Piru Creek- Fluvial Inventory

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Executive Summary

A fluvial geomorphology survey was conducted for Piru Creek, downstream of the Pyramid Lake. Pyramid Lake Dam, just above Piru pond needed relicensing for a Federal Energy Regulatory Commission (FERC). The fluvial survey consisted of water quality testing and knowing the geomorphology of the water body in order to observe the effects of the Pyramid Dam. Methods used to conduct this survey were Cross Sections, Wolman Pebble Count and Water Chemistry. The data collected in the field was processed in a laboratory to compile inventory on Piru Creek.

Project Objectives

Introduction to project

Piru Creek is down stream of Pyramid Lake, it is a tributary to the Santa Clara River. Piru creek was surveyed and evaluated because Pyramid Dam, which creates the Pyramid Lake reservoir is polluting and changing the natural geomorphology of the creek. Removal of the dam will be contemplated after closely observing the creek's natural behavior through-out different seasons.

Potential Career paths as it pertains to the USDA

Our society has found itself relying on water systems to control flooding, store water for drought seasons, and for the management of the natural resource. A consequence of creating water systems is that the infrastructure has disrupted the natural environment, which was not an issue that many were aware of until after the development of water system infrastructure. To help minimize the impact on the natural environment I would like to pursue a career that acknowledges the impacts of development aftermath. USDA internship has provided an opportunity to experience what it would be like to pursue such career.

Original goals of the project

The role of this project was to begin the inventory on the creek's morphology and water quality so in the future the data can be compared and determine if the dam is impacting the natural creek.

Project tasks

The tasks to begin this project was to gather geographical information about the study cite, gather necessary equipment, read survey manuals, create strategic survey plans, and finally collect & process acquired data from the field.

Project Approach

To begin this project the study site had to be closely observed to determine where is the best place to set temporary benchmarks followed by the cross sections, pebble count, and water quality.

Four locations where chosen downstream of Piru Creek for the cross-section study sites. This location was determined by the greatest visibility range of cross-sections through a total station. The cross sections were also scattered though out the entire reach of the creek. Once cross sections where identified the survey began and the objective was to capture elevation of right bank, the creek's waterbed, and the left bank. We did this for all the cross sections.

Wolman Pebble count was performed for each cross-section. This method consisted of collecting 30 random rocks from the creek waterbed along the cross-section area to determine what is the

sediment composition of the creek. Collected rocks were measured and classified. The purpose of this approach is to determine water behavior.

The rest of the fluvial survey picked three spots along the cross-section line which were the right, center, and left of the creek to: measure water velocity and depth with a Flow Probe, Collect Total dissolved solids and electrical conductivity with a HM digital COM-80 handheld meter, and collect water samples to test for PH, dissolved oxygen, and fecal coliform

Project Outcomes

Results

The elevation for each of the cross sections were identified and the water quality was tested. Personnel from the Angeles National Forest will take over and determine how to manipulate and analyze the data. However, figures of the data collection is available.

Limitations

It was difficult to pick ideal cross section because there were many areas that had high stream velocity, which is one of the requirements for an ideal cross-section but were areas that are not accessible because of the physical environment like steep hills and high-density vegetation.

Wolman Pebble count was also a challenge because the original methods collects 100 rocks along the cross-section area. Piru creek was not wide enough to collect that amount of rocks.

Figure 1: Land and Fluvial Survey Cross Sections1

Cross Section 1									
STATION	HI	SDx	HD	HA	VA	VD	ELEV	NOTES	
UNITS	FT	FT	FT	° " '	° " '	FT	FT	Monday July 23, 2018 9:30 AM	
P1TBM2							2222.196	No cloud cover, sunny, 939.2 hPa, 36.5°C	
BS1	2,211.34	145.44	144.46	48.55.17	83.20.47	16.85	2,222.20	BS to P1TBM1	
FS1	2,211.34	43.52	43.23	227.51.39	96.39.52	-5.05	2,200.29	FS to "P1TBM1a"	
BS2	2,192.51	97.16	96.18	47.53.21	81.50.47	13.78	2,184.73	BS to "P1TBM1a" from P1TBM2	

