Salt River Ecosystem Restoration Project
Post-Construction Geomorphic Channel Survey Report
Phase 1
Year 3 – 2016

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1) INTRODUCTION

In compliance with the Salt River Ecosystem Restoration Project (SRERP) Adaptive Management Plan, the Year 3 cross sectional and longitudinal surveys were conducted across the project area during June 2016. The cross sectional surveys were conducted on the main channel of the lower Salt River (SR), and on the newly excavated North (NC) and South (SC) slough channels that were excavated during the summer of 2013 (Figure 1). Longitudinal surveys were conducted of the main-stem Salt River channel from Cutoff Slough (CO) to the Phase 1 excavation boundary upstream of the Riverside Ranch barn, the North slough channel (NC) and the north branch of that channel, and of the South slough channel (SC) (Figure 1). This effort concentrates on Phase 1 in the estuarine and salt marsh portions. All elevations are geo-referenced, in feet, to the 1988 North American Vertical Datum (NAVD88).

In 2013 the SRERP converted 330 acres of dairy ranch into a salt marsh estuary. Two and a half miles of the Salt River channel were excavated, expanded, and deepened. Three miles of new slough channels (i.e. NC and SC) were also excavated and enhanced. In 2014, an additional 1.2 miles of the Salt River channel were excavated above the Phase 1 project area (Phase 2) and are not included as part of this survey. The channels excavated in 2013 are being monitored using cross sectional surveys to assess the amount of sediment deposition, erosion and channel bank slumping. The 2014 survey results are used as baseline comparison data to determine if corrective management actions are necessary. The 2013 cross sections are as-built design criteria, not actual survey results.

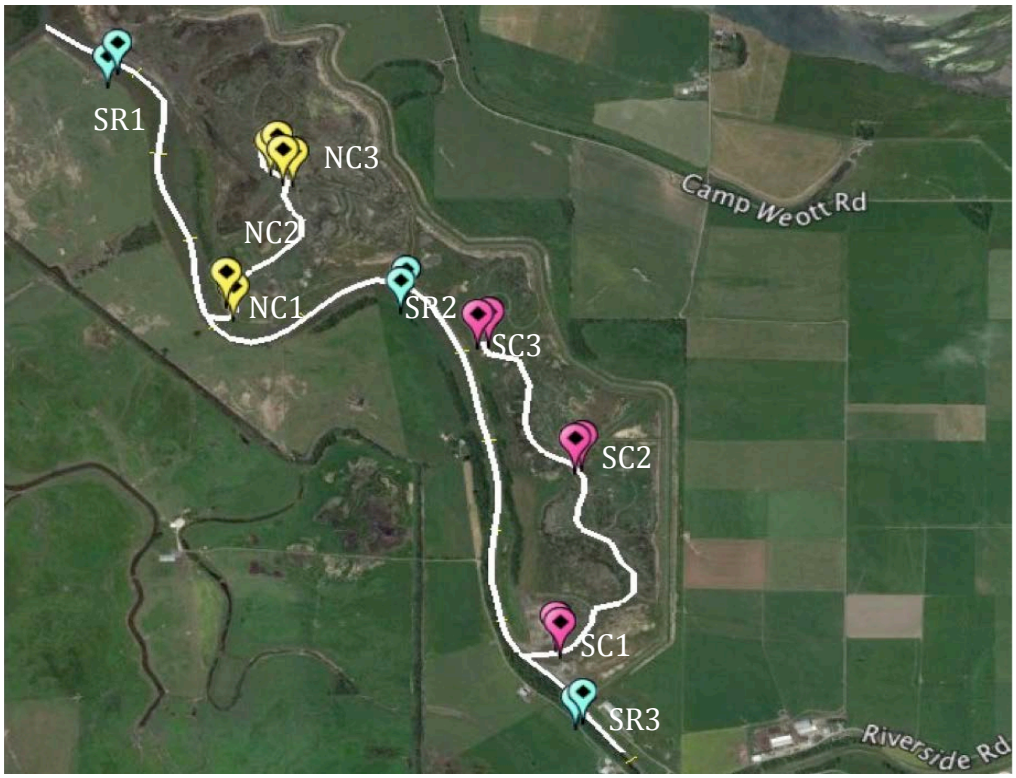

Figure 1: Location of the cross section profiles for Salt River Ecosystem Restoration Survey Project, Spring 2016. SR = Salt River cross sections; NC= North Channel slough cross sections; SC= South channel slough cross sections.

2) METHODS

2.1) Cross section elevations

Cross section elevations and distances were collected at the flood plain, channel slope, vegetation edge, waters edge, mid-channel or thalweg, and at least 2 locations on either side of the mid-channel. All data for the 2014 cross sections and longitudinal profiles were collected using a CTS/Berger automatic level, tripod and stadia rod. The data collected for 2015 and 2016 used a Nikon DTM-352 Total Station laser theodolite, tripod, prism pole and single prism (Figure 2). All elevations are reported in feet using the NAVD88 datum and elevations are based off a corrected position using survey benchmarks SR11, SR12, and SR14 (Table 1) on Riverside Ranch (Phase 1 project area), established in 2013. Flood plain measurements were collected up to 200-feet on either side of the main channel, with the exception of the south bank of SR3 due to limited access across private land. Cross section profiles are viewed from the west (or north) with the zero-point on the left-side of the graph and extending up to 400 feet toward the south (and east). The discussion refers to left bank and right bank when viewed looking downstream.

2.2) Channel cross section profiles

A total of nine cross sectional profiles are compared for the years 2014 through 2016 with three profiles on each of the main stem Salt River (SR), the recently excavated North slough channel (NC), and the recently excavated South slough channel (SC). All cross sections are GPS referenced to the survey benchmarks (e.g. SR11, SR12, SR14) and the survey control points (e.g. SR1, SC1, NC1, etc.) are monumented with ½" rebar and orange caps above the highest high water level. Several of the stations in the NC and SC are in the flood plain and are subject to biofouling and/or burial.

2.3) Salt River longitudinal profile

The main Salt River channel (SRL) from Cutoff Slough to the Riverside Ranch barn, the North slough channel (NCL) and the South slough channel (SCL) longitudinal profile surveys were collected using a Nikon DTM-352 Total Station laser theodolite, tripod, prism pole and single prism. The prism pole was placed in the thalwag approximately every 200-feet with the survey instrument located at one of four locations along the north bank of the main Salt River channel, then geo-referenced to the Salt River Restoration Project's survey benchmarks SR11, SR 14 and SR 12. A total of 48 measurements were taken along the Salt River. All elevations are reported in feet using the NAVD88 vertical datum. Results for these longitudinal profiles are presented in Figures 7A-9A and tables are presented in the appendix.

