Comanche Creek Morphology & Riparian Vegetation Monitoring Report

June 2005

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Rosgen Level II and Vegetation Monitoring in the Middle and Lower Reaches of Comanche Creek Monitoring, June 2005

Background: Steve Vrooman of Cuchilla Blanca Ecology was asked to perform monitoring at two sites on Comanche Creek in the Valle Vidal. Both sites were located in areas where Elk exclosures had been built. The crew taking data at the Large Elk Exclosure site included Abe Franklin (NMED), Nansy Carson (Rangeland Hands), Deborah Myrin (Quivira) and Steve Vrooman. Deborah Myrin and Steve Vrooman completed the monitoring at the lower site, Steve Vrooman and Katrina Salsman came back in August 2005 to re-survey the longitudinal profile (for bankfull and water level elevations, which hadn't been done in June).

We performed Rosgen Level II monitoring (cross sections, longitudinal survey) at both sites. We also set up several "hubs" to very accurately monitor the changes in bank location and shape due to the installation of Vanes for bank protections. A hub is several cross-sections arising from the same central point (the hub), unlike typical monitoring cross-sections, they may or may not be located at the "riffle" of the stream.

Vegetation monitoring was also performed at both sites using "Monitoring the Vegetation Resources in Riparian Areas" by Alma H. Woodward, also known as "Greenline Monitoring". We performed Vegetation Cross-Section Composition, Greenline Composition, and Woody Species Regeneration monitoring at both sites.

Site 1 (Large Exclosure Site) was placed in the large Elk Exclosure on Comanche Creek off of where Forest road 1950 leaves the Comanche Creek valley. This site is upstream of a tributary called Springwagon Creek, which enters from the right. Site 2 is about 1.2 miles upstream from the confluence of Comanche Creek with the Rio Costilla, and runs through three small Elk exclosures, numbers 43-45.

Site 1: Large Elk Exclosure, Greenline Monitoring:

Greenline Composition: We identified 10 native communities while walking the greenline (edge of vegetation on bank). The sites appeared to be stratified depending upon the amount of disturbance (grazing or flood scouring) and the water table (whether the vegetation was upland or riparian).

Community Type	Percent Composition	Successional Status (late or early)
Beaked Sedge/Baltic Rush	73	L
Baltic Rush/Native Clover/Small Sedge	8	L
Bluegrass/Artemisia frigida/Rubberweed/ Elymus longifolius	5	E
Baltic Rush/Small Sedge, Poa pratensis (Bluegrass)	5	L
Smooth Brome/Native Clover/Equisetum (horsetail), Poa Pratensis	3	E
Arizona Fescue/Poa pratensis/Erigeron divergens/ Shrubby cinquefoil	2.4	E
Coyote Willow/Beaked Sedge/sandy point bars	2	L
Poa pratensis/ coyote willow	1	E
Poa pratensis/Elymus longifolius/Gentian/Dandelion	0.6	E
Slender Wheatgrass	0.2	E

Data Analysis: The greenline measurements can be proportioned into Early Successional and Late Successional Communities. Eighty-eight percent of the greenline was measured as having a late successional community on the streambank. These were the areas with low-lying banks and little bank erosion. The other 12 percent of the greenline were early successional communities (or upland communities) found where there was active bank erosion, or the bank was high enough to be dry and have an upland plant community.

When these measurements are re-taken, there may be a natural growth of the Carex utriculata (beaked sedge) onto point bars that were scoured by the large floods in the spring of 2005. The most important information will be gained by looking at the banks that have been protected by vanes and the plant community that develops behind and downstream from the vane. If the vanes are working effectively, there will be a succession from the early successional types (Poa pratensis types) to a Carex utriculata or Juncus balticus community.

Vegetation Cross-Section Composition:
We surveyed the vegetative composition of three cross-sections at the Large Elk Exclosure site. We used three cross-sections that had been set up by John Pittenger (Pittenger 1-3). The table below considers all three cross-sections together in terms of their community composition.

