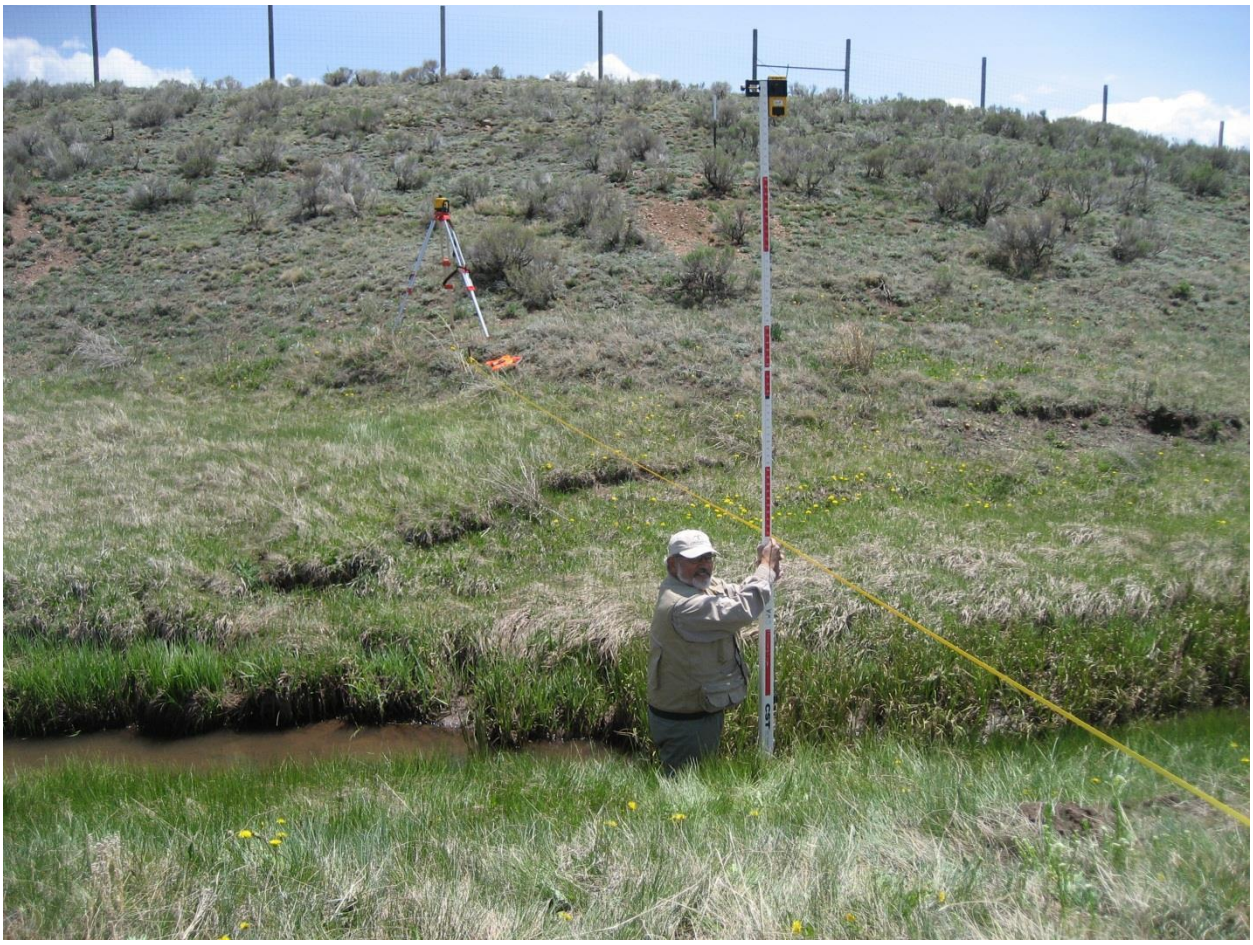
Cimarron Watershed Alliance/River Ecosystem Restoration Initiative

Cieneguilla Creek Riparian Ecosystem Restoration Project

2012 Final Report



Date: June 2012

Prepared by:
Implementation Task Manager: William "Hoot" Gibson
and Monitoring Coordinator: Alán Huerta

CIMARRON WATERSHED ALLIANCE, INC.

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Mission Statement:

"To strive for and maintain a healthy watershed for all residents through collaborative community activities involving all stakeholders with an interest in water"

Vision Statement:

"We envision a clean, healthy ecosystem where people work together to sustain and improve environmental and economic well-being for the region."

Attention: Deanna Cummings

Department of the Army

Albuquerque District, Corps of Engineers

Regulatory Division New Mexico/Texas Branch

4140 Jefferson Plaza NE Albuquerque, NM 87109

Subject: Action No. SPA-2010-00152-ABQ, Cieneguilla Creel Riparian Restoration Project

Ms. Deanna Cummings

Enclosed is the final Monitoring report for 2012. Hoot Gibson and I are very optimistic that the improvements we have worked on and the changes we have witnessed will continue to improve. The enclosed letter of request for termination and your copy of the 2012 Cieneguilla RERI Monitoring report are enclosed. Please note that Mr. Gibson had to retire from the board of the CWA and I have taken charge of the project as an officer of the CWA Executive Board. Any further questions or information should be directed to me. Thank you again for your attention to detail and suggestions.

Respectfully,

Alan Huerta, CWA Secretary.

11/15/2012
Attention: Deanna Cummings
Department of the Army
Albuquerque District, Corps of Engineers
Regulatory Division New Mexico/Texas Branch
4101 Jefferson Plaza NE Albuquerque, NM 87109

Subject: Action No. SPA-2010-00152-ABQ, Cieneguilla Creek Riparian Ecosystem Restoration Project

This is the third of required annual reports in accordance with requirements in the 404 permit with the submission of this annual monitoring report. The project involved construction of a large animal exclosure along approximately 1100 linear feet of the creek adjacent to and east of the Angel Fire County Airport. The exclosure provides the riparian area with protection from large animals and time for recovery. Seven pole vane structures with rock backing to secure installation and one rock flow through barrier to induce stream meandering were installed at locations identified by specialist from the NMED/SWQB. Cross-Section surveys were conducted to determine bank full and flood stage levels and vetted with the topographic characteristics at the site. Photo-documentation of the structures, permanent photo-point locations established with T-posts, monumented monitoring points for shade density, and water temperature data-loggers were established within the project area. Included are continuing photographic documentation, monitoring of water temperature, flow levels, and shade density for the water year of 2012. Willow and alder shoots were planted to support structure installations and at other points, calved grass clumps have controlled erosion. Thermographs were installed at the entrance and exit of the enclosure to detect changes in stream temperatures and photographic data is collected to determine if increased vegetation coverage occurs. A stream depth gauge has been installed and will be used to record stream levels during the monitoring period.

Summary. Project continues to progress as scheduled. Attached is the 2012 Report of the Monitoring Instrumentation package installed each spring and removed before snow fall each year. As can be seen from the pictures and readings from the nearby USGS station, snow runoff for the Cieneguilla Creek was moderate and stream flows never exceeded bank full situations. The relative to the effectiveness of the pole vane structures in terms of channel morphology may take more time than the life of the project or its funding. On the other hand, pole vane structures have altered the stream flow at all structure locations and some minor changes in the meander are evident. The top soil is characterized as 4-5 feet of alluvial fill with grass root systems that extend 18-20 inches deep and we attribute this hard pan clay formation has kept incising within the top 4 – 5 feet of the alluvial surface fill.

Over the years the stream bed has incised to below this grass root level resulting in significant sloughing type erosion of the banks where the stream course is subject to other than meandering patterns. The flow through rock dam structure continues to induce a change in stream channel sinuosity. The project remains completely fenced with no indication of any large animal penetration of the exclosure or any animal effects on the stream banks. Old large game trails and creek crossings have all but disappeared. 2011-2012 winter months were characterized as normal snow fall for the watershed coupled with, above average winds, and moderate spring temperatures that resulted in less than bank full spring run-off. As a result, flooding and the pole vane structures were effective in redirecting stream flow in areas that previously prone to erosion and calving of stream banks into stream bed. Overall flora and fauna growth has improved dramatically including growth of willow and alder. Avian, fish and rodent populations are increasing. Raptors continue to use the exclosure as a hunting ground.

Although the CWA grant for this project was complete on 30 June 2012 the large animal exclosure will remain in place and provide additional time for induced BMP practices to mature. Observed conditions as supplemented by photographs at each structure indicate improved functions and a total lack of impairment. CWA, therefore, requests release of the 5 year monitoring/report requirement as stipulated in the 28 May 2010 Corps project approval letter.

William "Hoot" Gibson; Implementation Task Manager; Alan Huerta; Project Manager

Cimarron Watershed Alliance, Inc.

5/20/12

Karen Menetrey

River Ecosystem Restoration Initiative
NMED Surface Water Quality Bureau
PO Box 5469
Santa Fe, NM 87504-5469

Subject: Cieneguilla Creek Riparian Ecosystem Restoration Final Report

The project involved construction of a large animal exclosure along approximately 2200 linear feet of the creek adjacent to and east of the Angel Fire County Airport. The exclosure provides the riparian area with protection and time for recovery. Structural prescriptions were installed to accelerate recovery. Structural prescriptions were installed to accelerate recovery within the enclosed area and along river portions that enter and exit the exclosure. Supplemental BMPs include re-vegetation of stream banks and installation of structural pole vanes, and rock baffles to recover stream morphology. The project also included mapping of in-channel structure treatments to document pre/post progress, the baseline of Proper Functioning Conditions (PFC), and documentation of seasonal shade canopy densities. All tasks with the exception of 3a and 3b have been completed.

Task 1a - Complete.
Task 1b – Complete.
Task 1c – Complete.
Task 2a - Complete.
Task 2b – Complete.
Task 2c - Complete.
Task 2d - Complete.
Task 2e - Complete
Task 3a - The Airport Manager objected to installation of the Raptor bird platform. Aircraft/bird collisions are considered a safety issue. A CWA supported Raptor platform has been constructed at Eagle Nest Lake. No Raptors have appeared in the area to use the platform and the State Park wildlife coordinator has requested we not place another platform at the lake until such time as raptors appear.
Task 3b- Task requested to be terminated and funds reallocated to another project.
Task 4a - Complete
Task 4b - Complete

Task 4c - Complete

Project Administration. Overall administration of the project was routine although there were a number of challenges for CWA.

The reimbursement nature of the RERI contract presented unique challenges. CWA is a volunteer organization with limited on-hand funds to finance the cost associated with many required start-up tasks. In order for planned actions to proceed on schedule, CWA had to establish a "line of credit" with a local bank to fund these expenses and the cost to establish and maintain line of credits are not reimbursable in the RERI contract.

Although the contract stipulates reimbursement request on a monthly or quarterly basis, the $1500 minimum placed on each request necessitated that some reimbursement be delayed until the established minimum was met. Again a challenge for organizations with limited cash flow situations.

Both 401 and 404 permit requirements were required and project monitoring requirements were not the same in the permits. The RERI Contract was for 3 years and the Corps of Engineer contract (404 Permit) required project monitoring for 5 years. Negotiations with the Corps resulted in a contract stipulation for a review at the 3 year point relative to release from the 5 year monitoring commitment. This request will be included in the CWA 2012 Annual report to the Corps and is expected to be approved.

Changes in stream bed morphology occur over an extended period of time. A 3 year project that involves site preparation (exclosure) followed by PFC (installation of structures) is not sufficient time to document other than observations of changes in stream bed morphology.

Budget. The proposed work plan budget and funds provided by RERI were adequate to accomplish all required tasks. At attachment #1 is an overview of the budget and funds spent. The Village of Angel Fire provided over 1500 willow shoots ($3000) for the initial plantings and replanting after the unexpected winter kill. Attachment #2 is a copy of the project time sheets for CWA personnel. Over 350 CWA hours were spent on project management, administration, and obtaining permits and over 150 hours were spent on BMP implementation. CWA matching funds in terms of man hours was met.

The $1040 provided in the budget for equipment was in sufficient. A total 0f $1899.70 was spent on equipment. CWA requested, and SWQB approved, a reallocation of $500 from Contracts to Equipment ($1540) and CWA provided the remaining $293.95. CWA funded the posts for the permanent photo points. $4600 in the budget was provided for services of Ecological Consultant Mr. Bill Zeedyke. Mr. Zeedyke's services were obtained and used, however, Mr. Zeedyke chose to provide his service "pro bono" and the $4600 was not used.