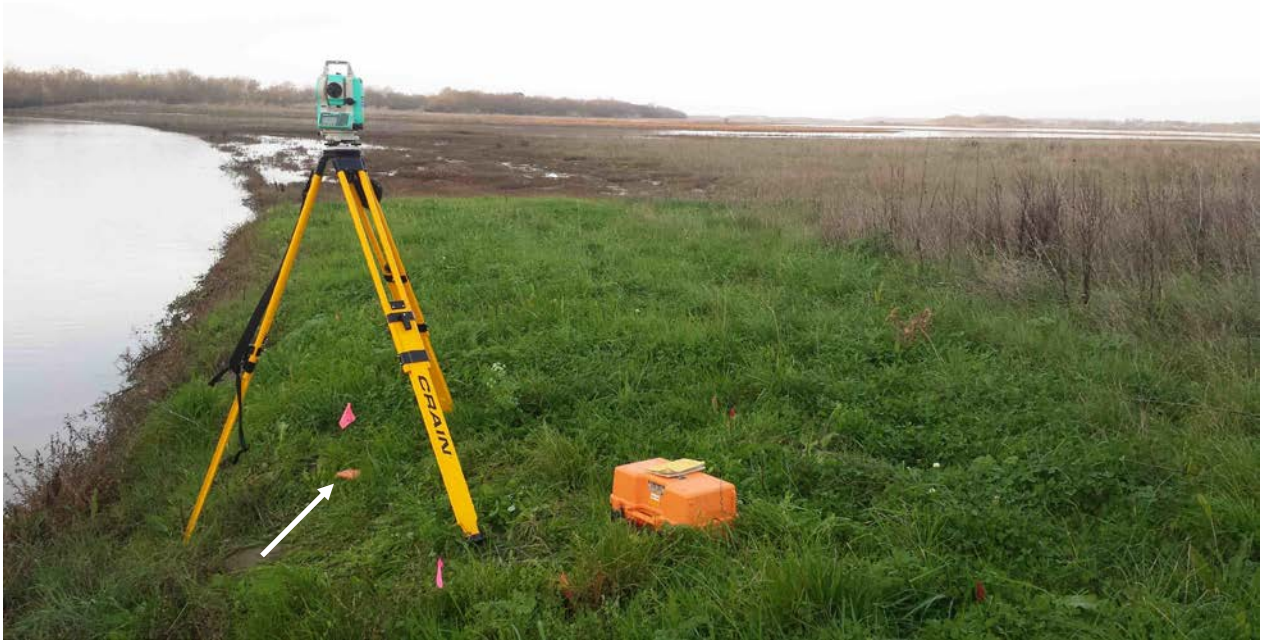

Figure 2: View looking west of the project site from the SR 3 cross section near River Ranch Barn site. Salt River is to the left in the photo and the monumented survey control point, with orange cap, is indicated beneath the theodolite.

Name	Latitude	Longitude	Elevation (NAVD88)
SR11	40°35'47.00"N,	124°17'39.76"W	13.85
SR12	40°37'10.50"N,	124°18'43.55"W	11.07
SR14	40°36'36.29"N	124°18'33.19"W	13.32
SR1	40°37'4.33"N	124°18'50.37"W	7.08
SR2	40°36'41.14"N	124°18'13.56"W	7.91
SR3	40°35'55.15"N	124°17'51.81"W	8.19
NC1	40°36'36.46"N	124°18'34.86"W	8.10
NC2	40°36'51.13"N	124°18'27.54"W	7.15
NC3	40°36'52.30"N	124°18'30.28"W	6.93
SC1	40°35'59.90"N	124°17'54.60"W	7.02
SC2	40°36'20.24"N	124°17'51.91"W	7.38
SC3	40°36'33.67"N	124°18'3.40"W	7.70

Table 1: GPS locations and elevations for survey benchmarks: SR11, SR12, SR14; and cross section monuments on Salt River SR1, SR2, SR3; North Channels: NC1, NC2, NC3; and South Channels SC1, SC2, SC3.

3) RESULTS

3.1) Cross section profiles

3.1.1) Salt River cross section profiles

The cross section profiles of the main channel of the Salt River indicate that the SR1 experienced 0.61 feet of erosion on the south/left side of the channel since 2015. Slumping appears to be most prominent on the south/left bank of the channel (Figure 3A). Since 2014, the channel capacity at SR1 has decreased by approximately 13%. Cross section SR2 showed very little change since last year. However, the SR2 channel capacity decreased by 9% due to the sediment accumulation at the bottom of the north bank (Figure 3B) since 2014. Cross section SR3 had 0.22 feet of deposition at the bottom of the south bank, where channel capacity decreased by 9% from 2014 due to sedimentation across the bottom of the channel (Figure 3C).

3.1.2) North and South slough channel cross section profiles

The North slough channels cross section profiles show that the NC1 experienced 0.29 feet of erosion at the thalwag since 2015 and has increased in channel capacity by approximately 21% from scour on the north/right side of the channel since 2014 (Figure 4A). The NC2 cross section shows that the bottom of the channel eroded by 0.76 feet since 2015. NC2 also increased its channel capacity by approximately 20% since 2014 (Figure 4B). Very little change occurred at NC3 over the course of one year, though the channel decreased in capacity by approximately 19% since 2014; due to sedimentation across the bottom of the channel (Figure 4C).

The 2016 South slough channel cross sectional surveys indicate 0.44 feet of deposition on the bottom of the channel at SC1 since 2015 but its channel capacity has increased by approximately 1% over 2 years due to scour and deposition occurring on opposing sides of the bottom of the channel (Figure 5A). Cross section SC2 experienced very little change since 2015. However SC2 increased 16% with scouring occurring mainly along the upper portion of the north bank (Figure 5B) within the last two years. Minor changes occurred at cross section SC3 over the past year and since 2014; where channel capacity has decreased by approximately 1% (Figure 5C).

3.2) Longitudinal profiles

3.2.1) Salt River longitudinal profile

The total relief on the 11,865-foot longitudinal profile section of the main Salt River channel surveyed in 2016 was 2.71 feet, yielding an average gradient of 0.023%. In 2015, the relief on the 11,706-ft channel was 2.37 feet, yielding an average gradient of 0.020%. The increased gradient from 2015 to 2016 is result of a general pattern of sediment deposition in the upper sections of the Salt River. This aggradation contrasts to an approximate 1.7 ft deep scour pool that continues to persist in the SR near the SC confluence 10,400 feet upstream from CO. Another scour pool approximately 5100 ft upstream from CO, near NC confluence deepened from 0.6 feet in 2015 to -0.9 feet in 2016. Corrections were applied to the 2014 longitudinal profile to include the starting point at SR3. Re-analysis of the 2014 data reveal errors likely due to winter weather conditions and are not included in the 2016 comparative profiles.

3.2.2) North slough channel longitudinal profile

Longitudinal profiles of the NC and SC for 2016 indicate very little change and minor upstream migration at scour pools as compared to the 2015 profiles. Longitudinal profiles are not available for 2014 due to winter weather conditions.

The total relief on the 2,022-foot NC in 2016 was 2.1 feet, yielding an average gradient of 0.10%. The relief in 2015 was 2.33 feet, yielding an average gradient of 0.12%, resulting from the 0.09 feet of erosion which lowered the upstream section.

The total relief on the 512-foot north branch of NC in 2016 was 2.92 feet yielding an average gradient of 0.57%. The relief in 2015 was 2.67 feet, yielding an average gradient of 0.44%, which is a result of the erosion at the confluence with NC.

3.2.3) South slough channel longitudinal profile

The total relief on the 4687-foot SC channel in 2016 was 3.50 feet, yielding an average gradient of 0.075%. The relief of the 3,943-foot channel in 2015 was 2.76 feet, yielding an average gradient of 0.069%.

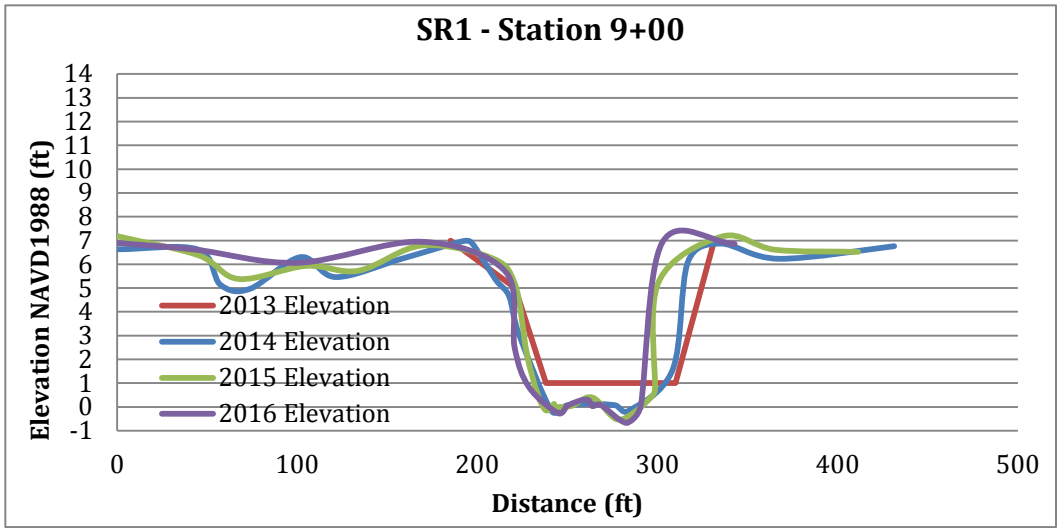

Figure 3A: Salt River main channel cross section SR 1, 2013 - 2016.