Community Type	Percent Composition	Successional Status
Baltic Rush/Poa pratensis/native clover	54	L
Beaked Sedge/Poa pratensis/native clover	12	L
Poa compressa/Erigeron divergens/Cinquefoil	8	E
water	6	
Erigeron/Shrubby Cinquefoil/dandelion/Sedum	5	E (highly disturbed and scoured)
Baltic Rush/Erigeron Poa pratensis/dandelion	4	L
Arizona fescue/Baltic rush bluegrass	3	L
Slender Wheatgrass/ Baltic rush/Poa pratensis	3	E
Smooth brome/ Arizona fescue/Junegrass	3	E
Poa pratensis/ Junegrass/ Artemisia frigida	2	E

Data Analysis: This data can be proportioned into Early and Late Successional Communities. Most communities that had Baltic rush was considered a late successional community, although many of these areas were disturbed (by grazing) and had a high proportion of early successional grass species, such as Poa pratensis, Smooth Brome, Junegrass and Slender Wheatgrass. Seventy-three percent of the cross sections were considered a late-successional community due to being dominated by Baltic Rush or Beaked Sedge. Twenty-seven percent of the cross-sections were considered early successional, either due to being a dry area (and an upland community) or due to being highly grazed in the past.

When these measurements are re-taken, it will be difficult to see a huge response, even if the area is left ungrazed and the water table rises. Many of the communities with Baltic Rush may change to a slightly wetter community, but this will be difficult to measure. For example, the community just uphill from the edge of the stream in the active floodplain is most often the Baltic Rush/Poa pratensis/Native clover community. If an area changes to being wetter or less disturbed, the Baltic Rush/Erigeron/Poa pratensis community may change to the wetter community above (Baltic Rush). Also the Erigeron/Cinquefoil/ Dandelion/Sedum community may change into a Baltic Rush type as it recovers from the large floods in the spring of 2005.

Woody Species Regeneration:
We walked the Greenline and measured any woody species that we came across. This site is of low gradient and very wet and cold, and it may be that few woody species would be found here in a "natural state" 200 years ago. The coyote willows we measured appeared to all be a result of planting by volunteers.

Species	Seedling	Sapling	Mature	decadent/dead	total
Alder		1			1
Coyote willow		28	6	1	35
Rubberweed	6	13	15	2	36
Shrubby Cinquefoil		1	2		3
Total Upland	6	14	17	2	39
Total Riparian		29	6	1	36

Data analysis: There are more upland than riparian woody plants on the greenline at the site (39 versus 36). Rubberweed (Chrysothamnus sp.) was most dominant and appeared to be regenerating (6 seedlings). There was a healthy number of coyote willows at the site, they were all about 3 feet tall and appeared to be planted. One Alder was found at the upstream end of the survey site, and appeared to be heavily browsed (Elk were getting into the exclosure). An absence of regeneration by woody species may indicate that there is no seed source, if willows can thrive here, why can't they reproduce. The new point bars deposited by the spring 2005 floods may be the ideal substrate for woody species regeneration, but few of the riparian woody plants were mature enough to make seed.

Overall Results from Greenline Monitoring at the Large Elk Exclosure:

This site has a healthy riparian community, but bank erosion has prevented it from stabilizing completely. Excluding Elk and the protection of banks with vanes may cause the entire greenline to change to a highly stable, Beaked Sedge community. There is some growth of riparian woody species (coyote willows) but they all appear to be planted. One native riparian woody species, an alder, was found and it is heavily browsed by Elk getting through the exclosure.

The heavy spring flooding in 2005 caused a lot of bank scour, erosion, and deposition of new point bars. The natural healing processes from this flood will probably show an improvement in plant community types to a later successional community, no matter what the management is. Basically, our measurements in June were just after an extreme disturbance event and the effects of natural recovery need to be separated from the effects of good management (exclosures and vanes).

In particular, future monitoring should look for evidence of regeneration of woody species on the new point bars deposited in spring 2005. Also, the banks that are protected by vanes should be looked at closely to see how quickly they are healing and if the vanes are effective in preventing bank erosion. This will be indicated by the growth of Beaked Sedge onto the material that is deposited behind the vane.

Site 2, Lower Site, Greenline Monitoring

Greenline Composition: We identified 5 native communities while walking the greenline (edge of vegetation on bank). The sites appeared to be stratified depending upon the amount of disturbance (grazing or flood scouring) and the water table (whether the vegetation was upland or riparian).