$360 in the budget was provided for support of Task #3a and 3b to build and install a Raptor bird platform in the exclosure. This Task was not accomplished and the CWA recommended to SWQB the funds be reallocated to other projects.

The budget provided $27000 for construction of the exclosure. The redesigned exclosure cost was $21,088.95.

$8,026.95 of the RERI allocated funds was not used. Of this amount $4,600 was for Mr. Zeedyke's Professional Services and $360 was for supplies (poles/lumber) for the Raptor bird platform.

Professional services Contracts. A Professional services Contract (09-677-5000-0016) was signed with NM Surface Water Quality Bureau authorizing project initiation on 19 May 2009. The Albuquerque District Corps of Engineers authorized the project on 28 May 2010 (404 Permit SPA-2012-00152-ABQ) and 401 Permit (SF-700) was issued by NMED SWQB on 8 June 2010. The Angel Fire Resort holds title to the project site and written approval for land use was obtained from the Resort. Colfax County hired Parametrix to conduct a Cultural Resource Survey of the planned airport exclosure project. Parametrix Representatives toured the project site on7 April 2009 and subsequent discussions with Cultural Affairs personnel in Santa Fe indicated the two projects are contiguous and a separate Cultural Survey was not needed.

Ecological Consultant. Task #2 in the Work Plan stipulates the technical services of Mr. Zeedyke be obtained to identify the project site, exclosure boundaries, and to define, locate stream structure treatments. Mr. Zeedyke was contacted on 20 April 2009 and on 11 May 2009 spent over 4 hours on site providing advice relative to the planned exclosure, and stream bed structure treatments. On 27 May 2009 Mr. Chris Cudia toured the site and reviewed specifics relative the exclosure and planned structures. Mr. Zeedyke subsequently advised he would not submit an invoice for his services as his visit was in conjunction with a similar survey at another CWA project (Ponil project) and his services were "pro bono".

Outreach. Task 3a and 3b in the work plan were based on building and installing a Raptor bird platform at the North end of the exclosure. The Colfax county Airport Manager voiced safety concerns relative to the platform. Aircraft/bird strikes are a concern at all airports and efforts should be to dissuade rather than attract birds. CWA discussed relocating the platform; however, a similar project at Eagle Nest lake did not attract any Raptor birds. In April 2009 CWA contact was established with the University of New Mexico and on 11 April 2009 CWA provided a tour and briefing to a UNM student. On 3 Nov 2010 CWA provided a similar tour to members of "Trout Unlimited" and on 29 Nov 2010 another tour was provided for students of the "Rocky Mountain Youth Corps". On 25 March 2011 CWA provided a tour on the project to a representative from an Australian watershed organization. Interface with the Village of Angel fire and local newspaper continued during the project and newspaper printed an excellent story about the project.

Exclosure Structure Prescriptions. In 2008 Colfax County obtained an FAA grant to install a large animal exclosure around the airport. In that the CWA project was contiguous to the planned County exclosure, CWA incorporated county exclosure specifications in our exclosure. Exclosure specifications are in Attachment #3. Discussions were then held with the County Manager (Don Day) relative to joint use of portions of the exclosure thus providing CWA

with the ability to increase the size of our proposed exclosure. Unfortunately the County received a protest on their project contract and the project was placed on indefinite hold. The CWA decided to proceed and obtained bids for a smaller exclosure. Fencing contractors in Raton, Santa Fe and Albuquerque were contacted, however, only one (Western Fence in Santa Fe) submitted a bid. The Western fence was accepted by CWA and the exclosure was completed in about 60 days. Colfax County eventually resolved their contract protest and installed their exclosure in 2011. In that our exclosure was already in place and was to the same specifications, the county tied onto CWA exclosure thus saving the County the Cost of a portion of their exclosure installation. The CWA project remains completely fenced with no indications of any large animal penetration

In Stream Structural Prescriptions. The Cieneguilla stream bed consists of 5 -6 feet of Alluvial Fill atop a layer of dense Clay. The top spoil is covered with various grasses with root structures that reach depths of 15 -18 inches. Over the years the stream has incised to the Clay layer. Vegetation at the bottom of the incised stream bed consists of various aquatic grasses and reeds with dense root structures resting on the Clay layer. During periods of heavy snow run offs and after summer thunderstorms the stream level rises above the bank full level with turbulent stream flows that undercut the top soil below the grass root layer resulting in erosion as the top soil sloughs into the Stream bed. Six of these sites were in relative contained areas. Pole Vane Structures were installed in these six areas to induce a more symmetric meandering of the stream bed. Rocks, willow shoots and grasses were placed on the stream bank side of the structures to provide stability as the stream course was realigned away from the structure. The seventh area was in an area that was not so contained. A flow through rock barrier structure was placed in the stream to induce stream bed meandering onto adjacent terrain. Stream bed meandering did occur which also resulted in an increase of stream sinuosity. Changes in the stream bed course and morphology are evident at each of the installed structures and these changes will become more evident over time. Attachment #4 (2012 Monitoring Report) and the previous Monitoring Report provide pictures and details of Pre and Post prescription results.

Monitoring. Attachment #4 is the 2012 Report of the monitoring Instrumentation installed each spring and removed before snow fall each year. Pictures and readings from nearby USGS station show that snow run off for the Cieneguilla Creek was moderate and stream flows did not exceed bank full situations. In fact the creek was actually dry for a couple of weeks in 2011. Thus there is little to report relative to the effectiveness of the pole vane structures in terms of channel morphology changes. On the other hand the pole vane structures exceeded expectations in terms of the control of stream bed meandering and that flow at the pass through rock dam structure induced a change in the channel structure, morphology, and stream sinuosity. Attachment #5 (2011 Monitoring Report) These reports documents these changes in pre/post installation photos.

Summary. The general goal of this project was to restore the riparian ecosystem of the creek to a point where it is near its potential to support a diversity of life. This general goal was met. The project has shown that the Cieneguilla creek riparian ecosystem (within the confines of an exclosure) can be restored to support a diversity of life. The lessons learned validate the fundamental principles of water quality and riparian ecosystem standards. Specifically channel courses and morphology affect erosion and sediment transport rates, the connectivity between riparian and floodplain areas, the relationship between vegetation and direct solar radiation, and the effects of woody plant densities on erosion and water quality. Application of these principals to the entire 13.8 miles of the Cieneguilla Creek will be difficult as most of the creek is on private land that is primarily used for cattle grazing.

Other benefits from the project include observations and documentation that the BMP practices and structures are effective. Protected stream crossings quickly re-vegetated, pole vanes re-directed stream flows, and rock barriers quickly induced stream meandering.

Public and Municipal interest was greater than expected. The Village of Angel fire quickly responded to the request for willow shoots, the local paper closely followed project progress, and several organizations toured and showed interest in the project.

Colfax County benefited from the project by tying into and using a portion of CWA exclosure.

CWA gained Water Quality experience and expertise that will be beneficial for use in future water quality projects.

William R Gibson

William "Hoot" Gibson
Implementation Task Manager

Attachment #1 Budget Overview

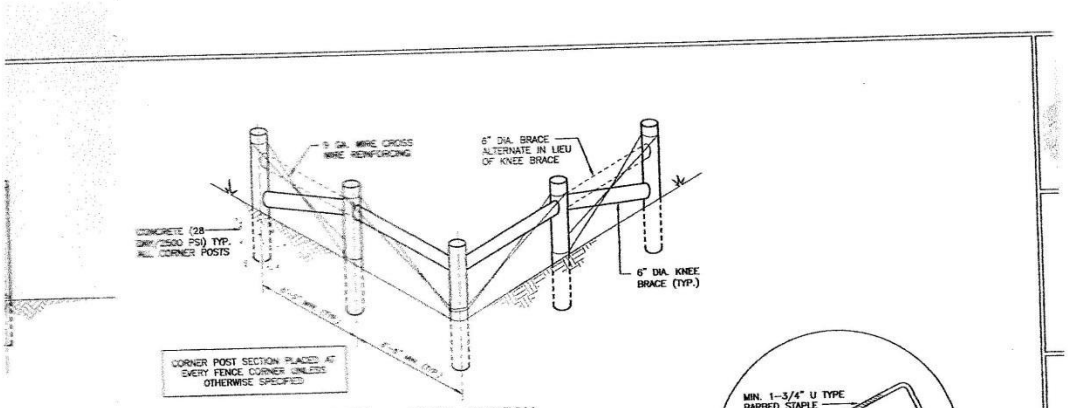
Attachment #2 Project man hour Time sheets

Attachment #3 Exclosure Specifications

Attachment #4 2012 Monitoring Report

Attachment # 5 Tri-Annual 2009-2010-2011 Monitoring Report

Plans and Specifications of Exclosure



CORNER POST – PANEL SECTION

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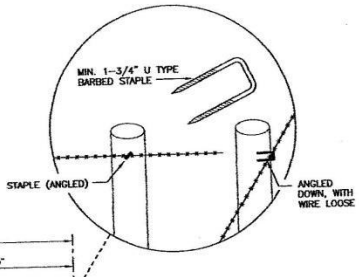
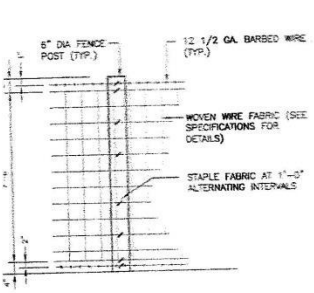
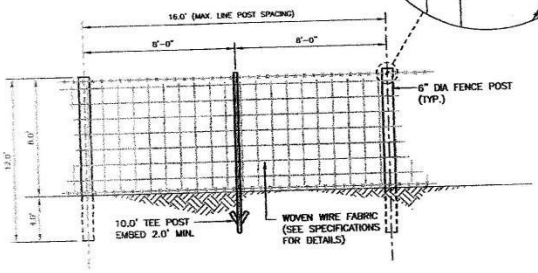




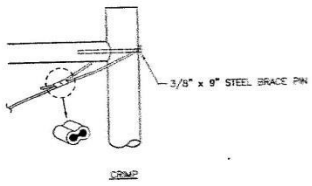
ENCE FABRIC SPACING DETAIL

CALE: NONE



LINE POST

SCALE: NONE



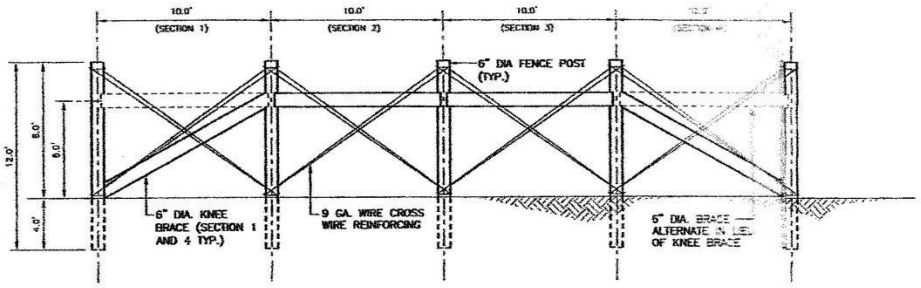
POST FASTENING DETAIL

SCALE: NONE

FENCING NOTES

1. LINE BRACE POST SECTIONS SHALL BE SPACED AT 400' INTERVALS, WHERE FENCING IS CONTINUOUS AND WHERE END CORNER POSTS ARE NOT SPECIFIED.
2. ALL WOODEN POSTS AND BRACES SHALL BE TREATED (SEE SPECIFICATIONS).
3. BARBED WIRE SHALL BE DOUBLE WRAPPED AND TIED OFF AT END POSTS, CORNER POSTS, AND LINE BRACE POSTS. WOVEN WIRE FABRIC SHALL BE SINGLE WRAPPED AND TIED OFF. FENCE TO BE CONTINUED SHALL BE RESTARTED IN LIKE MANNER.
4. FENCE MAY BE PLACED ON EITHER THE AIRPORT SIDE OR THE FIELD SIDE OF POSTS, DEPENDING ON LOCAL CONDITIONS; I.E., ON CURVES THE WIRE SHOULD BE PLACED ON THE SIDE WHICH WOULD RESULT IN THE LEAST AMOUNT OF TENSION ON THE STAPLES. THIS WILL ALSO APPLY WHERE WIND DRIFT OR OTHER CONDITIONS WOULD EXERT UNUSUAL PRESSURE AGAINST THE WIRE.
5. WOVEN WIRE FABRIC SHALL CONFORM TO AASHTO M 279 (ASTM A 116) DESIGN NO. 1047-6-11 WITH CLASS 1 COATING.
6. STEEL BARBED WIRE SHALL CONFORM TO AASHTO M 280 (ASTM A 121) 12 ½ GAGE WITH CLASS 1 COATING.
7. ALL FENCE WIRE TIES, BRACE WIRES, STAPLES AND OTHER WIRE APPURTENANCES SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M 232.
8. GAP CLOSURE – CONSTRUCT FENCE WITHOUT OPENINGS OR GAPS. WHEN A 6" OR LARGER GAP EXISTS BELOW THE NORMAL BOTTOM FENCE WIRE, CLOSE THE GAP ACCORDING TO THE CLOSURE DETAIL. ALL EXTRA MATERIAL USED FOR GAP CLOSURES OF ANY TYPE OR LOCATION SHALL BE INCLUDED IN THE WORK.
9. CORNER, END, AND GATE POSTS SHALL BE SET IN CONCRETE BASES AS SHOWN ON THE PLANS. ALL LINE POSTS MAY BE EITHER DRIVEN OR SET IN DUG HOLES TO A PENETRATION AS SHOWN IN PLANS.
10. SEE SHEET C-502 FOR TYPICAL TUBULAR GATE DETAILS.