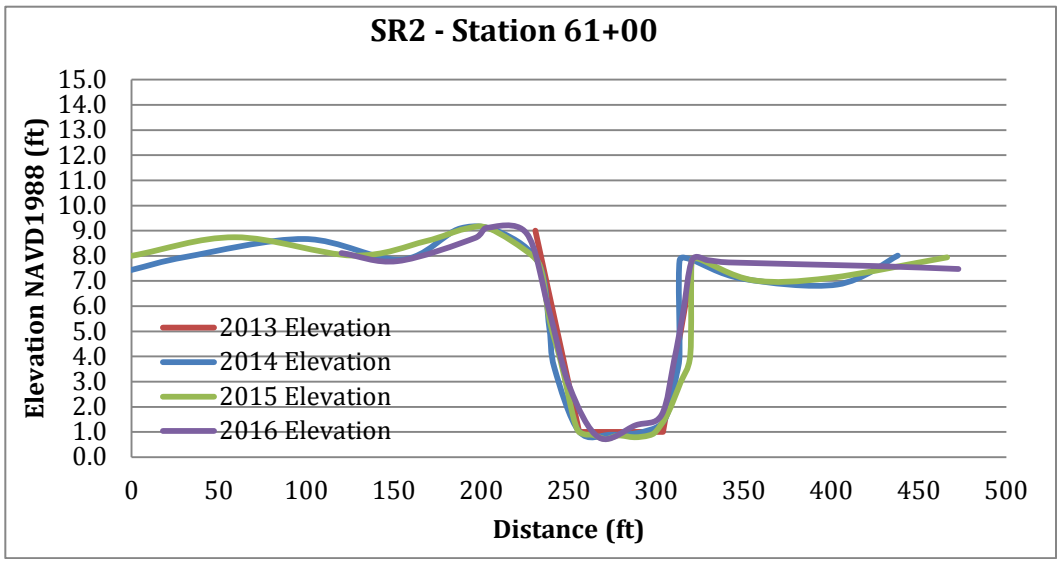

Figure 3B: Salt River main channel cross section SR2, 2013 - 2016.

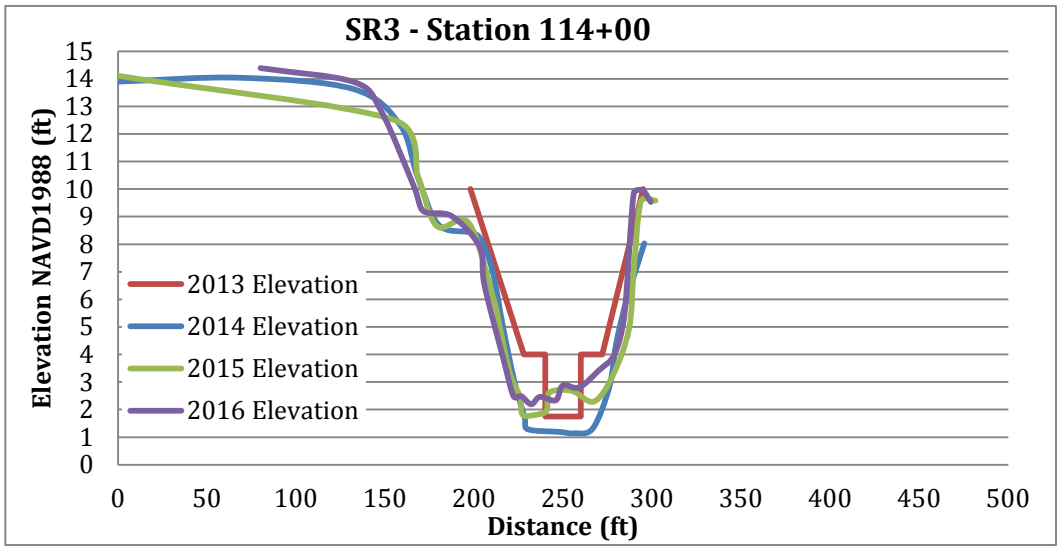

Figure 3C: Salt River main channel cross section 3, 2013 - 2016.

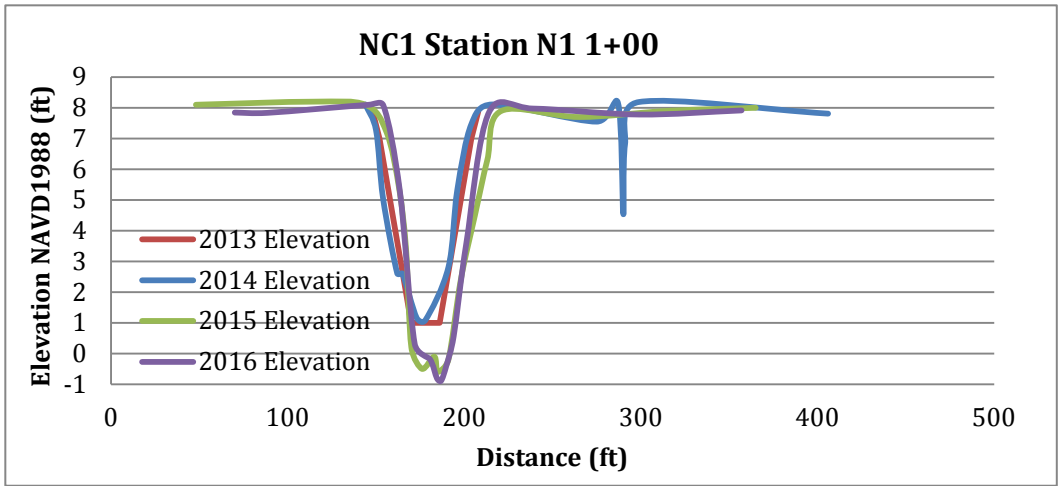

Figure 4A: 2014 North slough channel cross section NC1, 2013 - 2016.

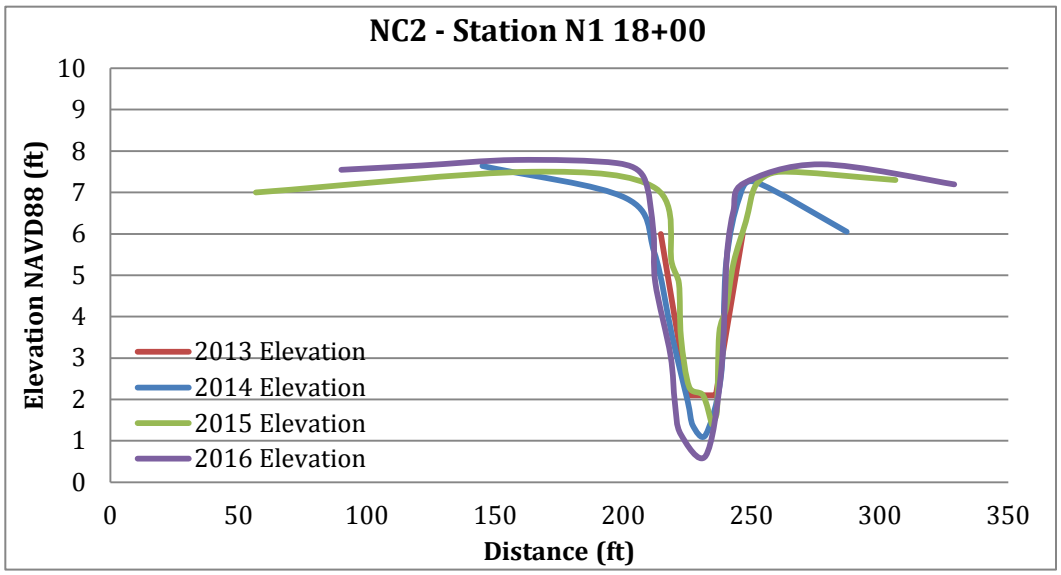

Figure 4B: 2014 North slough channel cross section NC2, 2013 - 2016.