FS2	2,192.51	25.74	23.82	182.38.50	67.42.08	9.77	2,196.28	FS to starting point of cross section. PH = 6	
FS3	2,192.51	25.57	24.64	219.44.17	105..31.15	-6.84	2,179.67	FS to 2nd point	
FS4	2,192.51	38.20	35.54	249.42.19	111.30.24	-14.01	2,172.51		
FS5	2,192.51	45.18	42.48	257.40.43	109.56.01	-14.40	2,172.11		
FS6	2,192.51	54.42	51.63	268.42.04	108.25.23	-17.20	2,169.32		
FS7	2,192.51	61.03	57.53	273.11.06	109.29.44	-20.37	2,166.15		
BS3	2,192.51	54.61	51.16	86.01.41	69.32.42	19.08	2,205.60	Set up at Northside of big flat rock. BS to P1TBM2	
FS8	2,192.51	6.72	6.40	301.59.02	107.47.52	-2.05	2,184.46		
FS9	2,192.51	29.47	29.31	296.33.58	95.53.14	-3.02	2,183.49		
FS10	2,192.51	33.97	33.77	297.27.00	96.11.23	-3.62	2,182.89		
FS11	2,192.51	40.06	39.79	295.57.19	96.45.30	-4.71	2,181.80		
FS12	2,192.51	43.68	43.32	285.40.12	97.19.31	-5.57	2,180.95		
FS13	2,192.51	50.62	50.14	296.30.31	97.56.05	-6.99	2,179.53	Right bank dry	
FS14	2,192.51	55.57	54.92	298.21.31	98.46.59	-8.49	2,178.03	Right bank wet	No right of center. Can't touch ground because of rock
FS15	2,192.51	60.67	59.99	299.44.52	98.37.10	-9.09	2,177.42	Center	
FS16	2,192.51	64.90	64.33	301.04.48	97.36.08	-8.86	2,177.66	Left of center	
FS17	2,192.51	67.24	66.61	299.11.35	97.58.53	-9.18	2,177.33	left bank wet.	
FS18	2,192.51	75.84	75.46	296.35.43	95.41.52	-7.53	2,178.98	Left bank dry	
FS19	2,192.51	82.09	81.86	296.44.26	94.17.20	-6.14	2,180.37		
FS20	2,192.51	90.78	90.63	297.16.43	93.17.28	-5.21	2,182.30	PH changed from 6 to 5 ft.	
FS21	2,192.51	98.15	98.07	296.57.54	92.17.47	-3.93	2,183.58		

CS1 Wolman Pebble Count					
	A (inches)	B (inches)	C (inches)	Shape	Notes
1	5.5	3.5	2.25	sub angular	right to left bank, using imperial ruler, not 10ths
2	4	4	3	sub angular	
3	4.25	3.25	1.25	angular	
4	2.75	2	2	sub rounded	
5	4.25	2.5	1.5	angular	
6	5	4.5	2.75	sub rounded	
7	4.25	3.25	2.5	sub angular	
8	3.5	2.75	1.5	sub angular	
9	2	1.5	1	sub rounded	
10	5	4	2.5	sub rounded	
11	5	4.5	2.25	rounded	
12	3.5	2.5	1.75	rounded	
13	2.5	2	1.75	sub rounded	
14	11.5	3.7	2.25	very angular	
15	4.5	2.5	1	sub rounded	
16	7	4.25	3.25	well rounded	
17	7.5	6.5	3	sub angular	
18	6.5	4.5	3.25	sub rounded	
19	5.5	3.5	1.5	sub rounded	
20	3.5	2.25	1.5	rounded	
21	3	2.5	1	sub angular	
22	7.75	3.5	2.5	angular	
23	5	4.5	2.5	rounded	
24	7.5	4.5	4	sub angular	

25	20	14	8	angular	
26	38	19	9	sub angular	
27	16	10	8	angular	
28	12	11	4	angular	
29	35	30	13	sub angular	
30	14	13	8	sub rounded	

CS1 water chemistry	
STATION	PH
Right of center	8.43
Center	8.45
Left of center	7.37
STATION	Dissolved O2
Right of center	1 PPM
Center	0.3 PPM
Left of center	1.3 PPM
STATION	Fecal Coliform
Right of center	negative
Center	negative
Left of center	negative

