

Channel Restoration at the Treatment Plant Arroyo in Taos

Keystone Restoration Ecology for Amigos Bravos

Dec 1, 2011

Introduction:

Steve Vrooman of Keystone Restoration Ecology performed an assessment of the lower Rio Pueblo de Taos with Rachel Conn of Amigos Bravos. This reach of the river is classified as impaired for both sediment and temperature by the New Mexico Environment Department's Surface Water Quality Bureau (SWQB).

Watershed Assessment:

The Taos Valley Regional Wastewater Treatment Plant is located in the middle of the floodplain of an arroyo that drains much of the southern end of Taos. The arroyo was pushed to the western edge of the valley to protect the treatment plant, and this shortening of the channel created a steeper slope and a gully downstream from the treatment plant. The outfall from the plant flows into this gully and flows downstream to the Rio Pueblo de Taos.

The entire watershed is in poor condition, the proliferation of roads and gullies upstream contribute both sediment and water to the Treatment Plant Arroyo. In large flood events, this sediment continues downstream to the Rio Pueblo, harming the fish habitat and causing sediment problems for the river.

The original form of this channel was probably wide and flat, similar to the channel upstream from the treatment plant. As this arroyo flowed downstream, the basalt bedrock lifted the water table and grew riparian vegetation such as willows and cottonwoods. In addition, the location of the well field is on a former alluvial fan, which was created by when the arroyo channel grade flattened at the Rio Pueblo and deposited its sediment in a delta fan. This fan would have stored a large amount of sediment and grown riparian vegetation, a large patch of wetland to the west of the wells and one huge cottonwood are all that remains of this alluvial fan.

Solutions: Watershed restoration involves addressing the root causes of the problem, rather than the symptoms. The root causes are:

Watershed problems (above the treatment plant)

- Too many dirt roads with poor drainage contributing soil and water to the arroyo
- Areas of sediment contribution such as the informal 4-wheeler park in the arroyo near the golf course
- Headcuts and gullies adding sediment to the arroyo

Watershed solutions

- Dirt road closure and drainage of roads onto healthy landforms and vegetation
- Closing 4-wheeler park and using this area to store sediment

- Repair of headcuts and gullies with hand-built rock structures and Induced Meandering

Arroyo channel problems (below the treatment plant)

- Cutting off of former floodplain caused gullying
- Gullied form keeps water table low and vegetation component weak
- Lack of alluvial fan to store sediment and filter water

The arroyo channel repair will depend on the interest of the landowners involved, including the Town of Taos and the owner of the leased land of the wellfield.

1. Gullied form of channel and loss of floodplain

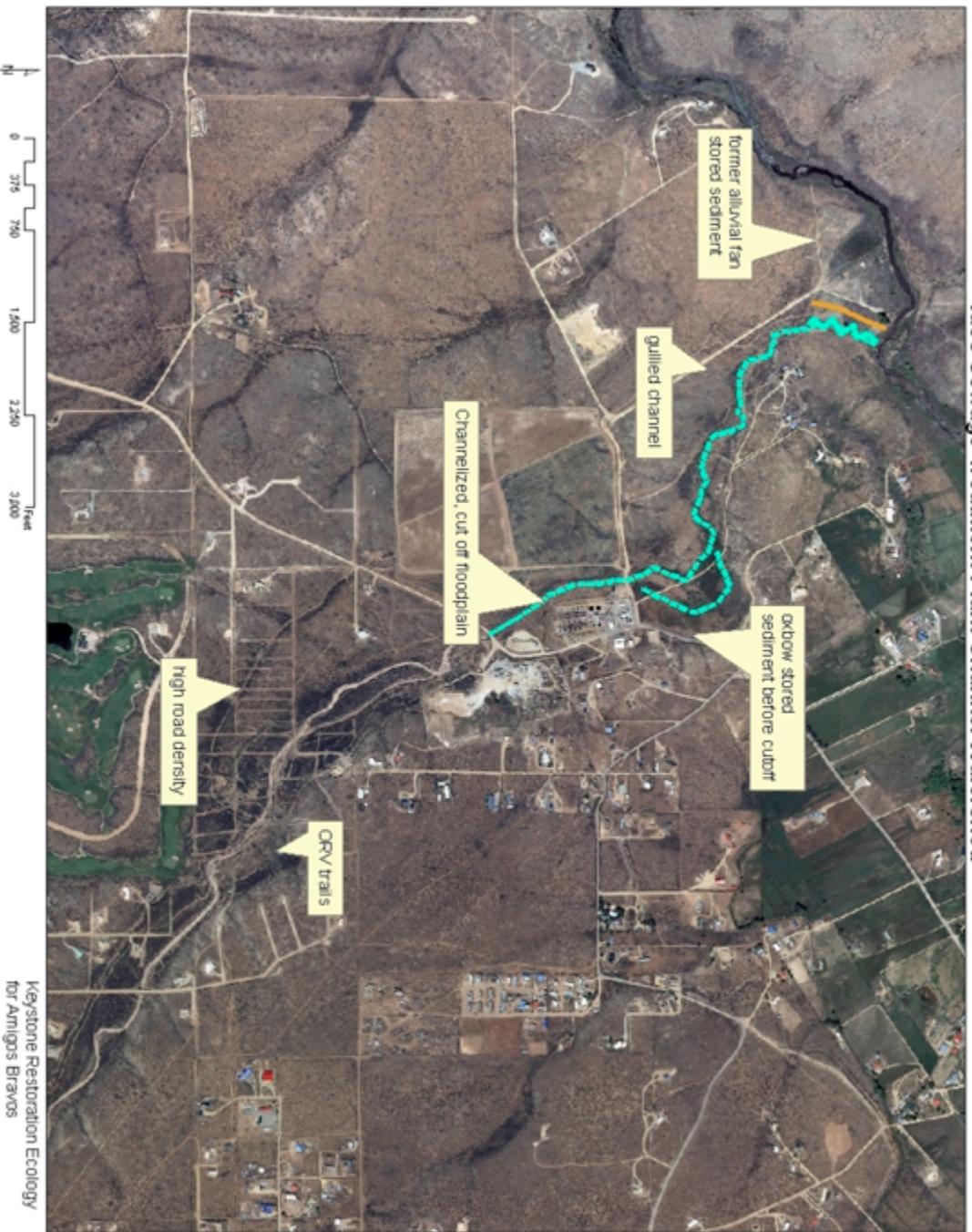
Some possible solutions include the addition of grade control structures in the channel to raise the water table and grow more willows and wetlands vegetation on the banks of the channel. Large flood events carrying sediment will be slowed down and buffered by this new vegetation, floodwaters will have access to the floodplain, and much less sediment will pass downstream to the river.