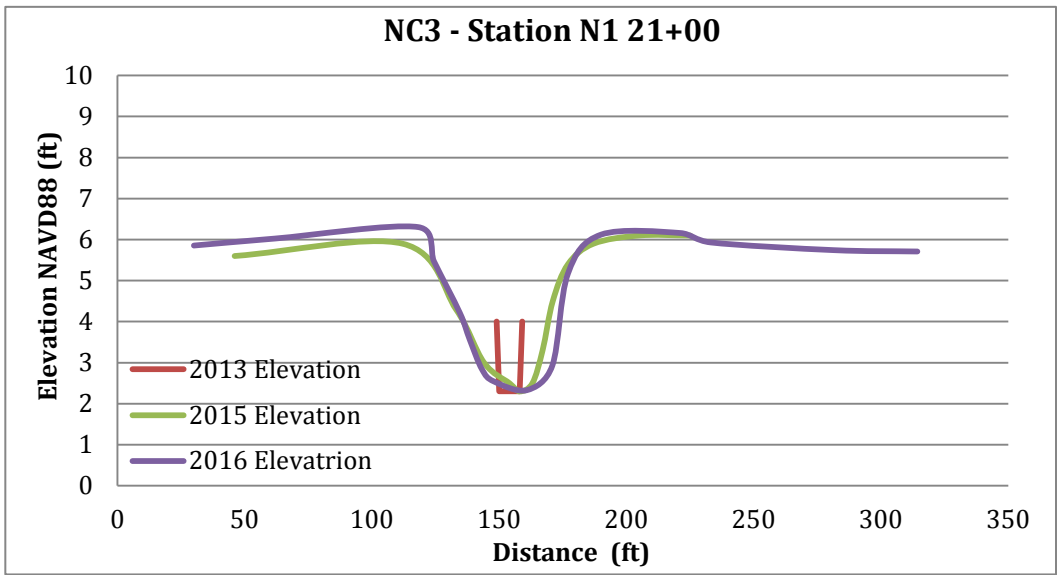

Figure 4C: North slough channel cross section NC3, 2013, 2015 - 2016. 2014 survey data not available.

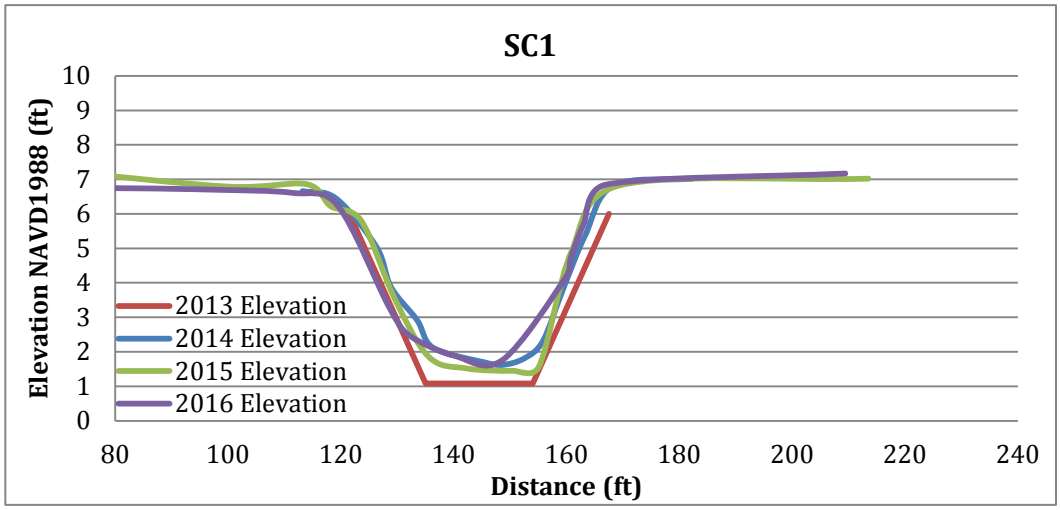

Figure 5A: South slough channel of the Salt River cross section profile SC1, 2013-2016

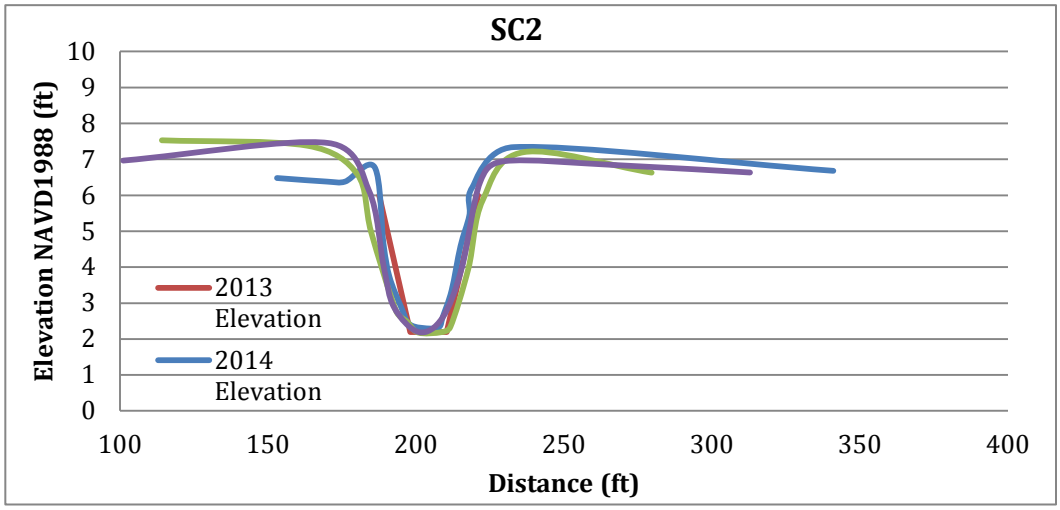

Figure 5B: South slough channel of the Salt River cross section profile SC2, 2013-2016.

