Society for Range Management

Case Study

Vegetation Restoration on the Pecos River in East Central New Mexico: Lessons Learned

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On the Ground

- In this article, I share river restoration techniques for land owners whose ranch property boundaries extend to the middle of a river.
- These lessons learned may help other ranchers save money and time if they should decide to tackle similar river restoration projects.
- Restoration techniques include fencing, vegetation replanting, and addressing the challenges encountered from floods, droughts, and stray cattle.
- Dramatic changes in vegetation composition occur more quickly than originally planned.

Keywords: Pecos River, East Central New Mexico, river restoration, establishing cottonwoods and willows, lessons learned.

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In 2008, I started a project to restore the vegetation along two miles of the Pecos River that was the northern boundary to my ranch in East Central New Mexico. The purpose was to exclude cattle grazing, plant cottonwoods (*Populus* spp.), and see what would happen in terms of plant succession. There are no dams upriver to check water flows, so flash floods can happen frequently during the monsoon season from July to September. Ranch boundary fences are generally on higher ground, away from the river, to prevent the fences from being washed out by floods. This leaves a long, open corridor along the river. Cattle freely move up and down this corridor, grazing along the banks of the river. As a result, riparian vegetation has been altered dramatically, most notably by the absence of cottonwoods and willows. I decided I could control one side of the river, so I applied for and received a Natural Resources Conservation Service grant through the Wildlife Habitat Improvement Program. From there, I started my project. I had no idea what I was doing except for having read some technical papers and talked to a few people.

Restoration Area

My main objective was to re-establish cottonwoods. Other than that, I was not sure what to expect; however, I knew if I could limit grazing I would see how the vegetation would come in through natural succession. Little did I know what would happen. The initial work included building fencing along the river on the edge of the overflow floodplain bank and planting 200 cottonwoods. With the advice from the Fish and Wildlife Service, I installed additional small fenced compartments from the flood bank fence to the river's edge. These small compartments ran perpendicular to the flow of the river and went down to the river's edge. The cottonwoods were planted in these small fenced compartments. Before the project started, the major plant species along the river included juniper (*Juniperus* spp.), salt cedar (*Tamarix* spp.), Chinese elm (*Ulmus parvifolia*), Russian olive (*Elaeagnus angustifolia*), and apache plume (*Fallugia paradoxa*). Grasses and forbs included cockleburs (*Xanthium* spp.), salt grass (*Distichlis spicata*), and the occasional blue grama (*Bouteloua gracilis*). Not much.

From the time the project began, several major events occurred that affected the Pecos River. From 2008 to 2012, a major drought occurred during which the Pecos River went completely dry for several months on many different occasions. In 2013 and 2014, major floods occurred, with the Pecos River dramatically jumping its banks; some say it was a 100-year flood in 2014. All this played havoc with my restoration project, and as a result, I learned some important lessons.

Fencing

Cattle eat cottonwoods. Horses do not, unless they do not have anything else to graze on; then they will chew on the bark of small young trees. Fencing was key, and it had many benefits other than just keeping cattle out. One of the greatest benefits was that the fences retained soil and debris behind its borders during floods, sometimes adding up to two to four vertical feet to the banks from each flood (Fig. 1). Fences that

Figure 1. Restoration area after a flood; notice debris stuck on fences. Cottonwoods are former transplants. The Pecos River (unseen) is to the left.

ran at a 90-degree angle to the river were able to retain the majority of flood silt and debris as the flood water made its way through, and in some cases, the silt completely covered a four-strand wire fence.

Lessons Learned

1. Be prepared to rebuild and restore fences. About 75% of the initial wire can be salvaged after floods, but it needs to be mended before stretching.
2. A three-strand fence is good enough. When I completed my first round of fencing, I had a standard four-strand barbed wire fence. After the first flood, the bottom wire was completely buried by silt and could not be salvaged. I found that a three-strand barbed wire fence was fine, especially when the riverbank began to grow in height after flooding. The bottom should be a minimum of 12 inches above the ground to allow water from small floods to flow under the wire without damaging the fence. Very rarely did cattle jump over or go under the fence, especially when looking up at it from the river.
3. Original fences were constructed with both new and used wire. I found that the new galvanized wire was easier to salvage because it retained its strength and viability, whereas old wire would break into short pieces and was harder to salvage. Even though the new wire was more expensive, it lasted longer over time and through floods.
4. Use wood posts. Although wood posts are more labor intensive (cutting, digging post holes, tapping, etc.), they withstand floods a lot better. Metal t-posts will bend in floods, making them hard to get out of the ground and meaning they have to be straightened to be reused. Most of the wood fence posts can be salvaged and reused in other locations.
5. Do not top the wood posts after the fence is completed. After flooding, when the fence needs to be rebuilt, excess soil that has accumulated can shorten the post height. Cropped fence posts may subsequently be too short to string a top wire.
6. Greater spacing between fence posts is preferred. Fewer posts result in less time in releasing the barbed wire from tie wires when posts and wire are buried in soil after a flood. When many posts are used, they are bent in many different directions and freeing the wire from them can be difficult.
7. As the riverbank becomes higher and more stabilized, small compartment fences are not needed and can be converted into a long river corridor fence. However, as new areas along the river become available for restoration, small, compartmentalized fenced areas can be used again to enclose these areas to the river.
8. When cutting posts, throw the unused branches into the river along the banks. As the river rises, debris accumulates in these branches and extends the bank into the river, offering more stabilization.

Planting Cottonwoods

In my opinion, cottonwoods are some of the most unique plant species in the arid southwest. They are key to riparian repair and probably one of the most important elements to restoration, along with willows. I was continually amazed by the hardiness of these trees once they are established. The effects of their root systems in holding soil and stabilizing riverbanks was one of the most important aspects of the restoration. Also, they provide great shade on a hot summer day to have a picnic along the river, something most southwesterners know very well.

Lessons Learned

1. Sizes of transplants do not matter—both will become established if they are transplanted in moist areas. Taller transplants are better in the event that cattle get through the fence after a flood