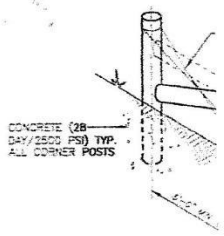
ATTCH 3



BRACE POST SECTION

SCALE: NONE

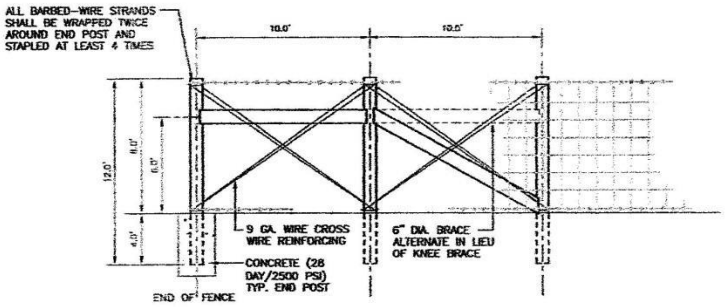
BRACE POST SECTION SHALL BE SPACED AT 400' INTERVALS, WHERE FENCING IS CONTINUOUS AND WHERE END CORNER POSTS ARE NOT SPECIFIED



CORNER POST SECTION PLACED EVERY FENCE CORNER UNLESS OTHERWISE SPECIFIED

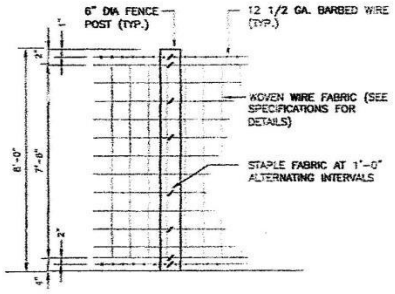
CORNER

SCALE: NONE



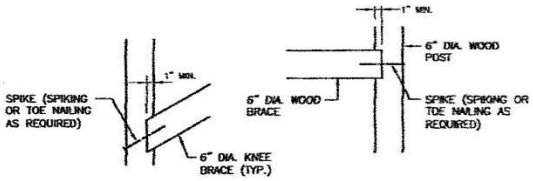
END POST SECTION

SCALE: NONE



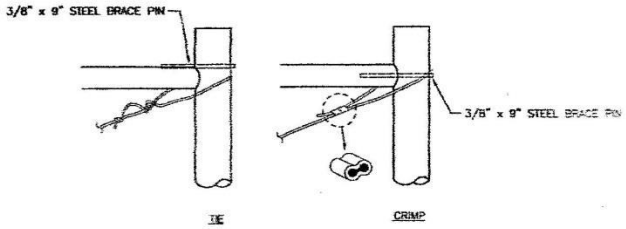
FENCE FABRIC SPACING DETAIL

SCALE: NONE



MORTISE DETAIL

SCALE: NONE



POST FASTENING DETAIL

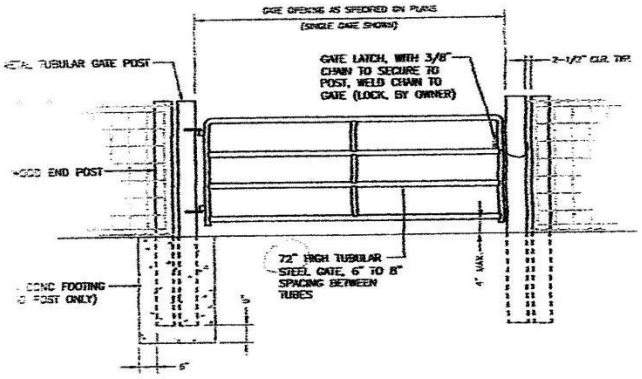
SCALE: NONE

STANDARD TUBULAR DOUBLE GATE

SCALE: NONE

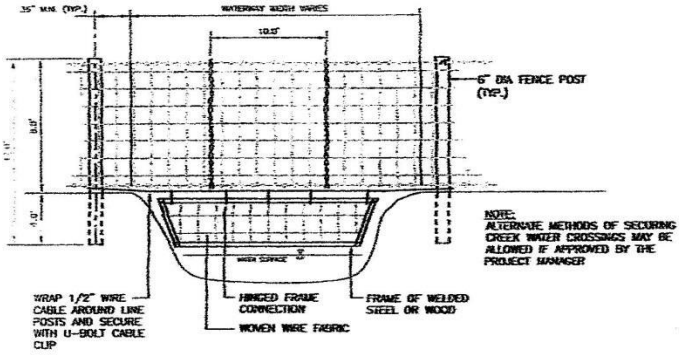
TUBULAR GATE NOTES

1. GATES SHALL BE A MINIMUM OF 72 INCHES IN HEIGHT.
2. ALL GATES SHALL BE TUBULAR STEEL AND SHALL BE CALVANIZED (AASHTO M181)



STANDARD TUBULAR GATE (METAL POST)

SCALE: NONE



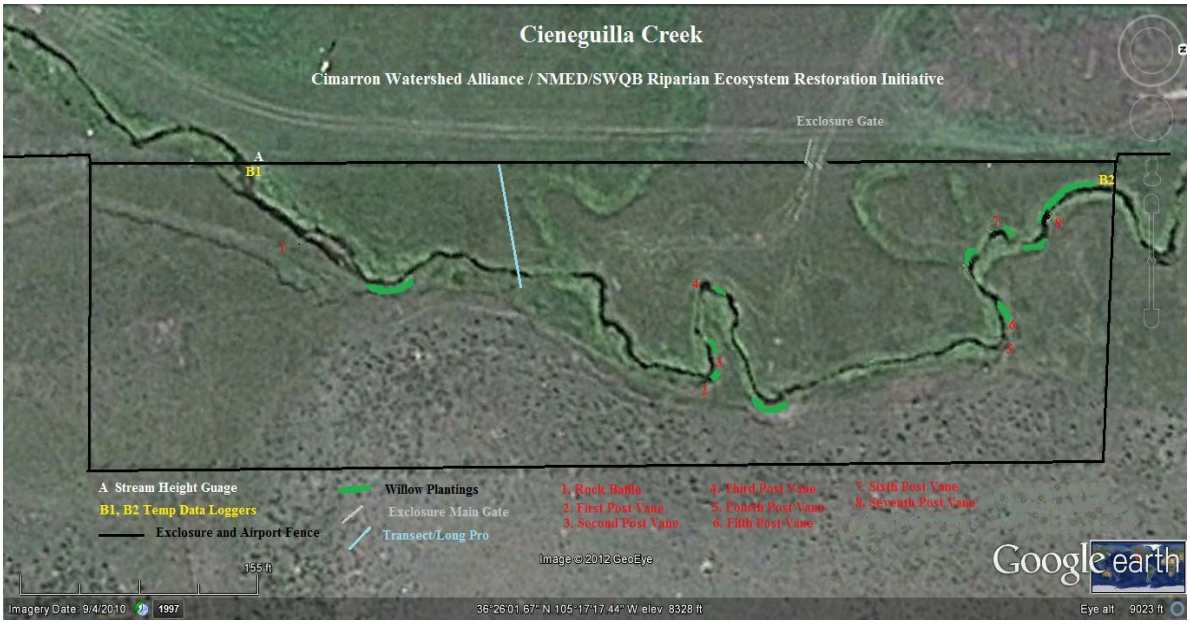
WATER GAP CLOSURE DETAIL

SCALE: NONE

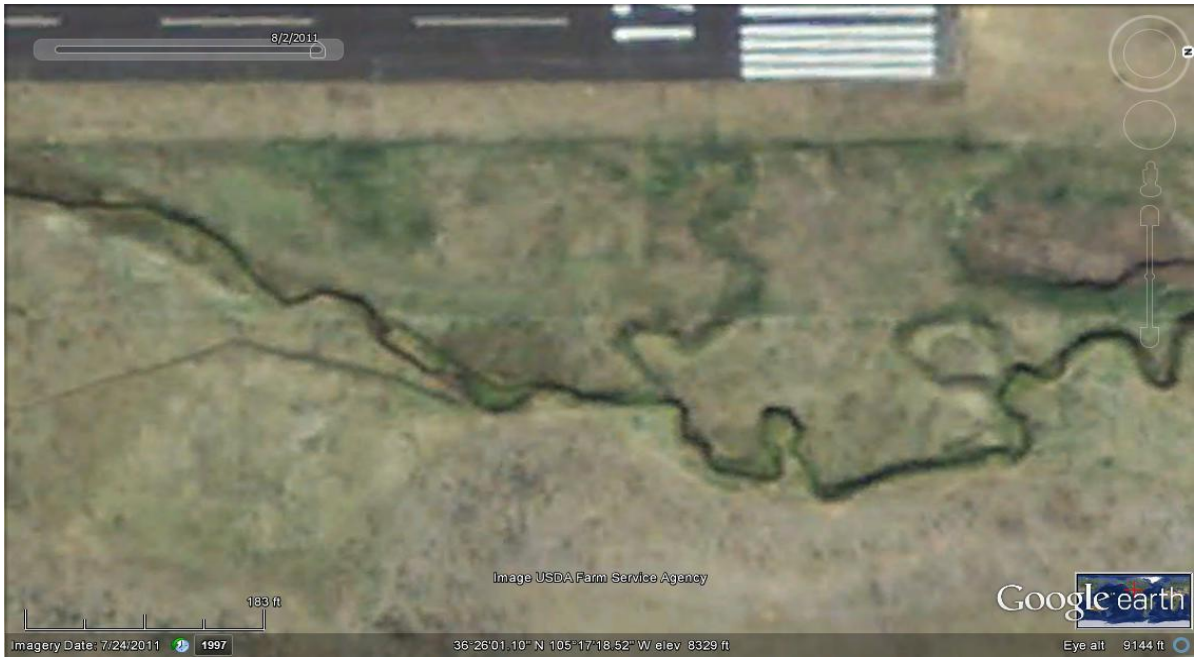
Attachment #4. Cieneguilla Creek Monitoring Report to June 20, 2012

Mapping and GPS Point Record: Cieneguilla Creek Restoration Project

2010 Aerial View



2011 Aerial view (drought and low flow season comparison)



2012 Aerial View

GPS Points of Record: UTM NAD 83

Corners of Exclosure:

NE	**13 S 0474202**	**4032204**	**Elev. 8357’**
NW	**13 S 0474145**	**4032211**	**Elev. 8350’**
SW	**13 S 0474137**	**4032001**	**Elev. 8367’**
SE	**13 S 0474194**	**4032998**	**Elev. 8362’**
Main Gate	**13 S 0474138**	**4032150**	
Alternate Gate	**13 S 0474194**	**4031998**	

Temperature data loggers: Underwater position.