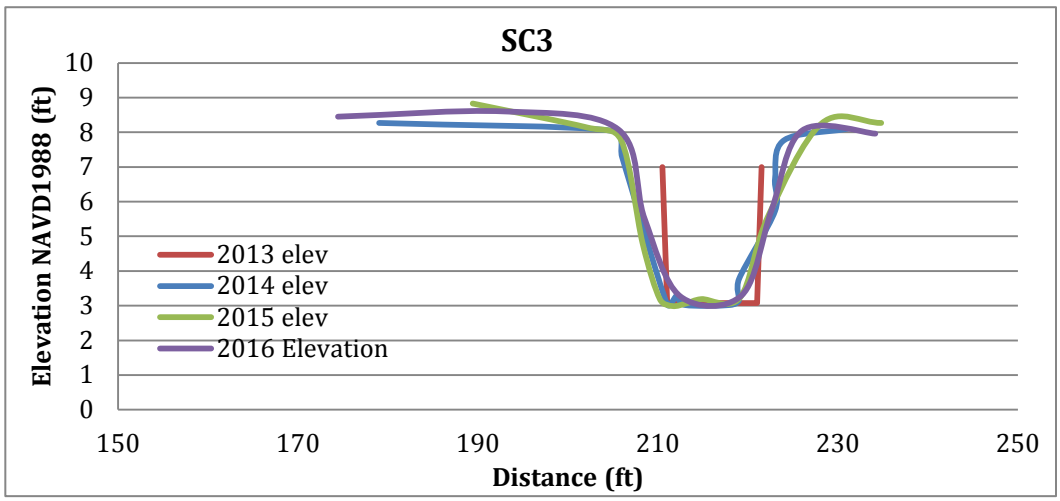

Figure 5C: South slough channel of the Salt River cross section profile SC3, 2013-2016.

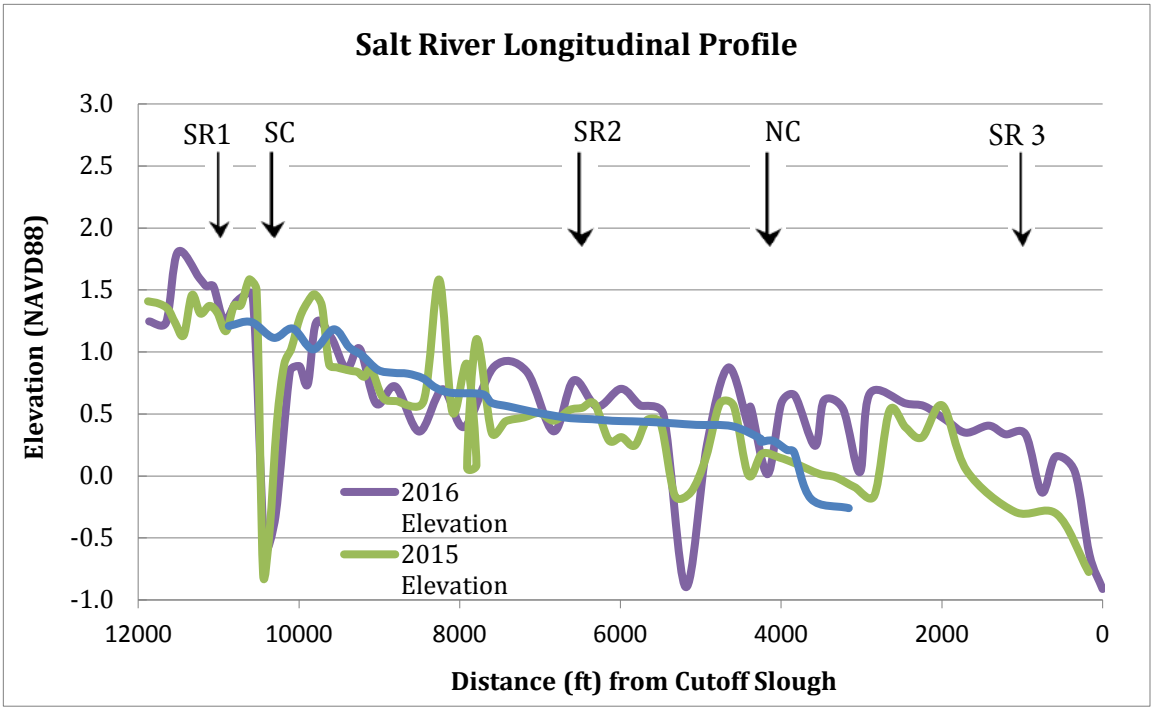

Figure 6: Salt River longitudinal profile of the main channel of the Salt River 2014-2016. SR1, SR2 and SR3 are locations of cross sections; NC and SC are the approximate locations of the confluence with the North and South slough channels, respectively.

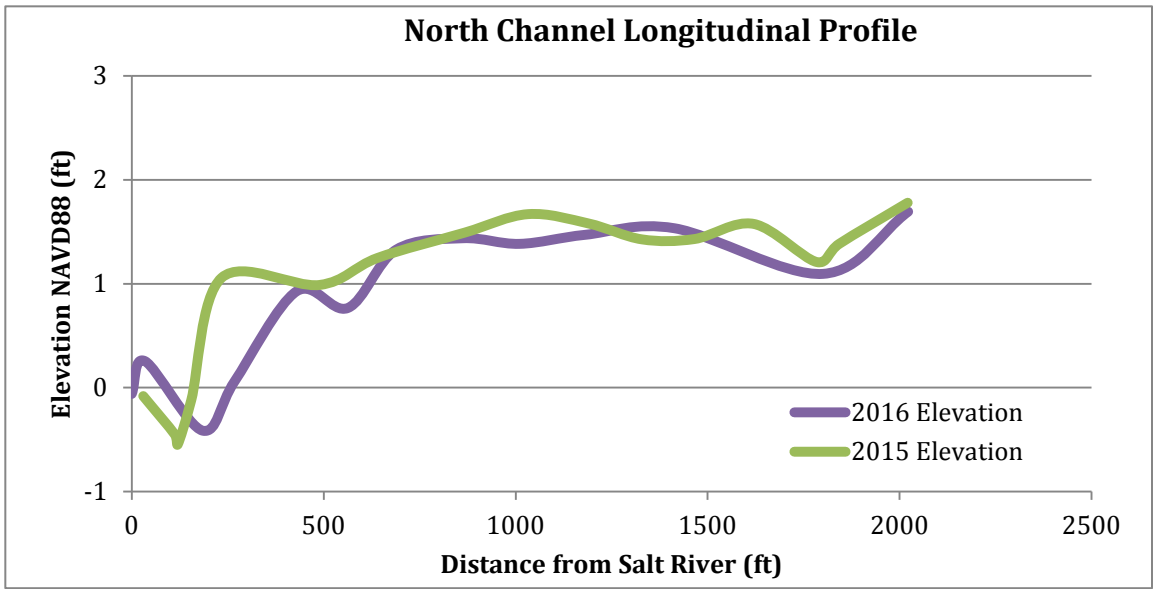

Figure 7A: North slough channel of the Salt River longitudinal profile 2015-2016.

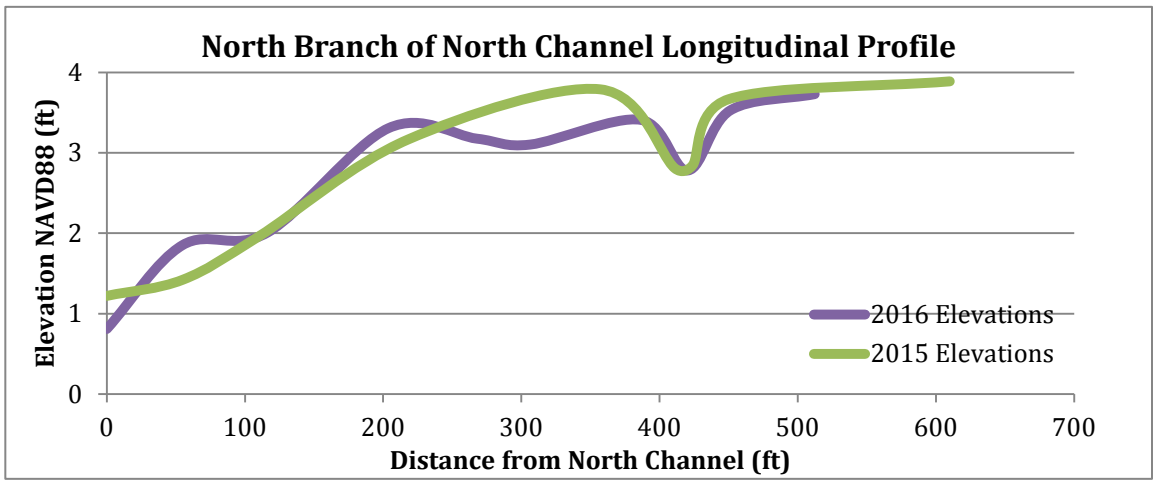

Figure 7B: North branch of the North slough channel of the Salt River longitudinal profile 2015-2016.