Community Type	Percent Composition	Successional Status (late or early)
Beaked Sedge/Mentha arvensis	65	L
Baltic Rush/Poa pratensis/ Thermopsis (goldenpea), small sedge	26	L
Poa pratensis/ smooth brome/ stinging nettle/Beaked sedge	4	E
Poa pratensis/dandelion/ Juncus Balticus	1	E
Poa pratensis/Idaho fescue/ Junegrass/sedge	1	E
Gravel/boulders	3	none

Data Analysis: The greenline measurements can be proportioned into Early Successional and Late Successional Communities. Ninety one percent of the greenline was measured as having a late successional community on the streambank. These were the areas with low-lying banks and little bank erosion. The other 6 percent of the greenline were early successional communities (or upland communities) found where there was active bank erosion, or the bank was high enough to be dry and have an upland plant community. Three percent of the bank was boulders, near the end of the longitudinal profile underneath the rocky cliffs on the right bank.

When these measurements are re-taken, there may be a natural growth of the Carex Utriculata (beaked sedge) onto point bars that were scoured by the large floods in the spring of 2005. This site was unique in that many of the banks had been scoured away and the narrow band of Beaked Sedge along the bank was gone. If the Baltic Rush/bluegrass community (26%) changes into the Beaked Sedge community, then natural healing is occurring.

The most important information will be gained by looking at the banks that have been protected by vanes and the plant community that develops behind and downstream from the vane. If the vanes are working effectively, there will be a succession from the early successional types (Poa pratensis types) to a Carex utriculata or Juncus balticus community.

Vegetation Cross-Section Composition:
We surveyed the vegetative composition of three cross-sections at the lower site, which were cross-sections 1, 3, and 5 of Hub 1. The table below considers all three cross-sections together in terms of their community composition.

Community Type	Percent Composition	Successional Status
Juncus balticus/Poa pratensis	33	L
Poa pratensis/small sedge/ Shrubby Cinquefoil/ Erigeron	33	E
Poa pratensis/Thermopsis Montana/ Dandelion	18	E
Water	7	
Beaked Sedge/mint	6	L
Poa pratensis/gravel	1	E
Smooth brome/Poa pratensis	1	E
Poa compressa	0.5	E
Gravel	0.5	E

Data Analysis: This data can be proportioned into Early and Late Successional Communities. In contrast to the Large Elk Exclosure site, there was much less Beaked Sedge type; it was only a narrow bank along the banks. Thirty nine percent of the cross-sections was considered late successional, and dominated by either Juncus balticus or Beaked Sedge. Fifty three percent of the cross-sections were considered early successional, either due to being a dry area (and an upland community) or due to being highly grazed in the past. This site appears drier than the Large Elk Exclosure site, and is much more dominated by Poa pratensis (Kentucky bluegrass).

When these measurements are re-taken, there may be a much greater coverage by Beaked sedge, as much of this community was scoured away by the spring 2005 floods. Much of the site is dominated by Kentucky bluegrass, with only a few native grasses, such as Junegrass, present. The presence of Goldenpea (Thermopsis montana) and dandelion shows that there may be a lot of grazing disturbance keeping these weedy species in high supply.

There is a large patch of Canada thistle spreading along the road in the vicinity, which the Forest Service knows about.

Woody Species Regeneration:
We walked the Greenline and measured any woody species that we came across. The small exclosures at the site were set up to protect riparian plantings from heavy browsing.

Species	Seedling	Sapling	Mature	decadent/dead	total
Alder	1		2	1	4
Coyote willow		2	1		3
Peach leaf willow		3			3
Gooseberry (Ribes sp.)		7			7
Shrubby Cinquefoil	11	18	1		30
Cottonwood (pole plantings)				3	3
Total Upland	11	25	1		37
Total Riparian	1	5	2	3	11

Data analysis: There are more upland than riparian woody plants on the greenline at the site (37 versus 11). Shrubby cinquefoil was very common and is usually a response to overgrazing (it invades disturbed grasslands); gooseberries were found in the rocky areas underneath the cliffs. There were a few willows (coyote and peach leaf) at the site and they all appeared to be planted. The alders at the site appear to be native and are heavily browsed. The three cottonwoods at the site were pole plantings and were dead. An absence of regeneration by riparian woody species may indicate that there is no seed source due to heavy browsing (all appeared chewed down). The new point bars deposited by the spring 2005 floods may be the ideal substrate for woody species regeneration, but few of the riparian woody plants were mature enough to make seed.

Overall Results from Greenline Monitoring at the Lower Site:

The heavy spring flooding in 2005 caused a lot of bank scour, erosion, and deposition of new point bars. The natural healing processes from this flood will probably show an improvement in plant community types to a later successional community, no matter what the management is. Basically, our measurements in June were just after an extreme disturbance event and the effects of natural recovery need to be separated from the effects of good management (exclosures and vanes). The narrow band of beaked sedge was stripped completely away in many places, this was found to have regenerated quite a bit by August.