2. Loss of alluvial fan

We propose to re-build a meandering channel in the alluvial fan by removing a large amount of sediment and using this sediment to create a berm to protect the wellfield. The removal of this sediment will create the space for both a meandering channel and a floodplain for this channel. A new, meandering channel will be dug that is appropriate to the slope and size of the watershed. Willows will be planted on the floodplain, which will be colonized quickly by wetland vegetation from the banks of the river. When floods come downstream from the upper watershed, they will spread across this newly created floodplain and the floodwaters will deposit their sediment.

One additional benefit to channel restoration below the sewage treatment plant is that the meandering channel and groundwater storage will create additional time for water to flow through sediment and for nutrients and contaminants to be filtered out before the outfall water reaches the Rio Pueblo. This riparian corridor will also create many acres of good habitat for wildlife and plants.

Taos Sewage Treatment Plant Channel Watershed



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Rio Pueblo de Taos Channel Restoration

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Hockmeyer Property

Brad is the former owner of KTAOs radio station and is building a geodesic dome house on his land on the lower Rio Pueblo de Taos. Brad contacted Rachel about riparian health and land management on his property, especially an area of extreme bank erosion that is eating away at his land. A walking assessment was performed of the Hockmeyer and Webber (downstream neighbor's) properties, and some recommendations were created for river restoration to address the temperature and sediment impairments.

Problem Assessment:

The Rio Pueblo de Taos has been modified and the channel moved to the edge of the valley. The evidence for this exists in the location of the cattail wetland downstream on the Webber property, this was the former channel. This moving of the river channel to one side of the valley is very common in Northern New Mexico, this is done to create more irrigated land for agriculture. Often this modification happened more than 100 years ago and the old stream channel may be obscured by vegetation or even filled in with soil to create a level pasture.

The present channel form is a Rosgen "B" channel, with a high Width/Depth ratio that inhibits the movement of sediment through the system. The excess sediment in this area is most likely due to uplands erosion from watersheds in poor condition as well as bank erosion from grazing cattle and horses. This sediment forms mid-channel bars in the river, which pushes the river against its banks and causes bank erosion on the outside bends. The sediment from the bank erosion is deposited downstream on the next mid-channel bar, which causes more bank erosion, and this problem continues downstream.

Large Scale Solutions:

The channel form that would be most desirable in the present location would be a Rosgen "C" channel with a meandering form, active floodplains with willows thickets, and a riparian overstory of cottonwoods. Pools would form at the outside of the bends, and sediment would move downstream and be captured on floodplains created by new meanders in the channel.

Many of these changes would happen naturally if cattle are either excluded from the floodplain, or managed for winter grazing only. This would allow bank vegetation and willows to grow and flourish, and keep the channel narrow and water temperature low. Some structures could be installed to encourage the meandering of the channel in the proper wavelength for the river. A 300 foot wide buffer around the river channel would allow for re-growth of the willows and for these changes to occur.

Small Scale Solutions

Without the agreement of a number of landowners and grazing exclusion from the river, there are smaller scale solutions to address the immediate problems of bank erosion and sediment falling into the river. The bank erosion at the upper end of the Hockmeyer property is due to straightening of the river and the increased slope, the Rio Pueblo is attempting to re-meander itself through bank erosion. Another way to disperse this excess energy is by the installation of J-Hook Vanes, which create a pool, and move the flow of the river away from the bank, slowing or stopping the bank erosion.

Across from the J-Hook Vane, a large arroyo from the uplands dumps sediment into the River, increasing the sheer stress on the eroding bank on the Hockmeyer property. Some earth moving could re-create the former alluvial fan and spread this sediment across the floodplain, keeping it out of the river. Without grazing exclusion and the addition of willows along the riverbanks, the installation of J-Hook Vanes would address the most severe bank erosion and create great fish habitat. However, the majority of the channel would remain wide and shallow, and continue to have problems moving and depositing sediment. Larger scale cooperation between landowners would have a better chance of addressing these systemic problems of the Rio Pueblo de Taos.



Rosgen J-Hook from upstream, eroding bank would be on left of picture