Up stream	**13 S 0474138**	**4032034**	**Elev. 8360’**
Down stream	**13 S 0474151**	**4032210**	**Elev. 8355’**

Shade density monument points:

1.	**13 S 0474157**	**4032185**
2.	**13 S 0474178**	**4032181**
3.	**13 S 0474181**	**4032153**
4.	**13 S 0474187**	**4032144**
5.	**13 S 0474176**	**4032135**
6.	**13 S 0474169**	**4032123**
7.	**13 S 0474170**	**4032110**
8.	**13 S 0474160**	**4032093**
9.	**13 S 0474157**	**4032062**
10.	**13 S 0474143**	**4032045**

Transect monument points:

East Side	**13 S 0474169**	**4032088**
West Side	**13 S 0474139**	**4032088**

Creek Depth Gauge Location 13 S 0474137 4032036

Structures: South to North

One Rock Dam	**13 S 0474153**	**4032046**	**Elev. 8360'**
Post Vane 1.	**13 S 0474182**	**4032127**	**Elev. 8359'**
Post Vane 2.	**13 S 0474180**	**4032126**	**Elev. 8359'**
Post Vane 3.	**13 S 0474166**	**4032127**	**Elev. 8358'**
Post Vane 4.	**13 S 0474178**	**4032189**	**Elev. 8358'**
Post Vane 5.	**13 S 0474170**	**4032186**	**Elev. 8358'**
Post Vane 6.	**13 S 0474157**	**4032198**	**Elev. 8357'**
Post Vane 7.	**13 S 0474159**	**4032196**	**Elev. 8356'**

Photo point "T" Posts South to North to top of "T" Post

1.	**13 S 0474138**	**4032026**	**Elev. 8367'**
2.	**13 S 0474148**	**4032041**	**Elev. 8365'**
3.	**13 S 0474163**	**4032054**	**Elev. 8368'**
4.	**13 S 0474174**	**4032127**	**Elev. 8370'**
5.	**13 S 0474186**	**4032132**	**Elev. 8368'**
6.	**13 S 0474176**	**4032190**	**Elev. 8363'**
7.	**13 S 0474167**	**4023184**	**Elev. 8365'**
North Hill	**13 S 0474192**	**4032173**	**Elev. 8378'**
South Hill	**13 S 0474173**	**4032082**	**Elev. 8378'**

Report on Monitoring Instrumentation

Entrenchment

Transects, long pro and Rosgen Stream Type measurements

6.30.2010

Cross Section #1 was done at the thalweg crossover for classification. Morphology is consistent with a Rosgen "Eb" Channel. Measured values indicate this cross section falls within the range of variability for the type. The sub "b" designation is triggered by a slope of 0.03. The cross section has a low width to depth ratio and the local channel was not incised (ENT of 2.97).

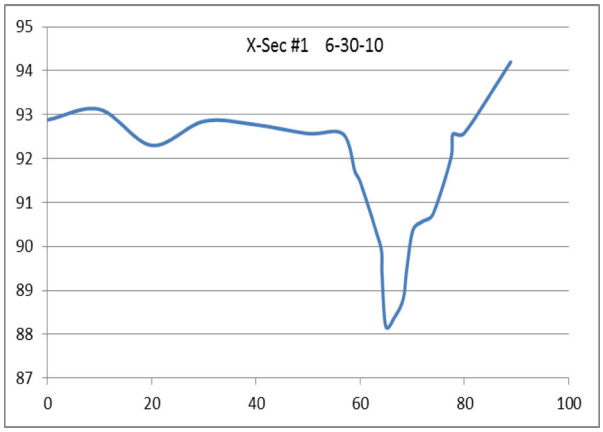
Discussion/Management implications: Meander belt width (B) is the width required to accommodate a dynamic meander pattern. Induced meandering is primarily driven by the need for more belt width. The relationship between belt width and bankfull width (W) is as follows:

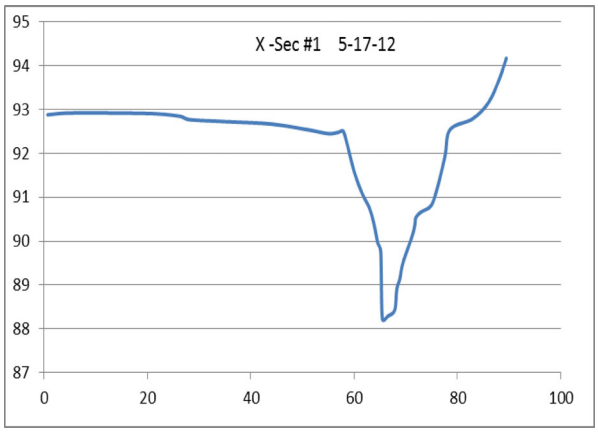
$B=4.3W^{1.12}$. Bankfull width at Cross Section #1 was 7.1ft. Therefore:
$B=4.3(7.1^{1.12})=$ **38.6ft**

Although this cross section is not incised (based on an ENT of 2.97) the flood prone area width (21.1ft) at this cross section was less than that required to accommodate the projected belt width. This could serve as rationale for induced meandering. However, another management option would be to stabilize soils in place and reduce the bankfull channel width to

approximately 4ft. This option is viable given that other channel characteristics fall well within the range of variability for the "Eb" stream type.

In order to fit the belt width within the existing flood prone area, W would have to be approximately 4ft, D would be approximately 2.3ft and the W:D would be approximately 1.7 . The existing cross sectional area (A) of 9.28ft would remain the same. A W:D of 1.7 with a mean bankfull depth of 2.3 is not unreasonable for an "E" channel type.





Key

LBP-left bank pin
FPA-plood prone area
Wbkf-bankfull width
LEW-left edge of water
REW-right edge of water
Dmax-max depth at bankfull
RBP-right bank pin
Dmean-mean depth at bankfull
W:D-width to depth ratio
Wfpa-width of flood prone area
ENT-entrenchment ratio (Wfpa/Wbkf)
S-slope
K-sinuosity-stream length/valley length
A-cross sectional area at bankfull

Cieneguilla Cross Section 6-30-10

Cross Section #1

Station	Elevation	Depth	Area	Comments	100-Elev
0	7.12			LBP	92.88
10	6.88				93.12
20	7.7				92.3
30	7.15				92.85
40	7.23				92.77
50	7.43				92.57
56.7	7.44			FPA	92.56
59	8.3				91.7
60	8.53				91.47
63	9.63	0	0	Wbkf	90.37
64.1	10.1	0.47	0.282		89.9
64.2	10.64	1.01	0.404	LEW	89.36
64.9	11.81	2.18	2.6705	Dmax	88.19
66.65	11.6	1.97	3.31945		88.4
68.27	11.19	1.56	1.755		88.81
68.9	10.56	0.93	0.85095	REW	89.44
70.1	9.63	0	0	Wbkf	90.37
72	9.43				90.57
74	9.26				90.74
77.4	8				92
77.8	7.44			FPA	92.56
80	7.42				92.58
88.9	5.8			RBP	94.2
		8.12	9.2819		

Wbkf	**7.1**	
Dmean	**1.35333333**	
Dmax	**2.18**	
W:D	**5.25**	
Wfpa	**21.1**	
ENT	**2.97**	
S	**0.003 (.3%)**	2.25/600
K	**1.66**	600/360
A	**9.28sqft**	

Cieneguilla Cross Section 5-17-12

Cross Section #1

0.7	6.2			Top Pin LDB		
0.7	6.89			Bottom of Pin	93.11	92.88
5	6.85				93.15	92.92
20	6.86				93.14	92.91
26.2	6.92				93.08	92.85

28.2	7			93	92.77
36	7.05			92.95	92.72
44	7.1			92.9	92.67
51	7.23		Wfpa	92.77	92.54
55	7.32			92.68	92.45
57	7.29			92.71	92.48
58	7.28			92.72	92.49
60	8.17			91.83	91.6
61.6	8.69			91.31	91.08
63	9.02			90.98	90.75
63.9	9.39	0	Wbkf	90.61	90.38
64.6	9.81	0.42		90.19	89.96
65.2	10.01	0.62		89.99	89.76
65.5	11.55	2.16	LEW Dmax	88.45	88.22
66.6	11.48	2.09		88.52	88.29
67.9	11.34	1.95		88.66	88.43
68.3	10.87	1.48		89.13	88.9
68.9	10.62	0.81	REW	89.38	89.15
69.5	10.26	0.87		89.74	89.51
71.3	9.64	0.25		90.36	90.13
71.8	9.39	0	Wbkf	90.61	90.38
72	9.23			90.77	90.54
73	9.11			90.89	90.66
74.9	8.97			91.03	90.8
76	8.62			91.38	91.15
77.6	7.85			92.15	91.92
78.6	7.23		Wfpa	92.77	92.54
83	6.98			93.02	92.79
86	6.62			93.38	93.15
88	6.12			93.88	93.65
89.5	5.6		Bottom Pin RDB	94.4	94.17
89.5	4.91		Top Pin RDB		

Wbkf	**7.9**	
Dmean	**1.18**	
Dmax	**2.16**	
W:D	**6.69491525**	
Wfpa	**27.6**	
ENT	**3.49367089**	
S	**0.00287273**	.79/275
K	**1.32850242**	275/207

Shade Density Readings

Spring: April 30, 2012. The shade density calculation was 2.8 %.

Summer: June 16 2012. The shade density calculation was 51%

Summer: August 3, 2012. The Shade density calculation was 58%

Summer: September 2, 2012. The shade density calculation was 80%

Fall: October 7, 2012. The shade density calculation was 68%

Turbidity Readings

04.30.2012 Sample vial: 5.32 NTU

Upstream at fence: 25.3 NTU

Downstream at fence: 17.3 NTU

06.16.2012 Sample vial: 5.32 NTU

Upstream at fence: 16.40 NTU

Downstream at fence: 14.10 NTU

08.03.2012 Sample vial 5.32 NTU

Upstream at fence: 11.80 NTU

Downstream at fence: 12.91 NTU

09.02.2012 Sample vial 5.30NTU

Upstream at fence 9.99 NTU

Downstream at fence 9.99 NTU

10.05.2012 Sample vial 5.22 NTU

Upstream at fence: 9.99 NTU

Downstream at fence: 9.99 NTU

Stream Flow Measurements and Related Information

On site Depth Measurements

Date:	Depth:	Date:	Depth:
04.30.2012	25”	06.16.2012	17”

07.03.2012	15.25”	09.02.2012	12.50”

10.05.2012	10”

Office of the State Engineer: Cieneguilla Creek Stream Gauge Data (M. Bogar)

The following data is a result of calibration of stream flow measurements at the Cieneguilla Creek new stream gauge. This process is also being conducted at the six Mile and Moreno Creek new stream gauge stations. Data gaps continue to exist as the system is perfected and satellite up-link for Moreno Valley stream gauges is not yet in place.

	24hr volume (acre-ft)	discharge (cfs)
3/20/2012	**17.83**	
3/21/2012	**17.11**	
3/22/2012	**16.71**	
3/23/2012	**18.09**	
3/24/2012	**19.49**	
3/25/2012	**23.52**	
3/26/2012		**13.13**
4/1/2012	**37**	
4/2/2012	**32**	
4/3/2012	**22.86**	
4/4/2012	**54.47**	
4/5/2012	**59.25**	
4/6/2012	**56.63**	
4/7/2012	**60.04**	
4/8/2012	**61.89**	
4/9/2012	**66.66**	
4/10/2012	**67.54**	
4/11/2012	**68.56**	
4/12/2012	**68.37**	
4/13/2012	**59.39**	
4/14/2012	**51.46**	

4/15/2012	**49.83**	
4/16/2012	**48.14**	
4/17/2012		**21.03**
4/18/2012		**18.87**
4/19/2012		**17.92**
4/23/2012		**16.18**
4/25/2012		**16.00**
5/1/2012		**10.49**
5/2/2012		**9.27**
5/3/2012		**8.26**
5/4/2012		**7.52**
5/7/2012		**6.98**
5/8/2012		**6.75**
5/15/2012		**5.45**
5/16/2012		**4.69**
5/17/2012		**4.13**
5/21/2012		**3.2**
5/22/2012		**3.15**
5/23/2012		**2.76**
5/29/2012		**1.5**
5/30/2012		**1.46**
5/31/2012		**1.39**
6/4/2012		**1.24**
6/5/2012		**2.01**

Note: Stream Flow data not available for the period of 6/6/2012 to 9/12/2012 due to malfunction.

