenaida macroura), broad-tail hummingbird (Selasphorus platycercus), belted kingfisher (Megaceryle alcyon), northern flicker (Colaptes auratus), piñon jay (Gymnorhinus cyanocephalus), Clark's nutcracker (Nucifraga columbiana), Steller's jay (Cyanocitta stelleri), common raven (Corvus corax), mountain chickadee (Parus sclateri), house wren (Troglodytes aedon), American robin (Turdus migratorius), and mountain bluebird (Sialia currucoides). The southwestern willow flycatcher (Empidonax trailii extimus), a neo-tropical migrant and riparian-habitat-obligate species federally listed as endangered, has also been documented as nesting within the riparian habitat associated with Bluewater Creek.

Mammal species commonly found within riparian habitats include: the deer mouse, piñon mouse, mountain cottontail, big brown bat, beaver (Castor canadensis), longtail weasel, coyote, red fox, gray fox, and mule deer.

Herpetofauna species include: the tree lizard, many-lined skink, western rattlesnake, southern spadefoot, red-spotted toad, and Woodhouse toad.

Finally, fish species found within streams associated with riparian vegetation habitats in the Bluewater Watershed include: rainbow trout (Oncorhynchus mykiss), brown trout (Salmo trutta), white sucker (Catostomas commersoni), central stoneroller (Campostoma anomalum), goldfish (Carassius auratus), and fathead minnow (Pimephales promelas).

Project Goals

The effort has been based on five goals: (1) reduce flood peaks and prolong baseflows, (2) reduce soil loss and resultant downstream channel and lake sedimentation, (3) increase fish and wildlife productivity, (4) improve timber and range productivity, and (5) demonstrate proper watershed analysis and treatment methods. Also important is close adherence to a variety of legal requirements to preserve the environmental and cultural values of the watershed, particularly addressing the needs of threatened, endangered, and sensitive plant and animal species; preserving the rich cultural history of the area; and complying with requirements of the Clean Water Act.

Monitoring

PROJECT ACTIVITIES

Description of Project Activities:

For analysis purposes, the watershed was divided into 13 subwatersheds and further stratified based on vegetation, geology, and slope. Analysis of data gathered measuring ground cover transects and channel analysis from August 1984 through July 1985 resulted in eight major conclusions: (1) areas forested with mixed conifer and ponderosa pine species were generally able to handle rainfall and snowmelt runoff; (2) excessive peak flows, as well as normal flows continually undercut steep channel banks, causing large volumes of bank material to enter the stream and lake system; (3) most perennial and intermittent channels were lacking the riparian vegetation they needed to maintain streambank integrity; (4) most watersheds had an excessive number of roads; (5) trails caused by livestock, particularly cattle, concentrate runoff into small streams and erodible areas; (6) several key watersheds suffered from livestock overuse and improper grazing management systems; (7) some instances of timber management practices were exacerbating watershed problems; and (8) excessive runoff in some subwatersheds continued to degrade the main channel. Based on the conclusions of the analysis, a broad range of treatments were prescribed and implemented. Some were active (e.g., construction of particular works or projects); others were more passive (e.g., adjustments to grazing strategies). Channel treatments such as small dams, gully headcut control structures, grade control structures, porous fence revetments, and channel crossings were used to affect flow regimes, channel stability, and water quality. Riparian plantings, riparian pastures, and beaver management programs were also established, and meander reestablishment and channel relocation were conducted. Land treatments, such as the establishment of best management practices (BMPs) for livestock, timber, roads, and fish and wildlife, were developed to prevent soil loss and maintain site productivity. In a few cases, land and channel treatments were implemented simultaneously (e.g., livestock drift fences and seasonal area closures). Additional attention was paid to improved road management practices, and unnecessary roads were closed.

PROJECT OUTCOMES

Ecological Outcomes Achieved

Eliminate existing threats to the ecosystem:

Results of the project have largely met its goals, and the watershed is more productive and enjoyable for a broad range of goods, services, and values. Most of the small in-channel structures are functioning as designed. The meander reestablishment has lengthened the channel and decreased gradient in a critical reach. The channel relocation project has just completed its first year, and initial results are promising. Beaver have established themselves along the main channel of Bluewater Creek, providing significant habitat for fish and wildlife, as their ponds capture sediment and moderate flood peaks. The watershed now provides a more varied and robust population of fish and wildlife species. Changes in road management have yielded significant results. Road closures have removed traffic from sensitive areas, and reconstruction of two key roads has reduced sediment damages to the stream. Special attention to road crossings of wet meadows has begun to rehabilitate scores of acres dewatered by improper crossings. Range management techniques (e.g., combined allotments, improved fencing, and more modern grazing strategies) are improving watershed condition. A limited timber management program on the federal property has had beneficial impacts on the watershed, but significant timber harvest on private lands provided a cause for concern, particularly regarding compliance with Clean Water Act best management practices.

Factors limiting recovery of the ecosystem:

Although one weakness of the project was the lack of a carefully designed monitoring and evaluation plan, observers generally agree that the completed treatments continue to perform their designed function, while additional treatments add to the success of the project.

Socio-Economic & Community Outcomes Achieved

Economic vitality and local livelihoods:

Bluewater Creek and Lake provide the only opportunity to fish for trout and other coldwater species in the area. They also offer a unique opportunity for water-based recreation in an otherwise arid part of New Mexico. The local citizens who use the watershed have benefited from the improved conditions; recreation use continues to climb.

KEY LESSONS LEARNED

Key Lessons Learned

The Bluewater Watershed received the 1997 Chief's Stewardship Award from the Chief of the Forest Service and continues to host numerous studies and research projects.

LONG-TERM MANAGEMENT

Long-Term Management

The U.S. Forest Service, Cibola National Forest, Mt. Taylor Ranger District is currently in the planning stages of a forest restoration project for the Bluewater Watershed. Intended to improve overall habitat conditions in the watershed, the proposed project will treat stands of piñon-juniper, ponderosa pine, ponderosa pine-oak, and mixed conifer forest.

FUNDING

Sources and Amounts of Funding

This project is supported by federal funding allocated to the USDA Forest Service, Cibola National Forest.

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CONTACTS

Primary Contact

Organizational Contact

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