CS1 Velocity		
STATION	Ft/S	NOTES
Right bank	0.1	7-20-2018
Center	0.2	
Left	0.2	

CS1 TDS/EC				
STATION	°C	mS	PPM	NOTES
Right bank	23.7	0.5	226	7-23-2018
Center	21.9	0.5	229	
Left bank	21.6	0.5	232	

Figure 2: Land and Fluvial Survey Cross Sections 2

Cross Section 2								
STATION	HI	SDx	HD	HA	VA	VD	ELEV	NOTES
UNITS	FT	FT	FT	° " '	° " '	FT	FT	Friday 8/10/18 8:45 AM
P2TBM1							2216.576	
BS1	2169.152	123.172	110.982	272.56.57	64.17.42	53.424	2216.576	BS1 to P2TBM1 at start point
FS1	2169.152	4.502	4.5	73.16.16	91.45.30	-0.138	2163.014	FS1 from start point
FS2	2169.152	30.758	30.734	64.25.20		-1.23	2161.922	
FS3	2169.152	46.894	46.856	64.08.23	92.19.25	-1.902	2161.25	
FS4	2169.152	53.768	53.606	62.53.03		-4.184	2158.968	
FS5	2169.152	62.872	62.714	63.12.59	94.03.54	-4.456	2158.696	
FS6	2169.152	66.32	66.226	62.49.16	93.02.48	-3.524	2159.628	
FS7	2169.152	85.272	84.93	62.46.04	95.08.10	-7.634	2154.018	Right bank dry. Adjuted PH from 6 to 7.5
FS8	2169.152	89.626	89.348	62.33.58	94.30.24	-7.042	2153.61	Right bank wet. Adjusted PH to 8.5
FS9	2169.152	92.224	91.976	62.02.06	94.12.29	-6.768	2153.884	Right of center
FS10	2169.152	94.518	94.254	62.02.17		-7.056	2153.596	Center
FS11	2169.152	97.128	96.826	62.42.25	94.30.46	-7.642	2153.01	Left of center
FS12	2169.152	98.966	98.68	62.37.49	94.21.13	-7.512	2153.14	Left bank wet
FS13	2169.152	100.586	100.308	62.46.54	94.15.50	-7.478	2153.174	Left bank dry
FS14	2169.152	103.674	103.474	62.20.11	93.33.36	-6.438	2154.714	Adjusted PH to 8 ft

FS15	2169.152	108.272	108.096	62.00.31	93.16.05	-6.172	2154.98	
FS16	2169.152	115.69	115.662	61.26.08	91.16.42	-2.582	2158.57	
FS17	2169.152	122.752	122.738	60.48.51	90.51.42	-1.846	2159.306	
FS18	2169.152	126.398	126.396	60.20.49	90.18.26	-0.678	2160.474	

CS2 Wolman Pebble Count					
	A (inches)	B (inches)	C (inches)	Shape	Notes
1	1.5	1.75	0.25	sub rounded	right to left bank, using imperial ruler, not 10ths
2	0.75	1.5	0.5	well rounded	
3	0.75	1	0.5	sub angular	
4	0.5	1	0.25	rounded	
5	0.5	0.75	0.25	sub angular	
6	0.5	0.5	0.25	sub angular	
7	0.5	0.75	0.25	sub angular	
8	0.25	0.25	0.25	angular	
9	0.25	0.25	0.25	well rounded	
10	0.25	0.5	0.25	sub angular	
11	7.5	8	4	sub rounded	
12	2	2.75	1.5	rounded	
13	0.5	1	2.5	rounded	
14	1	2	2.5	rounded	
15	0.75	1	0.5	sub angular	
16	0.75	1.25	0.5	well rounded	
17	0.75	1	0.25	sub angular	
18	31	45	16	angular	
19	18	19.5	11	angular	