USGS Flow record 09.13.2012-10.19.2012

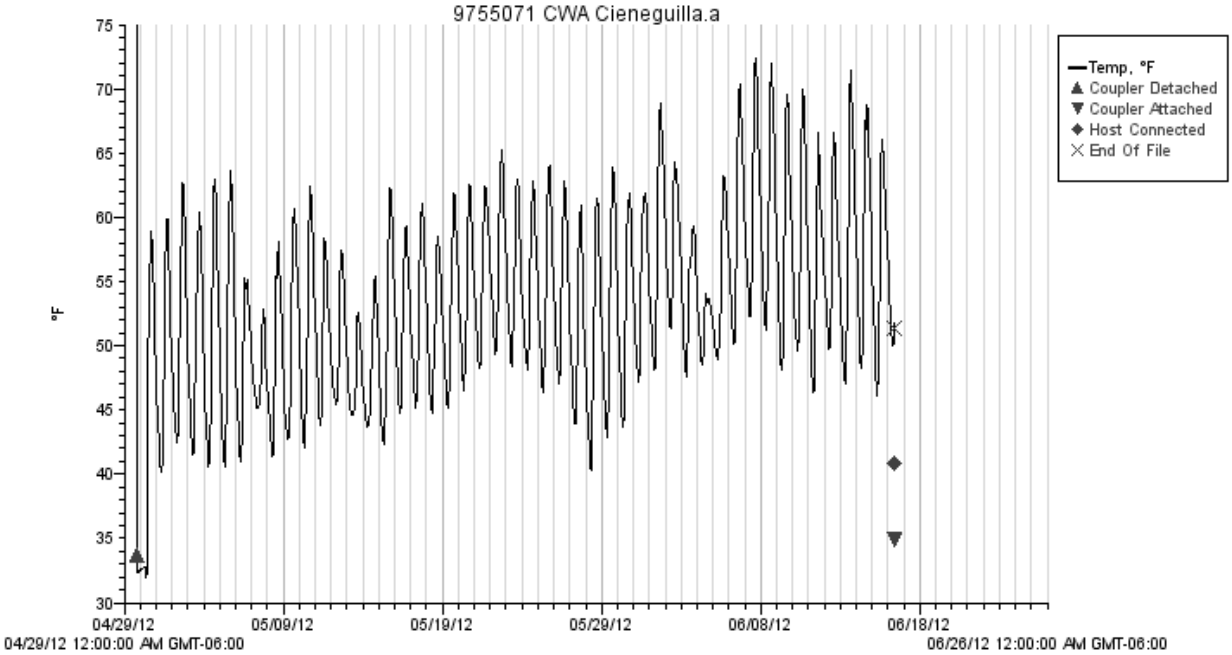
Cieneguilla Creek records OSE/ISC M. Bogar

date time	Stage	units	quality	Discharge	units	quality
9/13/2012 6:00	0.211	ft	Good	2.61	CFS	Good
9/14/2012 6:00	0.208	ft	Good	2.56	CFS	Good
9/15/2012 6:00	0.149	ft	Good	1.74	CFS	Good
9/16/2012 6:00	0.128	ft	Good	1.48	CFS	Good
9/17/2012 6:00	0.115	ft	Good	1.33	CFS	Good
9/18/2012 6:00	0.134	ft	Good	1.56	CFS	Good
9/19/2012 6:00	0.122	ft	Good	1.41	CFS	Good
9/20/2012 6:00	0.112	ft	Good	1.29	CFS	Good
9/21/2012 6:00	0.103	ft	Good	1.19	CFS	Good
9/22/2012 6:00	0.1	ft	Good	1.16	CFS	Good
9/23/2012 6:00	0.097	ft	Good	1.12	CFS	Good
9/24/2012 6:00	0.094	ft	Good	1.09	CFS	Good
9/25/2012 6:00	0.1	ft	Good	1.16	CFS	Good
9/26/2012 6:00	0.109	ft	Good	1.26	CFS	Good
9/27/2012 6:00	0.106	ft	Good	1.22	CFS	Good
9/28/2012 6:00	0.106	ft	Good	1.22	CFS	Good
9/29/2012 6:00	0.165	ft	Good	1.95	CFS	Good
9/30/2012 6:00	0.165	ft	Good	1.95	CFS	Good
10/1/2012 6:00	0.134	ft	Good	1.56	CFS	Good
10/2/2012 6:00	0.125	ft	Good	1.45	CFS	Good
10/3/2012 6:00	0.115	ft	Good	1.33	CFS	Good
10/4/2012 6:00	0.106	ft	Good	1.22	CFS	Good

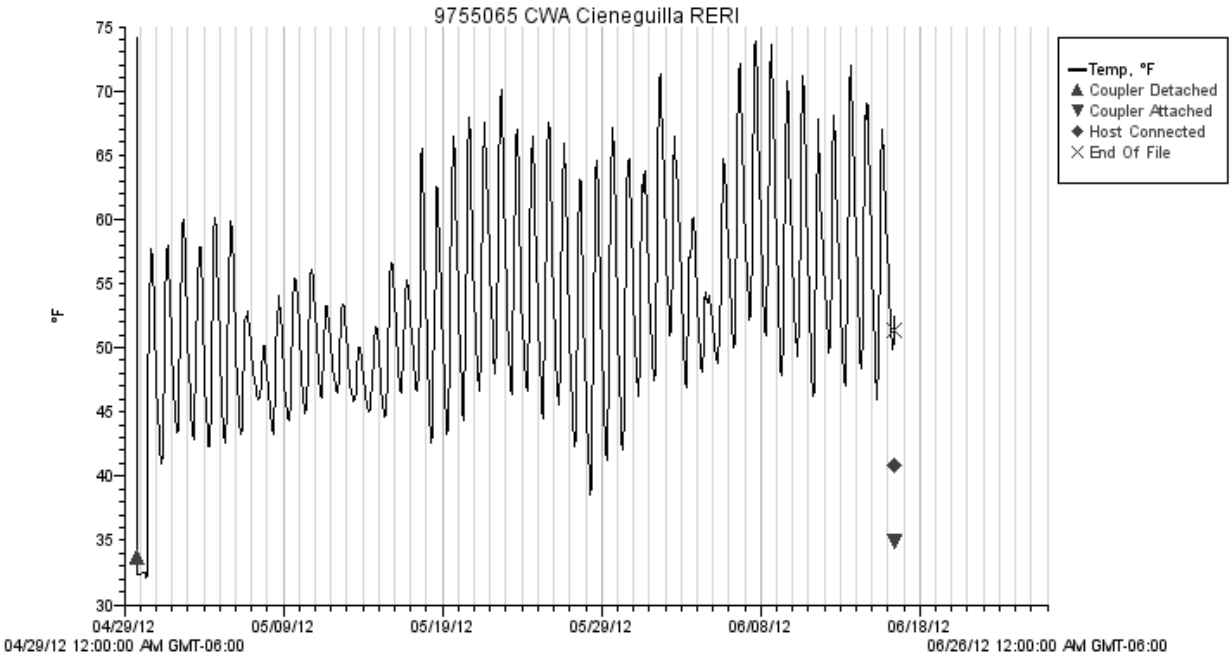
10/5/2012 6:00	**0.103**	**ft**	**Good**	**1.19**		**CFS**	**Good**
10/6/2012 6:00	**0.097**	**ft**	**Good**	**1.12**		**CFS**	**Good**
10/7/2012 6:00	**0.097**	**ft**	**Good**	**1.12**		**CFS**	**Good**
10/8/2012 6:00	**0.1**	**ft**	**Good**	**1.16**		**CFS**	**Good**
10/9/2012 6:00	**0.103**	**ft**	**Good**	**1.19**		**CFS**	**Good**
10/10/2012 6:00	**0.103**	**ft**	**Good**	**1.19**		**CFS**	**Good**
10/11/2012 6:00	**0.103**	**ft**	**Good**	**1.19**		**CFS**	**Good**
10/12/2012 6:00	**0.103**	**ft**	**Good**	**1.19**		**CFS**	**Good**
10/13/2012 6:00	**0.143**	**ft**	**Good**	**1.67**		**CFS**	**Good**
10/14/2012 6:00	**0.162**	**ft**	**Good**	**1.91**		**CFS**	**Good**
10/15/2012 6:00	**0.137**	**ft**	**Good**	**1.59**		**CFS**	**Good**
10/16/2012 6:00	**0.128**	**ft**	**Good**	**1.48**		**CFS**	**Good**
10/17/2012 6:00	**0.122**	**ft**	**Good**	**1.41**		**CFS**	**Good**
10/18/2012 6:00	**0.112**	**ft**	**Good**	**1.29**		**CFS**	**Good**
10/19/2012 6:00	**0.118**	**ft**	**Good**	**1.36**		**CFS**	**Good**

Temperature Data Loggers

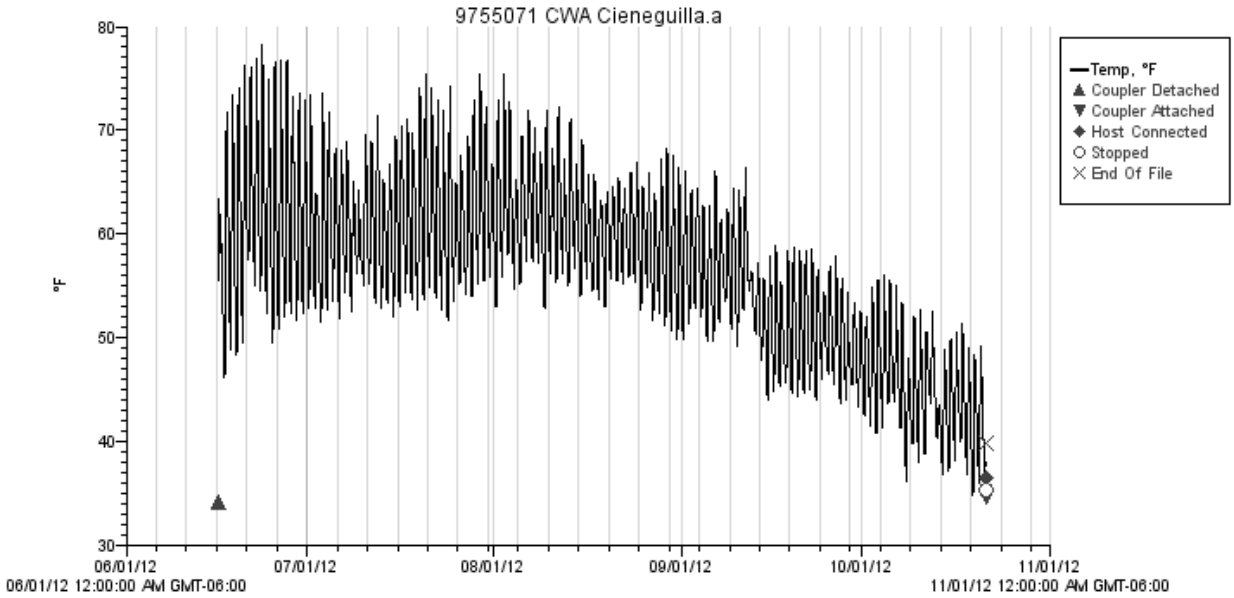
#071 Upper Data logger: 04.29.2012-06.16.2012



