

Revegetation Recommendations from the LLPMC for the Santa Clara Creek Canyon

Essential Preliminary Activities

We advise that it is too early to initiate revegetation treatments on the canyon floor. Our recommendation is to wait until regular canyon flash flooding, active gullying, and sheet erosion with rock slides on the canyon walls and slopes subsides. Currently there is too much water and debris (boulders more than 10-feet in diameter and logs more than 40 feet in length) that flow down the canyon floor during intense rainstorms which may occur in the spring time, summer, or fall.

These activities are identified in the following sections.

Eliminate Invasive Weeds in the Canyon

Watch for the infestation of invasive weeds that can quickly colonize the vast areas of bare ground in the canyon and surrounding mountains, particularly those species on the New Mexico noxious weed list that are common to this area. These species include:

- Canada thistle (*Cirsium arvense*)
- Russian knapweed (*Acroptilon repens*)
- Dalmation toadflax (*Linaria dalmatica*)
- Perennial pepperweed (*Lepidium latifolium*)

A pocket guide containing pictures of these species of noxious weeds would help workers to identify them and notify their supervisor to promptly apply treatments. Herbicides are the only effective treatment against these weeds. By treating promptly, less herbicide will have to be used because the plant colony will have less time to spread, particularly at higher elevations which receive more precipitation than do lower elevations. The use of the proper herbicide labeled for a particular weed is the only way to control these rhizomatous, invasive species.

The tribes that we have worked with in the past were initially opposed to using herbicides. It would be advisable to get approval as soon as possible to use these herbicides (if not already approved) before the situation arises where herbicide treatment needs to be applied promptly.

Develop Plant Materials at the Pueblo

The Tribe is interested in using local germplasm for the development of the plant materials that will be used for the revegetation treatments and have been collecting local seed. We suggest that they continue to collect seed from plants in the canyon and surrounding mountains and to include grasses, forbs, shrubs, and trees. During our brief visit, I observed colonies of very healthy mountain muhly, muttongrass, and woods rose. This seed would be very easy to collect with the proper timing. The Pueblo is welcome to come to the LLPMC, and with training, would be able to use our seed cleaning equipment. If there is a decision to produce containerized transplants or install grass and forb seed production fields at the Pueblo, they are always welcome to come and visit us again. Our plant ecologist, Dr. David Dreesen, has his PhD

in horticulture from Cornell University, and he was a Research Associate of horticulture at Cornell. He has been successfully propagating native plant materials from all elevations in New Mexico for the past 25 years and has written many Scientific Journal articles on innovative propagation strategies for New Mexico native plants.

Generally, just regular hay and corn farming equipment with a seed harvester is all that is needed to install and maintain most grass and forb seed production fields. For a seed harvester, we would suggest the purchase of a \$3,000 Trac Vac or something similar (Figure 1). This is a PTO driven vacuum machine and is very easy to operate, affective, and it relatively inexpensive compared to a \$100,000 plot size combine. Seed harvested by this equipment may be directly planted without any additional processing.



Figure 1. Harvesting bottlebrush squirreltail seed with a vacuum harvester

Initiate Vegetation Trials–Upper Watershed

Begin vegetation trials on slopes and flat areas of the upper watershed to determine what vegetation can be successfully established before spending a considerable amount of resources on revegetation treatments. Include areas where contour felling has occurred on steep slopes. Trials should include both seeding and transplanting of plant materials. Successful establishment of plantings involves managing

sustainable moisture. If the roots of the plants or seedlings dry out, the plants will die. Any soil treatment that enhances moisture retention and reduces surface evaporation would be desirable (i.e. mulching after seeding or planting).

Seeding trials should be practical for the steep slopes that dominate the area and may include:

- Aerial seeding
- Hydro-seeding
- Hand broadcasting
- Hand held mechanical broadcaster
- Different types of tractor-mounted seeding equipment where practical
- Mulch treatments (for example, different depths of wood chips and hay mulch)
- Time of seeding (spring, summer, or fall)
- Diversity of native species

Transplanting trials should also be initiated. Because local plant materials are currently not available, we recommend planting commercially available plant materials from New Mexico or southern Colorado that are adapted to the same elevations of the canyon. The LLPMC can provide assistance locating adapted plant materials. Transplanting trials should include several species, containers of various depths (which determines rooting length), and time of planting (spring, fall, and winter). Generally, in the Southwest the very best performing treatments will be those that most efficiently utilize the limited water between rainfall events. Successful transplanting methodologies are generally very expensive, and are often used to establish seed source islands to improve diversity of an ecosystem. We have had great field transplanting success (80% or higher) by sub-irrigating shrubs grown in tall pots (30" deep containers) twice in the spring with a hydrated starch polymer. An example planting of this can be seen on a 6-mile highway median planting of 2,000 plants on NM Highway 285 between Interstate 25 and the Lamy turnoff (Figure 2). The planting is in its 14th year.



This established shrub planting by the 12th year only received two irrigation treatments in the village of Eldorado, NM

Mid-Term Activities Continue Focus on Stabilization

- Initiate successful revegetation treatments from the trials beginning in the upper watershed where vegetation densities need to be improved to help armor the site enhancing slope stability.
- Continue the application of proven vegetation treatments focusing on north and east facing slopes that traditionally respond better to revegetation treatments because they receive less sunlight which reduces moisture stress. Also, focus on flat areas with shallow topsoil to protect it because these areas have a good chance of successful establishment as long as the topsoil remains in place.

Late Term Activities After Sufficient Stabilization Has Been Achieved

- Apply vegetation treatments to canyon floor including in the riparian zone
- Consider using water weirs at appropriate locations on inside turns (composed of rock or logs used to reduce velocity of flow) to encourage sedimentation to reduce bank erosion.

- Consider using long-stem narrow leaf cottonwoods, willows, alders, redosier dogwood, birch and other species to rebuild the riparian ecosystem.



Plants established using long-stem technology without irrigation and Rock Weirs* on the Rio Grande in Bernalillo, NM six years after planting (2012) .

*Rock Weirs installed by the Bureau of Reclamation, Albuquerque, District Office