20	19	26	10	angular	
21	7.5	8	3.25	angular	
22	53.5	74	18	sub rounded	
23	2.5	4	1	well rounded	
24	4	5.5	2.5	sub angular	
25	3	4	1.5	subrounded	
26	2	2.25	0.75	angular	
27	1	1.5	0.75	sub rounded	
28	1.25	1.75	1	sub rounded	
29	6.5	8.5	5.5	rounded	
30	7.5	11.5	25	angular	

CS2 water chemistry	
STATION	PH
Right of center	7.42
Center	8.07
Left of center	8.09
STATION	Dissolved O2
Right of center	0 PPM
Center	0.28 PPM
Left of center	1.0 PPM
STATION	Fecal Coliform
Right of center	negative
Center	negative
Left of center	negative

CS2 Velocity		
STATION	Ft/S	NOTES

Right bank	3.6	8/10/2018
Center	0.9	
Left	0.8	

CS2 TDS/EC				
STATION	°C	mS	PPM	NOTES
Right bank	21.6	0.5	256	8-10-2018
Center	21.4	0.5	257	
Left bank	20.3	0.5	262	

Figure 3: Land and Fluvial Survey Cross Sections 3

Cross Section 3								
STATION	HI	SDx	HD	HA	VA	VD	ELEV	NOTES
UNITS	FT	FT	FT	° " '	° " '	FT	FT	
BM							2155.934	
BS 1	2161.842	67.394	67.394	156.20.31	89.55.20	0.092	2155.934	this BS was tken to BM Q1374
FS1	2161.842	79.166	74.314	48.21.02	110.09.43	-27.286	2128.556	
FS2	2161.842	86.044	81.036	47.51.16	109.38.47	-28.928	2126.914	
FS3	2161.842	94.926	89.34	48.07.18	109.45.20	-32.086	2123.756	
FS4	2161.842	101.446	95.74	47.53.53	109.18.32	-33.544	2119.798	
FS5	2161.842	107.688	102.338	48.10.59	108.08.12	-33.522	2119.82	
FS6	2161.842	114.336	109.83	48.27.33	106.08.19	-31.78	2121.562	
FS7	2161.842	121.746	118.04	48.33.08	104.10.30	-29.814	2123.528	
FS8	2161.842	132.218	128.782	48.48.07	103.05.31	-29.948	2123.394	

FS9	2161.842	145.87	141.908	48.25.37	103.23.08	-33.768	2119.574	Placed TS on FS9 close to a cotton wood tree
BS2	2091.274	129.102	123.746	231.42.25	73.26.18	36.8	2119.574	This is when height of instrument changes
FS10	2091.274	29.042	28.996	42.32.58	42.32.58	-1.646	2081.128	
FS11	2091.274	33.73	33.708	42.44.02	92.06.01	-1.236	2081.538	
FS12	2091.274	39.352	39.252	42.23.51	94.04.15	-2.982	2079.792	
FS13	2091.274	41.988	41.86	44.04.57	94.28.01	-3.27	2079.504	
FS14	2091.274	48.058	47.924	42.18.23	94.16.28	-3.582	2079.192	
BS3	2077.958	44.89	43.824	215.20.36	77.20.97	9.734	2079.192	
FS15	2077.958	4.908	4.898	357.46.31	85.52.11	0.354	2069.812	
FS16	2077.958	6.148	6.14	12.16.10	92.45.00	-0.294	2069.164	
FS17	2077.958	9.472	9.384	21.12.58	97.46.18	-1.28	2068.178	
FS18	2077.958	12.996	12.884	25.27.12	97.31.29	-1.702	2067.756	ds right bank dry
FS19	2077.958	14.184	13.978	25.30.04	99.47.13	-2.412	2067.046	right bank wet
FS20	2077.958	16.228	16.048	24.10.57	98.18.20	-2.342	2067.116	right of center
FS21	2077.958	17.318	17.136	24.28.50	98.18.22	-2.502	2066.956	center
FS22	2077.958	20.334	20.174	19.37.35	97.11.07	-2.544	2066.914	left of center
FS23	2077.958	22.958	22.846	28.18.02	95.40.24	-2.27	2067.188	left bank wet
FS24	2077.958	23.87	23.798	35.01.37	94.26.18	-1.848	2067.61	left back dry
FS25	2077.958	25.146	25.102	26.49.16	93.22.34	-1.48	2067.978	
FS26	2077.958	33.692	33.506	25.42.44	96.00.50	-3.53	2069.028	
FS27	2077.958	40.082	39.902	25.17.34	95.25.38	-3.79	2069.268	
FS28	2077.958	42.94	42.83	25.06.27	94.05.28	-3.064	2069.994	