#065 Lower Data logger: 04.29.2012-06.16.2012



#071 Upper Data logger 06.16.2012-10.21.2012



#065 Lower data Logger 06.16.2012-10.21.20

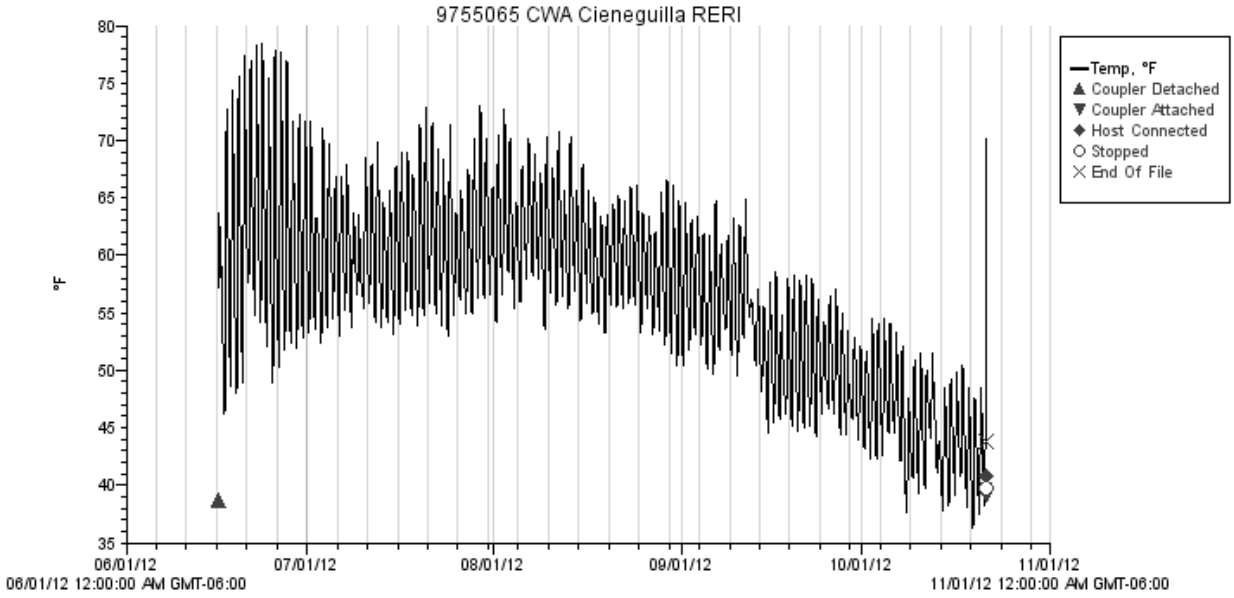


Photo Points, Landscape and Structure Photography

Photo Points Stream and Landscape 06.16.2012

#1

#2

#3

#4

#5

#6

#7

#8

#9

#10



Structures 1-8

Pass through one rock dam


Post Vane #1


Post Vane #2

Post Vane #3

Post Vane #4

Post Vane #5

Post Vane #6

Post Vane #7

Photo points and stream landscape 09.02.2012

#1

#2

#3

#4

#5

#6

#7

#8

#9

#10

Structures 1-8

Pass through one rock dam

Post Vane #1

Post Vane #2

Post Vane #3

Post Vane #4

Post Vane #5

Post Vane #6

Post Vane #7

Photo Points Stream and Landscape 10.05.2012

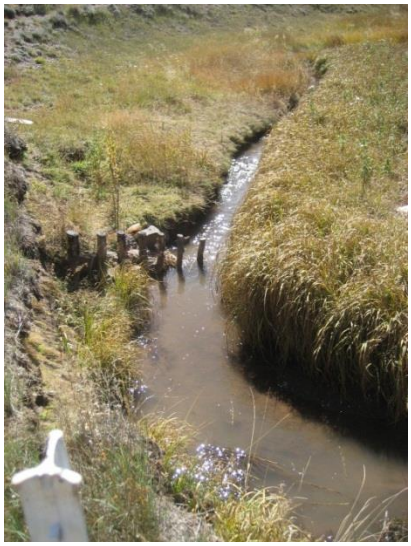
#1

#2

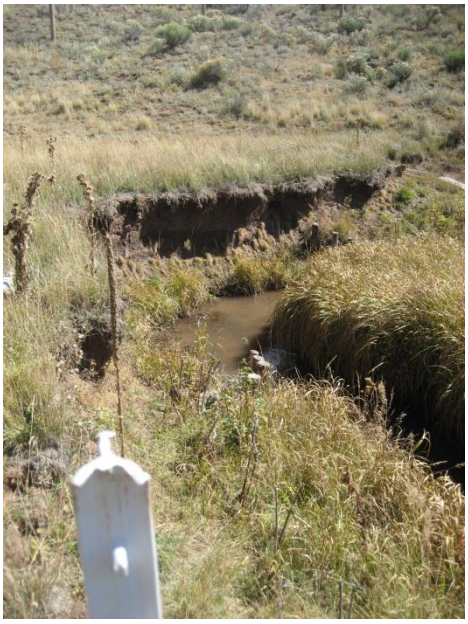
#3

#4

#5



#6



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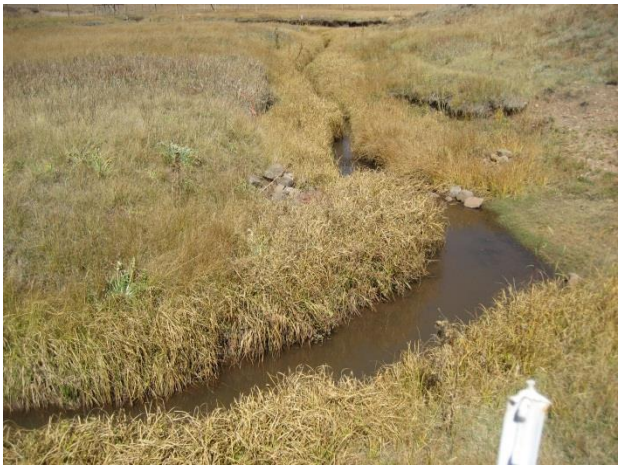
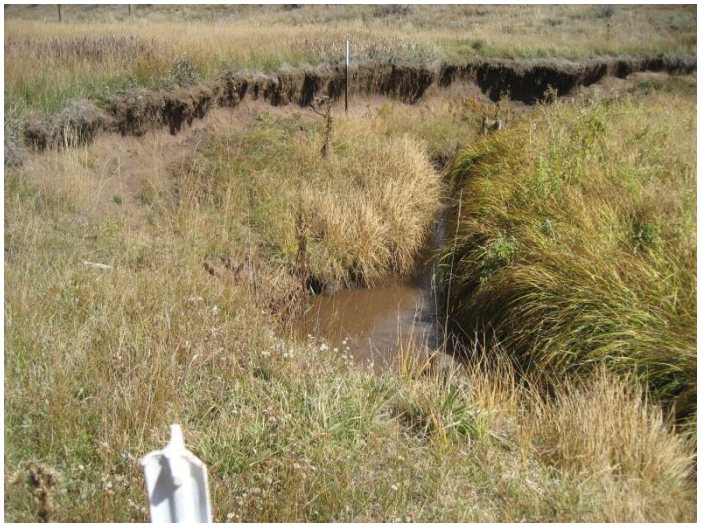
#8



#9

#10



Structures

One rock pass through dam

Post Vane 1

Post Vane 2

Post Vane 5

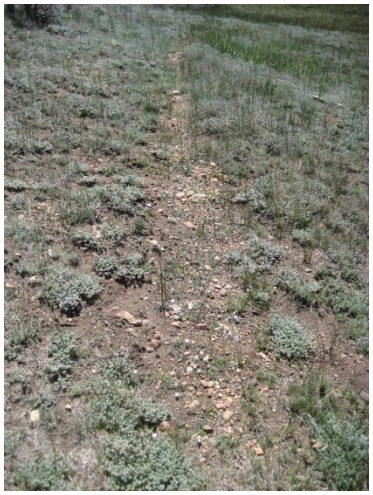
Post Vane 6

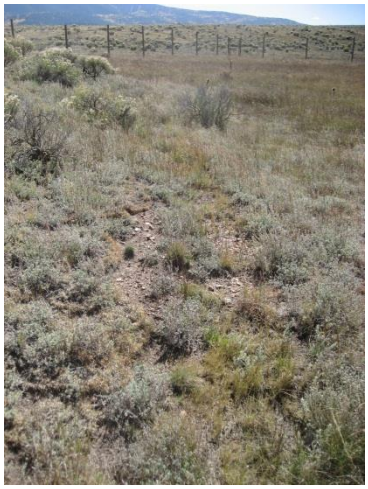
Post Vane 7

Post Vane 8

General Observations of Flora and Fauna:

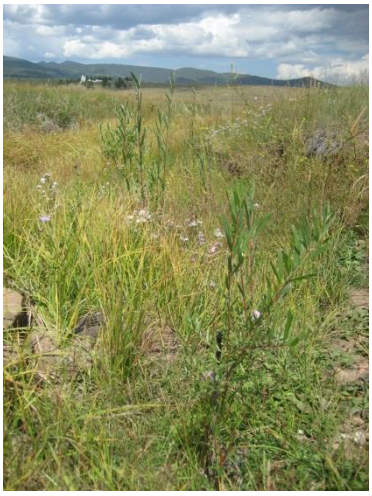
The disappearing large game trails are evident. Shrubs and Grasses are populating once bare trails.





Natural calving of stream banks are closing and re-vegetating once bare vertical stream banks.

Obligate plants such as grasses and planted red willow are taking hold.



The one rock pass through dam provides a perfect nursery for small fish, shelter from predators in the loose rocks and still get fresh water passing through the rocks. I conducted a count by walking down the entire length of the creek of the project area with a tally counter, pencil and field book. I counted 1 ~ dead 6" trout, over 157 ~ 1' – 3' small fish and 28 fish over 4" in length.

Ironically, the exclosure posts placed on the hill of the project area did provide a perch for large raptors such as red tail hawks and bald and golden eagles who sought to predate on rodents in the exclosure. These large raptors were constantly harassed by smaller more agile birds protecting their nests in the stream banks and holes in the ground they created for their nesting sites. A symbiosis exists now between rodents and small birds.

As of 2012, quite an increase was observed in stream bank obligate plant growth. Willow planted in 2010 and again in 2011 have survived and are growing from the roots into sturdy plants. Alder plants have taken root and have produces a good crop of leaves. As seen in the structure photographs 1-7, plants are repopulating all areas that follow or precede a post vane. The one rock pass through dam not only shows a narrowing of the stream bed by grasses, but also the beneficial effect of calving which has also had a productive narrowing influenced.

2012 Report Analysis and Conclusions:

Entrenchment

It should be noted that the stream morphology has not changed dramatically over the past three years. Both of the following graphs look very similar. Although entrenchment at the representative transect in the project area of the Cieneguilla Creek did improve, the data at this time does not indicate that there was a significant or statistically significant change. More time is needed in order to see a more conclusive result. Water has to flow through over a longer period of years and at a level that will allow observable and statistically significant change.

Shade Density

Each year shade density starts at a low percentage and increases to a peak about the first week of July. Monsoonal precipitation may cause some flash flooding that may thin out the grassy banks of dead vegetation. Fall shade density readings tend to decrease as winter sets in. Over the duration of the project the mid-summer shade densities have increased from 2010=42%, 2011=44.6%, and 2012=80.58% . I think this increase is attributable directly to the exclosure allowing plant growth by keeping out deer and elk and also to the milder weather pattern we have had in 2012.

This year calving banks and surviving red willow planting had added to shade density averages. The main reason for the increased shade densities in 2012 has been the growth of grasses that line and in some places, completely cover the creek. Vegetation of previously barren areas around structures has added to this figure. Calving stream banks have not only allowed for more grasses to grow on the stream banks but also have narrowed the overall width of the stream channel. The planting of red willow that has survived some pretty brutal winters will take some time to establish, so in the coming years there should be a substantial growth of a higher summer into fall canopy created by red willows. Red willow is established about 150 yards upstream from the project site and has survived seasonal flood stage waters, and it is hoped that the willow plantings in the project area will also survive future flood events well.

Stream Flow and Drought Conditions

As noted in the previous report, stream data for the Moreno valley was not collected from 07.06.2010 to 3.26.2012 due to the fact that the stream gauge at the Cieneguilla, Six Mile and Moreno Creeks were demolished to make way for newer stream gauges that have the capability to up-link their data to the USGS Real Time Stream Flow System. The lapse in time was caused by construction delays. As of the writing of this report, the satellite up-link is still not operational even though the OSE has successfully calibrated all the stream gauges in the Moreno Valley. The OSE and the ISC have made up for this data loss by supplying raw data until the up-link is established. More information will be forthcoming upon successful up-linking of data from all the new stream flow gauges now in place in the Moreno Valley.

Temperature

Stream depth, shade density and daily atmospheric temperatures have a direct impact on temperature ranges. During 2011, a drought year with record low water levels in the Cieneguilla Creek and die back of stream bank vegetation are reflected in the thermograph data in the 2011 Cieneguilla RERI Monitoring report. The amazing ability of stream bank vegetation to regenerate and expand its cover area even within the stream bank has been notable mid-summer 2012. The prediction of an overall temperature decrease this year in the overall temperature average from spring to fall is reflected in the differences between 2011 of 54° - 76° F and 2012 of 52° - 72° F on 08.01. of each year. Data from the water year of 2013 should confirm if this 4° F reduction holds.

Turbidity in NTU

Turbidity has a direct relation to stream bank and stream bottom disturbances. When making readings I learned to take the turbidity readings first before crossing the creek or standing in it to take shade density readings. I have also noted that in areas that have a freestone gravel bottom are clearer than heavily silted areas. In addition deep pools are a result of stream water carving of silt and fine sands in the bottom of the pool. In the Cieneguilla, more flow equals more silt in suspension due to the composition of the Moreno Valley soil composition.

