

# Restoration of White Springs

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**Abstract.**—Rock structures, road closures, fencing and revegetation methods were employed to restore a culturally and ecologically important spring that had been damaged in the aftermath of a wildfire. The project has reestablished the stability of the spring and has moved it closer to its former condition. School groups were an essential part of the restoration project, and their involvement has helped to communicate the results to members of the community.

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## Introduction

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For countless generations, White Springs has sustained perennial flow in Cibecue Creek and has provided the people of Cibecue with spring water for use in their homes. The stream below the spring supported trout until 1996, when a wildfire led to severe downcutting of the channel. Tribal elders have reported that the spring used to bubble up into a clear blue pool surrounded by various herbs and riparian trees. A photo of the spring in a 1965 issue of *Arizona Highways* provided a physical image to use as a reference. Comparisons of current conditions to both stories and photos revealed that the spring had degraded in recent decades. Due to the tremendous importance of the spring, we began integrated efforts to arrest further degradation and initiate recovery of the spring's past conditions.

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## Site Description

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White Springs originates from the base of an old cottonwood tree. The area is underlain by sedimentary rocks permeated by springs and sinkholes. Although the spring flow varies throughout the year, it maintains perennial flow into Cibecue Creek. The spring water is highly mineralized, but meets tribal water quality standards for drinking water.

The spring is an inviting spot ringed by cottonwoods (*Populus angustifolia*), walnuts (*Juglans major*), and various

herbaceous plants, particularly horsetail (*Equisetum* sp). Watercress (*Rorippa nasturtium-aquaticum*) grows profusely in the channel, especially since restoration.

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## History of Degradation

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Photos of White Springs taken in 1994 revealed that the pool below the spring had lowered and had less vegetation compared to photos taken in 1965. Some of the trees had fallen over, exposing the banks. The area around the spring was heavily compacted by ungulate trampling and vehicular traffic.

In April 1996, the White Springs fire burned over 4,000 acres of ponderosa pine woodland in the White Springs subwatershed. Shortly after the fire, localized rain storms drenched the area triggering soil movement and erosion. The channels in the area underwent major geomorphic adjustments, with some reaches downcutting over 1 meter, and others filling in by similar depths (Watershed Program unpublished data). The channel below the confluence of the springs and the burned area downcut by over 1 meter. The downcutting in this reach triggered a headcut up to White Springs. Furthermore, surface runoff from roads leading to the spring washed out the side of the pool at the spring.

Animal trails from the burned area led directly to the spring, since it was the chief source of perennial water in the vicinity. Animal impacts contributed to bank erosion. The combination of impacts increased sediment in the pool below the spring, causing the water to become very murky and unpleasant. Garbage left behind by visitors added to water quality and aesthetic concerns. The sight of the spring was disconcerting to people who wanted to use the spring water and who felt that the water was not being shown proper respect.

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## Restoration Activities

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The conditions at the spring made it a top priority for the Tribe's watershed restoration program in Cibecue.

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Preliminary efforts began in 1997 and led to an integrated restoration effort in 1998.

In 1997, upon the direction of a Tribal Council Representative from Cibecue, the road leading directly to the spring was closed with tall tank traps. Community members applauded this change.

The area surrounding the spring was fenced to keep livestock from grazing and trampling the area. Members of the Cibecue Livestock Association constructed the fence. Funds for this task came from a Challenge Cost-Share grant awarded to the Tribe by the US Fish and Wildlife Service.

## Channel Structures

On March 13, 1998, students from the local high school in Cibecue conducted restoration activities at the spring. They were assisted by students from Nueva Vista High School in Concord, California, who were participating in an Adopt-a-Watershed exchange program. The group built three large rock check-dams below the spring to raise the water level and stop the headcutting. The structures served to dissipate the energy of the current during the spring snowmelt. The students also placed debris on the old road leading to the spring to disperse runoff. They seeded the area with native wetland graminoids and upland grasses.

## Revegetation

In the next phase of the project, the Cibecue Project Manager supervised students from Cibecue High School during the summers of 1998 and 1999. They continued work at White Springs by transplanting rushes (*Juncus saximontanus*), spikerush (*Eleocharis* sp.), sedges (*Carex* sp.), three-square bulrush (*Scirpus pungens*) and common reed (*Phragmites australis*) from nearby wetlands.

In 1998, the crew built a large rock and log structure on the channel below the confluence of the spring and the drainage burned in the fire. This channel was still very unstable due to the aftereffects of the fire. The large structure was needed to keep the headcut from undermining the rock structures built on the spring channel.

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## Results

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The rock structures stabilized the spring channel and reversed the downcutting that was occurring. The large structure quickly filled in with rocks and litter. Pools and riffles reformed upstream of the structure. The spring area became lush with plants including watercress, yellow monkey flower (*Mimulus guttatus*) and various grasses.

Visitors to the site have been pleased with the changes that have occurred. They particularly note the peacefulness and beauty of the area. The students have written articles in their school magazine about the work they have done at the spring. One student commented, "I was surprised to see how it looks now. There is a lot more vegetation, fresh air, and nice, clean spring water to drink."

During the unusually heavy monsoon rains of late July 1999, a severe flood swept down off the burned area. The raging waters surged out of the channel and into the spring area. The flood completely washed out the large rock and log structure on the main channel; however, the structures upstream held their positions in the channel and along the banks. Many of the transplants survived. The vegetation laid over to protect the soils, although some erosion occurred where vegetation was still sparse. Due to the restoration work, the spring was able to withstand this severe disturbance.

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## Conclusion

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Without these restoration efforts, White Springs would have been devastated by the recent floods. White Springs will continue to require restoration efforts until the upstream watershed conditions have stabilized. However, in important ways the spring already has been restored. People in the community are returning to White Springs for the refreshing taste of the water. Today it is shown the respect that it truly deserves.

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