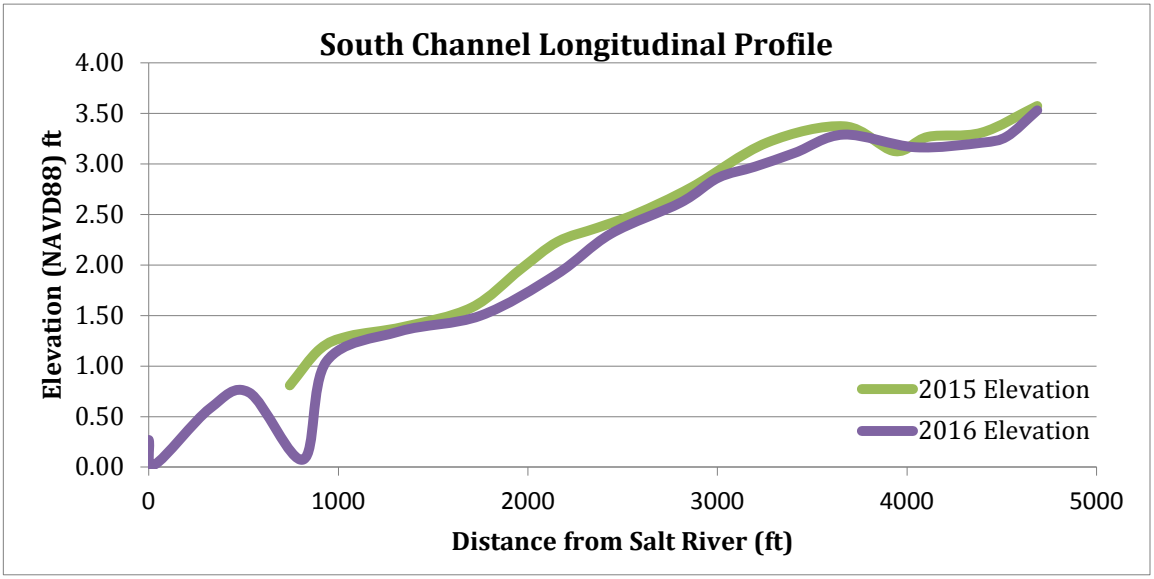

Figure 8: South slough channel of the Salt River longitudinal profile 2015-2016.

4) Discussion

Patterns of erosion, transport and deposition observed in 2015 continued in much the same manner in 2016. Bank erosion and slumping were observed throughout the project area, particularly in the downstream reaches of the SR, and near the confluences with the NC, CO, and upstream near the SC confluence. Sediment deposition in upstream reaches along the Salt River channel was likely due to re-suspension of fine-grain sediments (e.g. silt and clay) being transported upstream during flood tide then deposited at slack, high water. Sediment cohesion inhibits the amount of re-suspension during the ebb tide, which accounts for net the deposition that was observed at SR3 and in the longitudinal profiles. It is difficult at this point to determine if there is a net upstream transport of sediment in the Salt River main channel. The net transport direction and quantity of sediment will be resolved in future channel surveys. Sediment erosion, transport and deposition, will likely change in response to pending upstream restoration that will introduce more sediment inputs into the system, while at the same time bring in larger volumes of water as the project connects into two tributaries.

4.1 Salt River cross sections

The Salt River channel continues to adjust to the base levels established in 2014, following the 2013 excavation of the main Salt River and the North and South slough channels. The main-stem Salt River channel bottom on the left side at cross section SR1 has scoured another 7 inches in the pre-excavation channel. This has caused the left-side bank at the high-water portion of the channel to narrow somewhat as the banks are undercut and slump toward the channel (Figure 3A), thus reducing the average channel capacity. SR 2 channel appears to be in equilibrium with the sediment re-suspension/transport and the channel banks are stable (Figure 3B). Following the 2013 excavation, the channel at SR3 initially eroded, then aggraded on the left side of the channel in 2014 at a faster rate than the mid- and right portion of the channels (Figure 3C). It is recommended that project managers review the channel capacity reductions across all the main channel Salt River cross sections. The approximate decreases in channel capacity over the last 2 years exceed, or are approaching, the 10% adaptive management trigger.

4.2 North and South slough channel cross sections

The NC includes a main channel and three, upstream channel branches. Only the north branch of the NC was monitored and includes cross section NC3. The east and south branches of the NC are not included in this study. Channel profile NC1 indicates continued erosion on the right-side channel bottom. Erosion of the left-side bank downstream of NC1 (Figure 4A), toward the confluence with the Salt River, continues to erode and slump. The NC2 channel profile is located just downstream of the confluence of three upstream three branches of the North slough channel and continues to exhibit upwards of 9 inches of mid-channel erosion. Scour around a large root wad was also observed in the channel downstream of NC2. The north branch of the North slough channel elevation has remained fairly stable, however, the two scour pools have migrated slightly upstream (see Figure 8A). The approximate changes in channel capacity at all the northern slough channel cross sections exceed the 10% adaptive management trigger. Thus review is warranted.

The South slough channel has several linear, gated, drain channels from farmlands located to the northeast of the project area that were not surveyed. The South slough channel at SC1 continues to aggrade, which is consistent with conditions in this region of the project area. Cross sections SC2 and SC3 remain stable and show very little change. Channel capacity in the SC1 and SC3 has also changed little since 2014. However, it is recommended to assess SC2's capacity increase.

4.3 Longitudinal Profiles

4.3.1 Salt River

The Salt River longitudinal profile indicates highly mobile sedimentation patterns with erosion near the confluence with the CO, NC and SC. It appears the re-suspension and transport of fine-grain sediments migrate up and down the channel during flood and ebb tides, respectively, however, development of scour pools near the confluence with CO, NC and SC are the result of large eddies that form during maximum ebb tide. Re-analysis of the 2014 revealed survey errors incurred in the downstream section as winter weather conditions prevented an accurate completion of the survey.

4.3.2 North and South slough channels

The longitudinal profile on the NC remains stable with minor downstream deposition where the gradient is slightly steeper. The scour pool near the 225-foot mark has migrated slighty upstream. The north branch of NC channel has a section with a steep gradient that is depositing downstream, eroding upstream and gradually decreasing the gradient. The upstream plunge pool near the 425-foot mark is stable and eroded only slightly upstream.

The longitudinal profile on the SC remains stable with scour developing approximately 900 feet upstream from the confluence at an unnamed side channel.

Appendix I: Salt River main channel cross section data.