In particular, future monitoring should look for evidence of regeneration of woody species on the new point bars deposited in spring 2005. Also, the banks that are protected by vanes should be looked at closely to see how quickly they are healing and if the vanes are effective in preventing bank erosion. This will be indicated by the growth of Beaked Sedge onto the material that is deposited behind the vane.

Rosgen Level II monitoring at the Large Elk Exclosure Site:
This data was taken from Pittenger Cross-Section number 1. The pebble count was taken every 60 feet from the top of the reach (10 points between banks).

Parameter	value
Bankfull Width	13
Mean depth	1.6
Bankfull Area	21.2
W/D ratio	8:1
Max Depth	2.0
Flood prone width	155
Entrenchment	11.9:1
D50	8mm
Water surface slope	0.7 %
Sinuosity	Need valley distance from GIS
Stream Type	E4

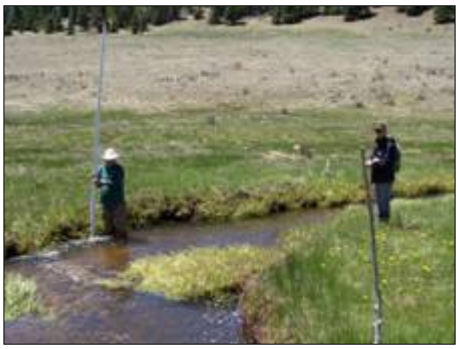
The data from the longitudinal profile and cross sections has been graphed in "The Reference Reach Spread Sheet".

There were two "hubs" set up in the Large Exclosure, Hub 1 was on the left bank and had four spokes, and was upstream near the top of the reach. Hub 2 had three spokes, one of which (2-2) was a repeat of Pittenger cross-section # 2. There were also two independent cross-sections, which are being called Pitt 1 and Pitt 3.

Geomorphology data taken at Large Elk Exclosure:
ComanchExclHub1-1
ComanchExclHub1-2
ComanchExclHub1-3
ComanchExclHub1-4
ComanchExclHub2-1
ComanchExclHub2-2
ComanchExclHub2-3
ComanchExclong (the longitudinal profile, also includes pebble count data under "materials sheet"
ComanchExclPitt1 (used for level II)
ComanchExclPitt3

Rosgen Level II monitoring at the Lower Site, 1.2 miles up from Costilla Creek:
This data was taken from Cross Section 3. The pebble count was taken every 60 feet from the top of the reach (10 points between banks).

Parameter	value
Bankfull Width	11.2
Mean depth	1.1
Bankfull Area	11.9
W/D ratio	11:1
Max Depth	1.6
Flood prone width	134
Entrenchment	12:1
D50	28mm
Water surface slope	1.16%
Sinuosity	Need valley distance from GIS
Stream Type	E4



The data from the longitudinal profile and cross sections has been graphed in "The Reference Reach Spread Sheet".

There was one hub with five cross-sections set up at the Lower Site. There were only two sites for vanes, and therefore, only one hub was seen as necessary.

Geomorphology data taken at Lower Site:
ComanchlowHub1-1
ComanchlowHub1-2
ComanchlowHub1-3 (used for Level II)
ComanchlowHub1-4
ComanchlowHub1-5
Comanchlowlong8-05 (resurveyed in August, also includes pebble count data

Plant Species List:

Alnus viridis (Alder)
Artemisia frigida (sage)
Bromus inermis (smooth brome)
Cirsium arvense Canada thistle
Carex utriculata (beaked sedge)
Dasiphora floribunda (shrubby cinquefoil)
Elymus longifolius (bottlebrush squirreltail)
Elymus trachycaulus (slender wheatgrass)
Equisetum hyemale (horsetail)
Erigeron divergens (fleabane, margarita)
Festuca arizonica (arizona fescue)
Hymenoxys richardsonii (rubberweed)
Juncus balticus (baltic rush)
Koeleria macrantha (junegrass)
Peach-leaf willow (not sure of species)
Poa pratensis (Kentucky bluegrass)
Ribes species (gooseberry)
Salix exigua (coyote willow)
Taraxacum officinale (dandelion)
Urtica dioica (stinging nettle)

Beaked sedge

Smooth brome

Fleabane