CS3 Wolman Pebble Count					
	A (inches)	B (inches)	C (inches)	Shape	Notes

1	3	3.75	2	rounded	right to left bank, using imperial ruler, not 10ths
2	4.25	3.5	2	angular	
3	3.5	3	0.1	well rounded	
4	2.25	1.25	1	sub rounded	
5	2.5	2	0.75	sub angular	
6	5.75	5	2.5	rounded	
7	2	1	1	sub rounded	
8	2	1	0.25	sub rounded	
9	2	1.5	0.5	angular	
10	1.5	1	0.25	angular	
11	3	1.75	1.5	angular	
12	4.5	4.5	2.75	sub angular	
13	2.5	2	1.75	sub rounded	
14	3.5	2.5	1.5	sub angular	
15	1.25	0.75	0.75	sub angular	
16	1.25	0.5	0.75	angular	
17	1	0.75	0.5	sub angular	
18	1	1	0.5	sub rounded	
19	3	2	1.25	sub angular	
20	2.75	2	0.75	angular	
21	0.75	1.5	0.75	sub angular	
22	31	2.5	1.5	sub angular	
23	2.5	1.5	1	rounded	
24	4	2.5	3	sub rounded	
25	2	2	0.5	rounded	
26	2	1.5	1	angular	

27	2.5	2.5	1	sub rounded	
28	4.5	3	2.75	sub rounded	
29	5	3.5	2	sub angular	
30	4	2	2.5	rounded	

CS3 water chemistry	
STATION	PH
Right of center	8.05
Center	7.77
Left of center	8.06
STATION	Dissolved O2
Right of center	N/A
Center	N/A
Left of center	N/A
STATION	Fecal Coliform
Right of center	negative
Center	negative
Left of center	negative

CS3 Velocity		
STATION	Ft/S	NOTES
Right bank	0.5	8/2 2018
Center	1.3	
Left	0.2	

CS3 TDS/EC

STATION	°C	mS	PPM	NOTES
Right bank	22.8	0.6	287	8-2-2018
Center	22.7	0.6	288	
Left bank	22.7	0.6	289	

Figure 4: Land and Fluvial Survey Cross Sections 4

Cross Section 4 (part 1 of 2)								
STATION	HI	SDx	HD	HA	VA	VD	ELEV	NOTES
UNITS	FT	FT	FT	° " '	° " '	FT	FT	Monday July 9, 2018 10:10 AM
								942 hPa, 34.6°C, Cirrus 20%
								Total Station = Kevin, Rod = Suzette, Notetaker = Amalie
P3 TBM1							2181.224	
BS1	2173.012	256.416	256.416	171.50.32	86.49.40	14.212	2181.224	BS to P3TBM1, PH= 6.0 FT
P3TBM2	2173.012	99.638	98.908		96.56.31	-12.042	2154.97	FS to point (Nail w/flag) on SE edge of concrete irish bridge
B2	2140.072	248.672	247.792	207.17.03	85.10.47	20.898	2154.97	TS moved to irish bridge across from CK. BS to TBM P3TBM2
FS P3 TBM3	2140.072	62.942	62.924	74.56.57	91.22.30	-1.51	2132.562	FS to point (Nail) near big tree in dry channel west of gravel bar
								*Battery change) battery failure as soon as PT.4 read
								Kevin photographed the data & then recorded, 35°5°C
								1100
								Moved TS to bridge below gate. BS (3) to P3TBM2 to get HI, then shot to P3TBM4, then changed to auto level

Cross Section 4 Automatic Level (part 2 of 2)