SR1

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
185	7	0	6.63	0	7.18	0.0	6.90
220.9	5	44.9	6.62	45	6.38	43.2	6.62
237.9	1	57.4	5.13	67.5	5.38	100.3	6.06
309.9	1	73.8	4.97	104.7	5.93	168.6	6.95
331.4	7	101.7	6.3	134	5.73	215.5	5.70
		121.4	5.46	169.1	6.79	220.6	2.50
		157.4	6.22	207.3	6.28	228.6	0.83
		191.2	6.96	220.7	5.18	244.7	-0.26
		196.8	6.9	227.3	2.27	249.5	0.03
		209.9	5.37	233	0.62	249.8	0.05
		217.5	4.66	237.9	-0.14	255.8	0.24
		223	3.06	242.5	0.13	261.2	0.30
		241.1	-0.17	242.6	0.01	263.5	0.05
		249.3	0.06	252	0.04	264.4	0.04
		260.8	0.13	263.7	0.4	268.4	0.09
		276.5	0.07	277	-0.51	282.8	-0.67
		283.7	-0.17	287.3	-0.21	290.5	0.03
		308.3	1.56	296.4	0.42	302.7	6.93
		316.8	6.1	298.5	0.71	342.7	6.86
		334.6	6.87	300.5	5.25		
		367.4	6.23	335.9	7.17		
		431.3	6.76	365.2	6.61		
				411.3	6.52		

SR2

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
231	9	0.0	7.44	0	8.00	120.0	8.11
256	1	31.2	7.96	59.1	8.74	151.9	7.79
304	1	99.1	8.67	126.6	8.01	196.4	8.71
319	7	154.2	7.85	168.0	8.58	202.9	9.11
		187.9	9.09	190.5	9.07	225.7	8.90
		211.6	8.91	204.7	9.08	238.1	5.98
		232.9	7.68	228.6	8.03	250.3	2.80
		238.8	5.12	234.4	7.34	267.3	0.77
		241.7	3.54	238.9	5.46	288.0	1.27
		255.8	1.02	245.5	3.75	302.9	1.68
		273.9	0.89	252.2	1.67	310.1	3.84
		292.6	1.01	255.0	1.07	315.1	5.69
		305.0	1.53	258.8	0.91	320.4	7.84
		311.6	3.32	263.9	0.88	329.4	7.83
		313.2	4.09	271.0	0.72	341.2	7.74
		313.2	7.81	278.3	0.86	424.6	7.60
		319.8	7.85	287.4	0.79	472.6	7.48
		349.3	7.09	295.5	0.86		
		403.4	6.86	299.8	1.03		
		437.9	8.01	306.4	1.73		
				313.7	2.96		
				319.3	4.03		
				320.1	7.78		
				323.8	7.89		
				355.3	7.03		
				398.9	7.12		
				466.1	7.94		

SR3

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
198	10	0	13.9	0	14.11	80.0	14.39
228	4	68.5	14.04	155.4	12.5	132.6	13.88
240	4	132.2	13.63	168.3	10.49	147.5	12.87
240	1.75	158.4	12.33	179	8.66	166.2	10.09
260	1.75	168	10.5	197	8.77	171.4	9.20
260	4	179.8	8.72	210.7	6.07	187.5	9.02
272	4	197.2	8.43	214.6	4.94	203.1	7.90
295	10	203.6	8.19	220.1	3.33	205.8	6.51
		210.3	7.04	225.9	2.44	216.4	3.85
		216.2	5.01	227.2	1.82	222.2	2.48
		222.5	3.06	234.5	1.81	226.4	2.49
		228.4	1.71	240.8	1.97	232.1	2.19
		230	1.29	242.3	2.62	236.9	2.46
		248	1.19	254.9	2.68	245.9	2.34
		256.2	1.14	267.2	2.29	249.8	2.88
		266.7	1.32	277.7	3.21	259.1	2.81
		276	2.83	287	4.92	270.0	3.42
		279.9	4.42	289.7	7.07	279.0	4.02
		285.8	6.01	293.7	9.55	284.5	5.47
		295.6	8.03	301.9	9.58	289.7	9.84
						294.6	9.96
						299.3	9.53

Appendix II: North slough channel cross section data.

NC1

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
148	7.9	0	7.77	48.0	8.10	70.0	7.85
152	7	21	7.54	114.0	8.20	88.5	7.84
170	1	144	8.11	144.0	8.10	145.4	8.10
186	1	150	7.27	156.0	7.20	154.2	8.07
204	7	154	5.04	163.0	5.40	163.5	5.29
208	7.9	162	2.61	167.0	3.40	171.9	0.32
		165	2.6	170.0	0.20	180.5	-0.18
		173	1.16	176.0	-0.50	184.5	-0.81
		178	1.09	183.0	-0.10	186.8	-0.89
		191	2.81	185.0	-0.60	189.8	-0.40
		196	5.32	191.0	-0.20	193.9	0.55
		204	7.47	198.0	2.40	201.2	3.60
		216	8.11	206.0	4.50	214.1	7.87
		275	7.55	213.0	6.30	239.1	7.98
		287	8.16	221.0	7.90	298.9	7.78
		290	4.55	265.0	7.70	357.0	7.92
		291	6.81	315.0	7.90		
		299	8.19	365.0	8.00		
		406	7.81				

NC2

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
214.5	6	145.0	7.64	56.7	7.00	90.0	7.55
225	2.1	201.0	6.86	164.2	7.50	121.2	7.65
236	2.1	212.0	5.55	212.5	7.10	158.0	7.79
246.5	6	219.0	3.51	218.8	5.30	197.4	7.71
		225.0	1.96	221.6	4.80	207.9	7.37
		227.0	1.37	222.4	3.50	211.7	6.04
		232.0	1.14	225.6	2.30	212.4	4.83
		238.0	2.57	231.0	2.10	218.3	3.07
		240.0	5.29	234.4	1.40	220.0	1.92
		245.0	6.85	234.5	1.40	222.3	1.16
		251.0	7.26	236.4	1.70	232.0	0.64
		287.0	6.05	237.3	3.60	238.0	2.63
				240.0	4.20	240.3	5.47
				242.9	5.30	242.8	6.55
				247.7	6.30	246.9	7.22
				251.8	7.20	277.0	7.68
				261.2	7.50	328.9	7.20
				306.0	7.30		

NC3

2013		2014*		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
149	4	86.0	5.98	46.0	5.60	30.0	5.86
150	2.3	126.0	5.94	112.0	5.90	61.8	6.03
158	2.3	137.0	2.85	133.0	4.30	118.1	6.31
159	4	143.0	1.99	144.0	3.00	124.3	5.47
		152.0	1.53	154.0	2.50	134.5	4.22
		163.0	1.99	158.0	2.30	138.3	3.57
		170.0	3.19	163.0	2.50	143.2	2.84
		174.0	3.55	167.0	3.30	147.9	2.54
		180.0	3.76	171.0	4.50	160.8	2.33
		186.0	5.2	177.0	5.40	170.8	2.93
		193.0	6.11	187.0	5.90	177.0	5.17
		209.0	5.14	205.0	6.10	190.0	6.12
		290.0	5.65	225.0	6.10	221.1	6.16
						233.1	5.93
						281.4	5.74
						314.3	5.71

* elevations may be off from 2014

Appendix III: South slough channel cross section data.

SC1

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
121.5	6	113.2	6.66	69	7.26	25.0	5.82
135	1.08	119.1	6.45	99.9	6.79	48.2	6.75
154	1.08	126.3	5.04	113.9	6.86	80.8	6.74
167.5	6	128.9	3.87	118.2	6.22	97.9	6.70
		133.5	2.92	123.6	5.8	111.4	6.61
		136.4	2.11	129.6	3.52	119.4	6.25
		145.3	1.7	135.6	1.85	128.4	3.35
		148.6	1.62	142.2	1.52	131.9	2.51
		152.5	1.81	150.4	1.45	140.1	1.89
		155.8	2.31	155.1	1.57	148.7	1.77
		159.4	3.83	160.9	4.92	159.9	4.18
		163.3	5.38	169.5	6.83	160.7	4.68
		168.3	6.82	213.5	7.02	163.1	5.74
		182.4	7.02			167.1	6.85
						209.4	7.17