Flora and Fauna

Aside from providing canopy that reduces temperature spikes, flora also prevents the erodability of stream banks. As seen in the photographs, new growth will add to the effect of stream bank lay back caused by calving. BEHI (Bank Erodability Hazard Index) in some areas of this project is still very high. Recent training has made this observation apparent. If this method had been applied at the beginning of the project, a baseline assessment survey could have been compared to an end of project assessment.

Additional Comments

Additional unexpected benefits of the project have been the capacity building of water quality monitoring skills. The experience of monitoring the project area even for only three years has been beneficial to the CWA in that I can teach others from my experience and apply my knowledge to the application of other grants we may compete for. Our efforts at tackling landscape size projects in the future will be more productive. Just being on site has increased the visibility of watershed restoration projects in the Moreno Valley. This project has allowed an understand the entire process rather than just monitoring. It has also has been learning how to handle administrative paperwork needs and understanding the State of New Mexico process of managing grant funds.

Project obstacles, problems that might be avoided and possible solutions in future endeavors.

First, granting of projects need to have their deadlines adjusted to the water year and not the fiscal year. Providing complete water year data and observations is essential for understanding the connectivity of watershed functions. Also, having to accelerate time schedules at the end of the fiscal year did cause some conflicts to my business schedule that luckily I was able to manage.

Second, any proposal submitted for watershed restoration has to be fluid in its reaction to unknown conditions caused by dependent and independent variables. Grant administrators must be open to the changing needs of the work plans submitted. In the case of the Cieneguilla project, a five year term would have been more effective in allowing data and observations to inform needed changes to the work plan and produce data and or results that would be quantifiable. Temperature is a variable that can be affected in a shorter time frame than the endemic silt and turbidity levels that are dependent on the soil composition.

Third, the NM Environment Department/ Surface Water Quality Bureau and the US Army Corps of Engineers need to work in unison to address the reality of expectations placed on the persons and organizations that compete for grant funds during the RFP process, vetting work plans, and maintaining contact with project execution, changing needs and conditions in the stream, and allowing for one report due at the end of the calendar year.

Input regarding establishing BEHI baseline standards, allowing for or recommending equipment not listed in the work plan that would have enhanced the quality of data collected, (stream flow measurements independent from USGS data) and providing training for operators so that they can establish procedures that provide data needed to comply with SWQB quality control protocols. This last need; the standardization of quality control of data protocols based on complexity of the project will provide the state with data that meets its own standards.

Fourth, Administrative costs are real. If the state wants to compete with federal grants it must allow up to a 15% minimum to pay for rent, utilities and the production of reports required in this type of grant. The idea that normal citizens can “volunteer” hours of free work is a fallacy. Most of the persons that are members of the CWA have real full time jobs. Building capacity and functionality into RFP’s will deliver the growth of professional watershed management providers that will augment the abilities of the NMED/SWQB.

Fifth, the River Ecosystem Restoration Initiative is a great program. It has provided a much needed economic spark to the growth of the watershed industry. I would like to suggest that the NM ED/SWQB now must follow through with asking for more funds, revamping selection processes to look not only at the RFP’s but also the potential benefit awarding a funds to organizations that are relatively unknown. Building flexibility into the administration of the granting process and allowing for realistic

results on the ground to fit the capacity of the organization must also be tempered by the benefit of building capacity in the industry.

Conclusions:

Given the discussions on entrenchment, seasonal shade density cycles, stream flow fluctuations and cyclical drought conditions, temperature variations and annual fluctuations, endemic turbidity that is relative flow and dependent on soil composition, flora and fauna and the additional comments; the scope and purpose of this project was served well by the efforts and services provided. We found out that we could improve sinuosity, implement the placement of structures, boost the potential of increasing shade density, collect appropriate data, and receive technical advice from Surface Water Quality Bureau staff pertinent to the needs of those that actually do the instream work. Making informed observations and asking the important questions; a). Why is this happening and b). How can we help this creek heal itself. By far, the most important and useful result of this experience has been observing changes in shade density, temperature, flora and fauna, Stream bank stabilization and capacity building. Capacity building is one of the less noted but most important results of the formation of the Cimarron Watershed Alliance ten plus year ago.

A.C. Huerta

CWA Monitoring Coordinator/Project Administrator and Monitoring Service Provider

Cimarron Watershed Alliance/River Ecosystem Restoration Initiative

Cieneguilla Creek Riparian Ecosystem Restoration Project

Tri-Annual 2009-2010-2011 Report

Date: November 2011

Prepared By: Alán Huerta

Monitoring Services Consultant

Summary:

Monitoring Implementation was slow in getting started due to funding needs and procedures at the CWA to pay for equipment. Once monitoring instrumentation was in place there was a period of instrument calibration that needed to be worked out.

Photo points were established by using “T” posts as monuments and digital photography commenced. Establishing aspects and coverage needs will become more specific and informative as the project progresses.

The installation of the pass through rock dam will insure that a meander will take hold. Initially five Post Vanes were installed. Plans for an additional two and their installation will happen in 2010-2011. Other non-substantial additions to the Creek may have occurred before the project was subjected to a monitoring regime.

The exclosure of Elk and Deer will cause game trails that traversed the project before the exclusionary fence to disappear under new growth. The small bird and rodent population is showing signs of increasing and may reach a symbiotic level in the future. Raptors visit the site but are chased off by the smaller bird population. It is unknown if the raptors; red tailed hawks and eagles, are actually controlling the rodent population.

It may take a few years before shade density readings increase from one season to the next depending on weather and water flow. Plants that help shade productions are subject to drought and low flow periods in the annual water cycle.

Alan Huerta

CWA Monitoring Services Provider

Monitoring:

Included in this report is the monitoring work performed during the 2009, 2010, 2011, water years. Depending on availability of instrumentation, the following monitoring services were performed.

- Calibration, launching, placement and downloading of temperature data loggers and repositioning when needed.
- Photo-point determination, (GPS), digital photography of all in stream structures, spring and mid-summer and fall.
- Shade/Canopy survey locations set at randomly determined monument locations and spring summer and fall surveys to determine shade density average for project area.
- Turbidity readings spring, mid-summer and fall.
- Flow measurement: calculations depth of creek upon every visit

This report will be disseminated to the CWA Cieneguilla Project Coordinator for distribution to the SWQB RERI Director and USACE. In addition, this report has become an attachment to the Final Reports to be sent to the SWQB RERI Projects Director and ultimately to the US Army Corps of Engineers for satisfaction of 401 and 404 permits issued for this project.

Cieneguilla Creek flow levels:

April 25, 2011 ~ 22" depth at center 1:45 pm

June 17, 2011 ~ 10" depth at center 12:15 pm

July 11, 2011 ~ 3" depth at center 3:43 pm

September 27, 2011 ~ 18" depth at center 1:30pm

See Attachment #1 for more stream flow data.

USGS 07204500 CIENEGUILLA CR NR EAGLE NEST, NM

Colfax County, New Mexico

Hydrologic Unit Code 11080002

Latitude 36°29'06.78", Longitude 105°15'55.37" NAD83

Drainage area 56 square miles

Contributing drainage area 56 square miles

Gage datum 8,200.00 feet above NGVD29

Meas. Number	Date Time	Time Datum	Who	Stream flow (ft^3/s)	Gage Height (ft)	Rating No.	Shift Adj. (ft)	% Diff.	GH Change (ft)	Meas. Duration (hr)	Meas. Rated	Control	Flow Adjust. Code
378	2010-06-07 16:35:01	MDT	SHL	5.78	2.74	9.1	-0.01	-5.2	-0.01	0.40	FAIR	UNSP	MEAS
377	2010-05-06 10:22:01	MDT	SHL	57.4	3.91	9.1	-0.07	0.7	0.00	0.80	FAIR	CLER	UNSP
376	2010-04-12 14:00:01	MDT	SHL	61.9	4.15	9.1	-0.20	-7.3	-0.02	0.50	POOR	CLER	MEAS
375	2009-10-05 11:36:30	MDT	blm	2.13	2.40	9.1	0.01	-0.5	0.01	1.22	FAIR	CLER	MEAS
374	2009-07-08 11:42	MDT	blm	3.08	2.48	9.1	0.03	0.0	0.00	0.50	FAIR	HVDB	MEAS
373	2009-05-13 11:06	MDT	blm	10.8	2.94	9.1	0.00	1.9	0.00	0.50	FAIR	CLER	MEAS

372	2009-04-09 13:11	MDT	blm	14.2	3.00	9.1	0.07	0.0	0.00	0.50	FAIR		MEAS
371	2009-03-04 10:37	MST	blm	11.2	3.20	9.1	0.04	-45.1	0.08	0.50	FAIR	MAHV	MEAS
370	2008-10-08 10:36	MDT	blm	2.79	2.47	9.1	0.05	-12.3	0.00	0.50	FAIR	MAHV	MEAS
369	2008-09-10 09:35	MDT	blm	4.74	2.58	9.1	0.05	4.4			FAIR	MAHV	UNSP
368	2008-08-09 13:22	MDT	dgw	3.42	2.49	9.1	0.05	0.3			FAIR	CLER	UNSP
367	2008-07-02 10:11	MDT	blm	4.07	2.48	9.1	0.11	1.5			FAIR	MAMD	UNSP
366	2008-05-19 11:30	MDT	blm	27.7	3.33	9.1	0.07	0.4			FAIR	MAMD	UNSP
365	2008-04-14 11:53	MDT	blm	41.7	3.65	9.1	0.00	-1.9	0.00	0.50	FAIR	LGDB	MEAS
364	2008-03-25 11:43	MDT	blm	43.1	3.68	9.1	0.00	-3.4	0.00	0.50	FAIR	LGDB	MEAS

Turbidity in NTU: * sampling began in 2011 at request of Project Coordinator.

South sampling site at Creek inlet to exclosure area. See note *2.

May 5, 2011 ~ 12.5NTU

June 17, 2011 ~ 22.6 NTU

September 27, 2011 16.40 NTU

North sampling site at Creek outlet to exclosure area

May 5, 2011 ~ 16.1NTU

June 17, 2011 ~ 20.8NTU

September 27, 2011 ~ 16.0 NTU

*2. Turbidity readings are an added feature to the monitoring project requested by the Project Coordinator. First turbidity reading was taken on 5.5.2011.

Canopy Calculations: see note *3.

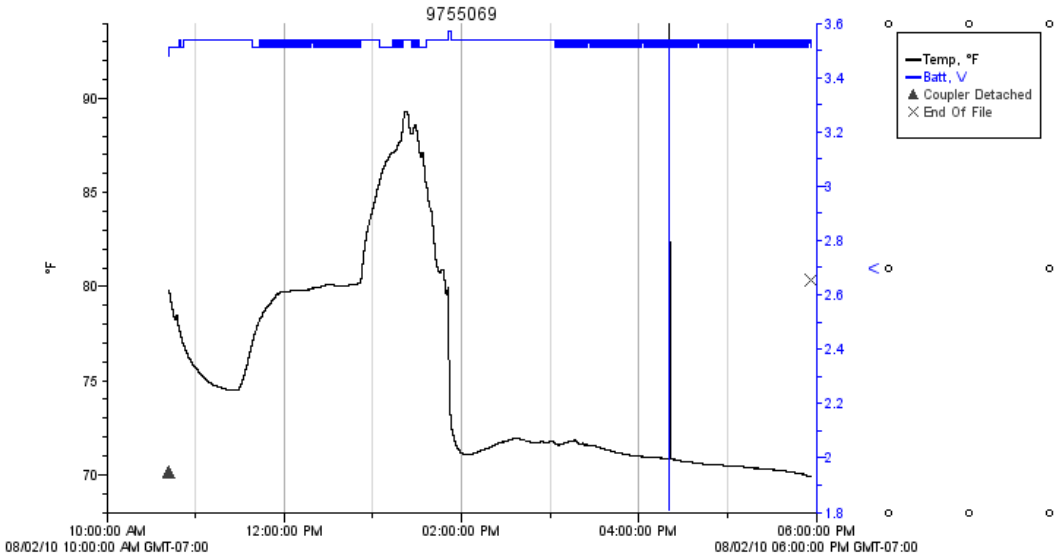
2010 ~ 42% Fall 8.23.2010

2011 ~ 33% Mid-Summer 6.17.2011

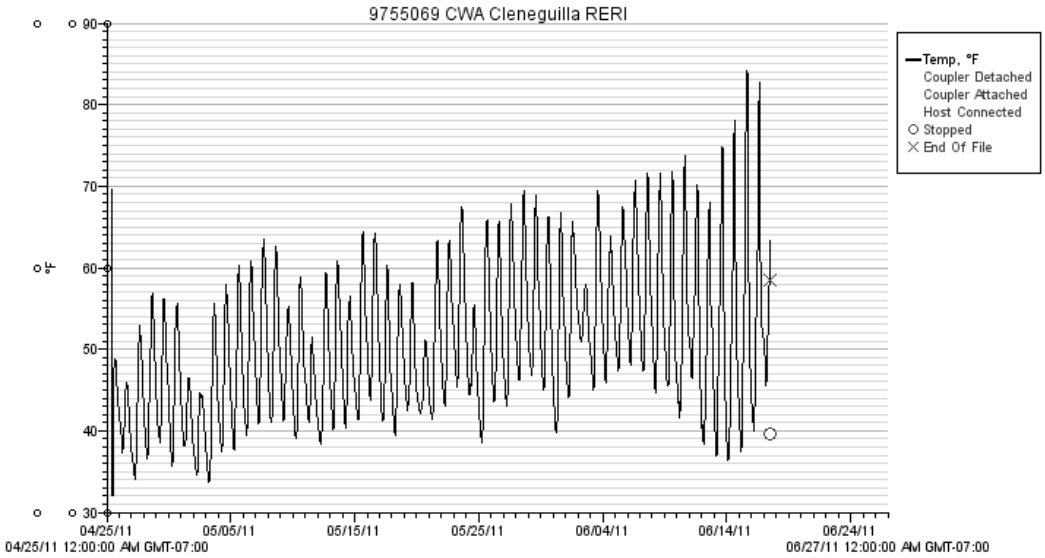
2011 ~ 45% Fall 8.27.2011

*3. Due to lack of funds for purchase of a densitometer and subsequent ordering and shipping, shade densities were first recorded on 8.23.2010.