STATION	HI	BS	FS	BEARING	DISTANCE	ELEV	NOTES (part 2 of 2)
							With T.S. battery failure, the auto level was moved to the gravel bar, then a BS to TBM P3TBM4 (near big tree on the west side of the boulder channel) was taken. All subsequent readings done with auto level continue same STN numbering sequence
	2139.162	6.77		223	0.35	2132.562	
		6.6					
		6.42					
6	2139.162		6.896	226	0.729	2132.608	East bank of west channel with sand bar
			6.554				
			6.167				
7	2139.162		5.417	224	0.625	2134.058	flood plain towards level with nettles, willows
			5.104				
			4.792				
8	2139.162		4.417	222	1.325	2135.408	floodplain (little ridge in channel)
			3.754				
			3.092				
9	2139.162		7.042	223	0.292	2132.266	in bouldery channel (dry)
			6.896				
			6.75				
10	2139.162		7.875	222	0.25	2131.412	in bouldery channel (dry)
			7.75				
			7.625				
11	2139.162		8.375	225	0.167	2130.87	in bouldery channel (dry)
			8.292				

			8.208				
12	2139.162		7.854	226	0.125	2131.37	channel east edge with vegetation
			7.792				
			7.729				
13	2139.162		6.688	229	0.084	2132.516	base of boulder bar
			6.646				
			6.604				
14	2139.162		4.938	247	0.042	2134.245	west edge of boulder bar
			4.917				
			4.896				
15	2139.162		5.729	42	0.062	2133.454	rod placed on east side of bar
			5.708				
			5.667				
16	2139.162		7.688	45	0.146	2131.516	low west edge of gravel bar
			7.646				
			7.542				
17	2139.162		8.479	42	0.229	2130.808	west edge of active channel
			8.354				
			8.25				
18	2139.162		9.021	42	0.229	2130.266	in water 6"
			8.896				
			8.792				
19	2139.162		9	40	0.292	2130.308	in water 6.5"
			8.854				
			8.708				
20	2139.162		9.083	39	0.291	2130.224	in water 5.5"

			8.938				
			8.792				
21	2139.162		8.792	37	0.667	2130.704	east edge of active channel
			8.458				
			8.125				
22	2139.162		7.542	33	0.417	2131.829	east bank of channel with boulders
			7.333				
			7.125				
23	2139.162		7.625	39	0.521	2131.797	"floodplain"
			7.365				
			7.104				
24	2139.162		7.167	54	0.5	2132.245	boulders above floodplain
			6.917				
			6.667				

CS4 Wolman Pebble Count					
	A (inches)	B (inches)	C (inches)	Shape	Notes
1	0.9	0.8	0.3	sub angular	right to left bank, using imperial ruler, not 10ths
2	0.8	0.7	0.2	angular	
3	0.75	0.525	0.1	angular	
4	0.3	0.3	0.1	angular	
5	0.275	0.275	0.025	angular	
6	0.9	0.8	0.5	sub angular	
7	0.2	0.1	0.05	sub rounded	
8	0.5	0.4	0.1	angular	
9	0.2	0.125	0.1	angular	

10	1.25	0.55	0.3	angular	
11	0.6	0.55	0.15	angular	
12	0.55	0.3	0.1	angular	
13	0.45	0.35	0.3	sub rounded	
14	0.3	0.25	0.15	angular	
15	0.275	0.1	0.05	very angular	
16	0.775	0.75	0.3	angular	
17	0.65	0.625	0.25	angular	
18	0.2	0.2	0.125	round	
19	0.95	0.7	0.2	angular	
20	0.4	0.2	0.125	angular	

CS4 water chemistry	
STATION	PH
Right of center	7.74
Center	7.73
Left of center	7.15
STATION	Dissolved O2
Right of center	N/A
Center	N/A
Left of center	N/A
STATION	Fecal Coliform
Right of center	negative
Center	negative
Left of center	negative

CS4 Velocity

STATION	Ft/S	NOTES
Right of center	0.4	7-9-2018
Center	1	Left bank downstream is next to rebar. If going downstream, you see rebar close to CS4. Left bank measurements start from left of rebar with flowprobe velocity
Left of center	0.9	

CS4 TDS/EC				
STATION	°C	mS	PPM	NOTES
Right bank	23.6	0.7	374	8-2-2018
Center	23.8	0.7	375	
Left bank	24.7	0.7	369	