SC2

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
187.5	6	153.0	6.48	114.1	7.53	101.0	6.97
198	2.19	170.0	6.38	163.2	7.38	170.3	7.46
210.4	2.19	176.0	6.38	180.1	6.59	184.1	6.12
220.9	6	186.0	6.78	184.8	4.98	189.0	4.02
		189.0	4.64	193.2	2.79	192.6	2.88
		191.0	3.73	196.9	2.49	200.9	2.19
		195.0	2.88	200.7	2.18	208.9	2.59
		198.0	2.40	208.5	2.19	215.4	3.96
		205.0	2.29	211.6	2.34	221.6	6.36
		208.0	2.35	217.7	3.97	229.9	6.95
		209.0	2.61	222.5	5.86	267.9	6.84
		212.0	3.35	236.4	7.20	312.8	6.63
		215.0	4.58	279.6	6.63		
		218.0	5.44				
		219.0	6.22				
		233.0	7.34				
		341.0	6.68				

SC3

2013		2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation	Distance	Elevation
210.5	7	179	8.27	189.4	8.83	174.4	8.45
211	3.08	205	8.04	202.1	8.14	192.9	8.60
221	3.08	206	7.29	205.9	7.77	205.6	8.09
221.5	7	211	3.04	208.3	4.78	208.5	5.52
		212	3.28	210.2	3.19	212.5	3.27
		213	3.02	211.6	2.99	219.3	3.30
		218	3.02	213.2	3.07	222.6	5.77
		219	3.16	214.8	3.19	226.0	8.05
		219	3.77	219.1	3.23	234.1	7.96
		223	5.73	222.2	5.56		
		223	6.66	228.2	8.26		
		224	7.77	234.8	8.27		
		231	8.10				

Appendix IV: Salt River main channel longitudinal profile data. Data highlighted in red was omitted due to collection error.

SRL

2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation
9774.4	1.21	11879	1.41	11865	1.25
9495	1.24	11742	1.39	11654	1.24
9214	1.11	11629	1.35	11509	1.81
8976.4	1.19	11542	1.24	11241	1.60
8724.9	1.02	11435	1.14	11151	1.53
8466.3	1.18	11332	1.46	11065	1.53
8276.5	1.04	11228	1.31	10929	1.25
8118.2	0.97	11114	1.37	10774	1.41
7918.4	0.86	11016	1.32	10579	1.46
7726.5	0.83	10909	1.17	10429	-0.57
7546.8	0.83	10810	1.37	10293	-0.33
7358.1	0.79	10723	1.38	10112	0.85
7204	0.71	10617	1.59	9994	0.89
7012.2	0.67	10528	1.50	9890	0.74
6619.7	0.66	10447	-0.79	9787	1.24
6501.8	0.59	10365	-0.44	9596	1.11
6293.8	0.56	10276	0.42	9410	0.86
6024.1	0.52	10185	0.90	9244	1.03
5779.9	0.49	10096	1.03	9040	0.58
5520.3	0.47	9989	1.28	8798	0.72
5251.5	0.46	9889	1.41	8504	0.36
5002.4	0.45	9804	1.47	8213	0.70
4755.4	0.44	9715	1.37	7943	0.40
4490.7	0.43	9625	0.90	7569	0.88
4226.1	0.42	9534	0.88	7171	0.85
3956	0.41	9453	0.86	6832	0.36
3507.7	0.40	9353	0.85	6583	0.77
3156.6	0.30	9270	0.84	6292	0.56
3156.4	0.28	9188	0.80	5992	0.70
3003.4	0.28	9101	0.86	5751	0.57
2825.7	0.21	8959	0.63	5466	0.50
2740.9	0.19	8787	0.60	5189	-0.90
2528.4	-0.19	8450	0.60	4922	0.26
2058.4	-0.26	8257	1.59	4657	0.88
1814.1	-0.29	8092	0.52	4406	0.40
1586.4	-0.34	7908	0.90	4377	0.55
1331.9	-0.42	7792	0.09	4170	0.01
1081.4	-0.43	7908	0.07	3997	0.59
841.5	-0.49	7792	1.10	3832	0.95
650.8	-0.55	7602	0.35	3579	0.24
333.4	-0.58	7431	0.44	3467	0.91
192.5	-0.65	7201	0.47	3230	0.84
184.1	-0.68	7008	0.51	3020	0.03

Appendix IV: Salt River main channel longitudinal profile data (continued).

SRL (cont'd.)

2014		2015		2016	
Distance	Elevation	Distance	Elevation	Distance	Elevation
95.9	-0.77	6828	0.45	2896	0.67
10	-0.78	6633	0.53	2451	0.79
		6479	0.55	2217	0.56
		6323	0.58	1948	0.45
		6143	0.29	1705	0.35
		5986	0.31	1417	0.71
		5822	0.25	1210	0.84
		5667	0.45	959	0.54
		5499	0.42	757	-0.13
		5323	-0.16	585	0.16
		5122	-0.13	345	0.33
		4935	0.15	163	-0.64
		4762	0.59	0	-0.91
		4590	0.56		
		4408	0.01		
		4238	0.18		
		4019	0.15		
		3836	0.10		
		3528	0.02		
		3321	-0.01		
		3083	-0.09		
		2840	-0.16		
		2651	0.53		
		2452	0.39		
		2247	0.31		
		1992	0.57		
		1692	0.04		
		1092	-0.29		
		570	-0.31		
		173	-0.78		

Appendix V: North slough channel longitudinal profile data.

2015		2016	
Distance	Elevation	Distance	Elevation
2021	1.78	2022	1.69
1843	1.39	1801	1.10
1784	1.21	1414	1.53
1620	1.58	1181	1.47
1465	1.43	1010	1.38
1329	1.43	863	1.44
1190	1.58	689	1.33
1032	1.67	563	0.77
867	1.49	429	0.93
640	1.25	268	0.06
489	0.99	185	-0.41
234	1.06	35	0.25
155	-0.12	0	-0.06
120	-0.55		
112	-0.45		
30	-0.08		

North branch of North slough channel longitudinal profile data.

2015		2016	
Distance	Elevation	Distance	Elevation
610	3.89	512	3.73
450	3.67	451	3.53
424	2.85	420	2.78
411	2.81	386	3.41
357	3.79	306	3.10
218	3.17	268	3.18
110	1.96	204	3.31
55	1.42	116	2.01
0	1.22	55	1.85
		0	0.81

Appendix VI: South slough channel longitudinal profile data.

2015		2016	
Distance	Elevation	Distance	Elevation
4687	3.57	4687	3.53
4393	3.31	4526	3.27
4111	3.27	4395	3.21
3935	3.13	4042	3.17
3670	3.37	3666	3.29
3262	3.21	3410	3.11
2865	2.77	3197	2.97
2571	2.51	3003	2.86
2365	2.37	2805	2.62
2156	2.23	2437	2.31
1959	1.96	2151	1.91
1703	1.58	1750	1.50
1344	1.39	1322	1.34
1053	1.30	937	1.05
902	1.17	815	0.08
744	0.81	530	0.74
		322	0.58
		32	0.03
		0	0.27

Appendix VII: 2015 and 2016 Photographs of Salt River and North and South channel cross sections (All photos by Daniel O'Shea):

2015 Salt River main channel cross section 1 –SR1. View is looking south.

2016 Salt River main channel cross section 1 –SR1. View is looking south. Note slump on left (south) bank.

2015 Salt River main channel cross section 2 –SR2. View is looking south.

2016 Salt River main channel cross section 2 –SR2. View is looking south.

2015 Salt River main channel cross section, SR3. View is looking upstream.

2016 Salt River main channel cross section, SR3. . View is looking upstream.

2015 North slough channel cross section 1 –NC1. View is looking south. Note scour on south bank indicated by arrow.

2016 North slough channel cross section. View is looking south. Continued scour on south bank indicated by arrow.

2015 North slough channel cross section 2 –NC2. View is looking west.

2016 North slough channel cross section NC2. View is looking west.

NC3 survey control point buried by 2.5 cm of sediment in the year since 2015.