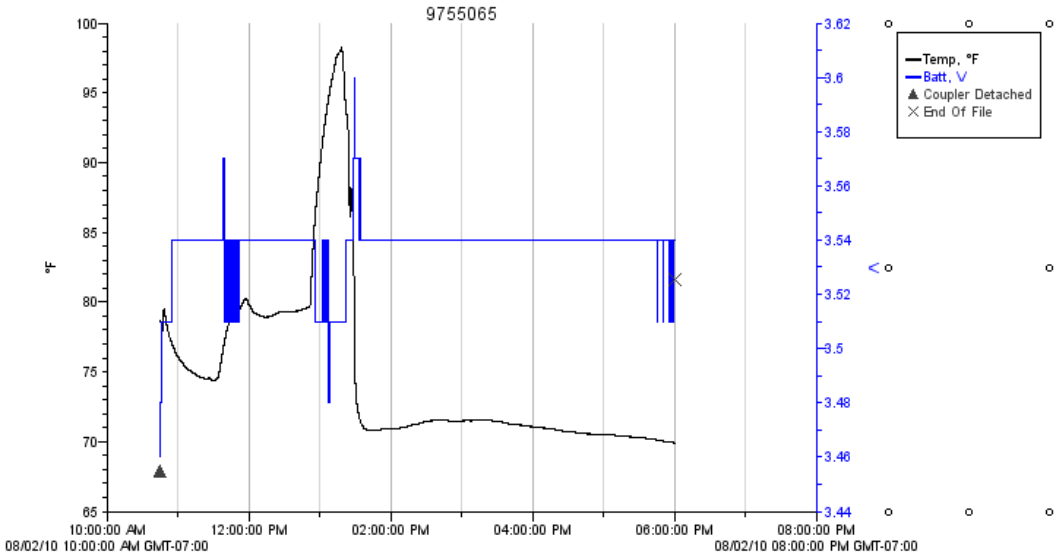
Temperature Data:



Downstream Data Logger (North) 2010. See note *1.

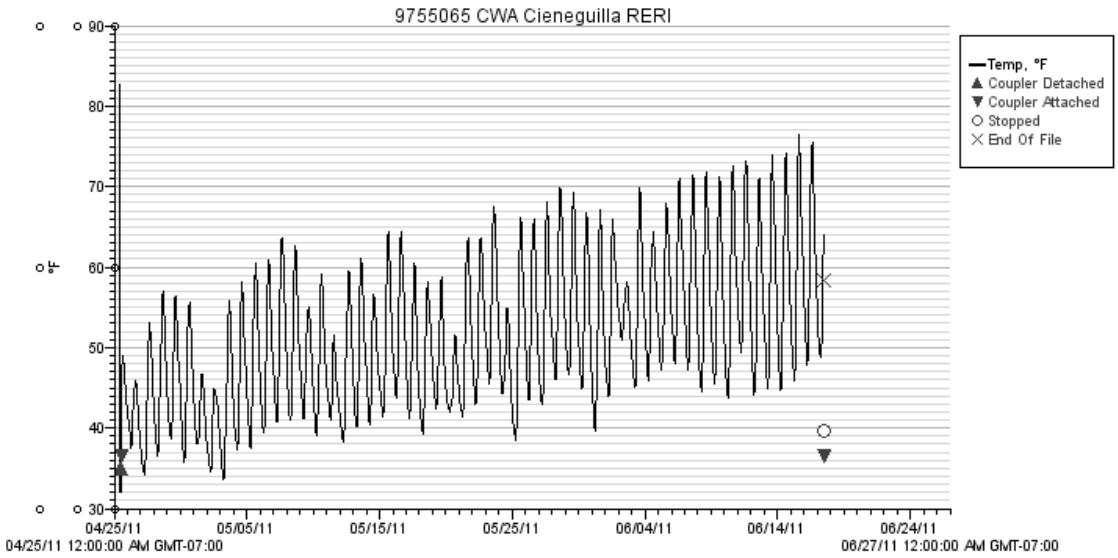


Downstream Data Logger (North) 2011

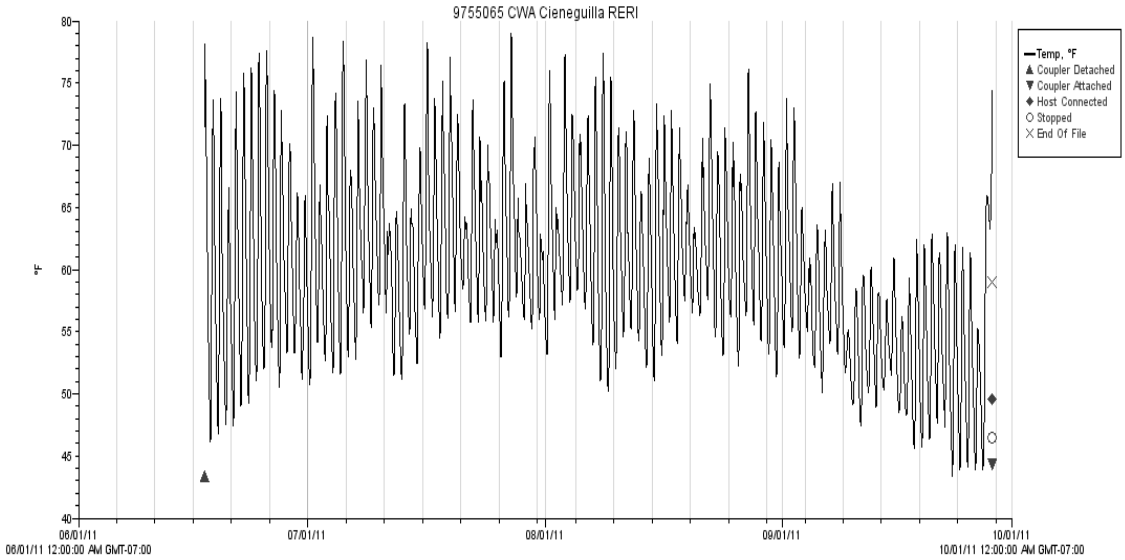


Upstream data logger (South) 2010. See note *1.

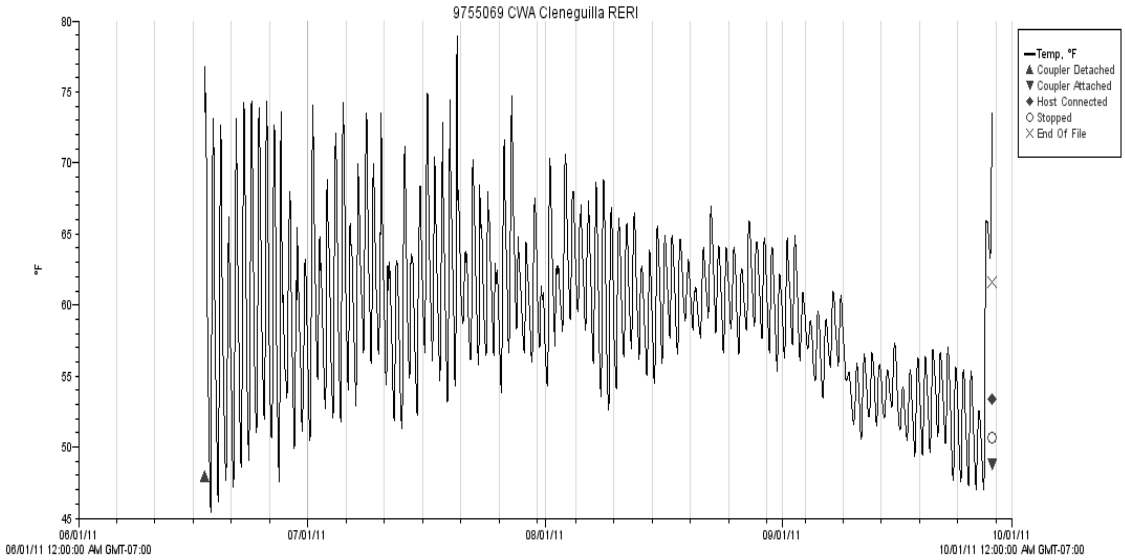
*1. Improper launch calibration limited data collection in 2010. Logger recorded data by seconds not hours.



Upstream Data logger (South) 2011



Upstream Data logger (South) 2011



Downstream Data Logger (North) 2011

Observations: A marked increase in fish fingerling population from ½ " to 1 ½", and in deeper holes fish larger from 4" to 8", species undetermined.


Low water levels in June 2011 reveal avian droppings and tracks on mud flats. Bird and rodent populations have been increasing as visible by more burrows and bird nests present.


Natural objects within the creek such as sunken logs and boulders cause scouring of holes on the down flow side. Project structures; one rock dams and post vanes altering the flow effectively where placed allowing for calving banks to seed grasses.



Planted willow stems taking hold with new sprouts shooting up from the roots.

Cycles of thistle and dandy lion plants are seen spring to fall. Evidence of subterranean water flowing is visible in greener growth in old channel depressions interrupted by runway construction in the past. No evidence of Elk or deer grazing present within the Exclosure.

Structures:

One rock pass through dam. Position: N 36.43328 W 105.28838

8.08.09

4.07.10

3.05.11

4.25.11

6.17.11

9.27.11

Post Vane #1. Position: N 36.43484 W105.208826

03.05.2011

04.24.2011

06/17/2011

09.27/2011

Post Vane #2. Position N 36.43401 W105.208807

03.05.2011


04.24.2011



06.17.2011

09.27.2011

Post Vane #3. Position N 36.43400 W 105.208824

03.05.11

04.25.11

06.17.2011

09.27.2011

Post Vane #4. Position N 36.43456 W 105.28809

03.05.2011

04.25.2011

06.17.2011

09.27.2011

Post Vane #5. Position N 36.43453 W 105.28819

03.05.2011

04.25.2011

06.17.2011

09.27.2011

Post Vane #6. Position. N 36.43456 W105.28835

03.05.2011

04.25.2011

06.17.2011

09.27.2011

Post Vane # 7. Position

09.27.2011

09.27.2011

Photo Points:

6.11.10


CWA RERI
CIENEGUILLA
PHOTO POINT
7


CWA RERI
CIENEGUILLA
PHOTO POINT
LANDSCAPE 8
SOUTH


CWA RERI
CIENEGUILLA
PHOTO POINT
LANDSCAPE 8
NW


BEEI
PHOTO POINT
9


BEEI
PHOTO POINT
10

Vegetation Growth

7.11.2011 Bottom Area







09.27.2011

Cieneguilla Creek Flow levels:

8.11.10

4.25.11

6.17.11

7.11.11

8.27.2011

09.27/2011

Overall Site Landscape Photos

09.27.2011

End of Tri-Annual report