

## **An innovative, low cost stream restoration and mitigation in the Flint Hill Prairie region of North Central Oklahoma**

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**Abstract.** In the Winter of 2010 Nature Conservancy constructed 1500 ft of restored intermittent and ephemeral channels within the Dry Creek watershed in Osage County Oklahoma. The Tallgrass Prairie Preserve protects 39,000 acres of cross timbers and tallgrass prairie and is one of the Nature Conservancy's premier preserves. Among other things, the preserve is designed to protect the headwaters of Sand Creek and the land area that drains into it. Sand Creek is a small prairie stream in Osage County, Oklahoma, and was identified as a priority stream in the Conservancy's Osage Plains/Flint Hills Prairie ecoregional planning process. Sand Creek represents one of the best remaining examples of a prairie stream in the ecoregion. Its protection is crucial to preserving the aquatic biodiversity of Oklahoma.

Dry Creek is currently eroding, resulting in a stream with an overly deep, overly wide channel and active head cuts. The increased sediment entering into the channel from bank erosion has converted a gravel-bottomed stream into a silty stream, impairing the viability of existing fisheries adapted to gravel streams. These problems were likely the result of historical grazing practices and land management activities in the area. Overgrazing by cattle directly impacted the stream by reducing the amount of biomass above and below the soil surface. Reduced root density in the riparian grasses failed to hold the stream in position causing it to incise and widen. Several stock ponds were also located in the watershed of Dry Creek. When these stock ponds failed, the amount of water coming into Dry Creek caused deepening and subsequent head cutting. Another cause of stream degradation is incompatible designs of road crossings. Such a flow concentration into the channel during flood events caused a bank erosion and incision of the channel below the road crossing.

A restored stable stream is one that can transport its water and sediment loads while maintaining its pattern form and dimension. The restoration returned reaches of an Unnamed Tributary of Dry Creek to a stable condition using a natural channel design approach. Working with the stream's natural tendencies, our goal is to return UT to Dry Creek to a stable geometry.

The design was focused around the project goals and objectives. The goals and objectives were as follows;

- 1.) Bank Erosion Reduction
- 2.) Vegetative Cover
- 3.) Geomorphic Stability
- 4.) Future Bison Accessibility
- 5.) Native Plants and Materials
- 6.) Cost

The Goal of the project was to be innovative with construction techniques to attempt to minimize the cost of restoration in order to be able to restore a maximum amount of the Dry Creek watershed. The project was assessed, design constructed, and monitored for less than \$30/lf

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