IMPERIAL IRWMP
INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Appendix G

IID Drain Water Volume

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Technical Memorandum

To: Matt Zidar
From: L. Niel Allen
Natural Resources Consulting Engineers, Inc.

Date: September 4, 2009

Re: Summary and analysis of available water quality and flow data for Alamo and New Rivers and for drains within the IID Project area.

IID drain flows and salinity levels were estimated to evaluate water supply augmentation options using reclaimed drain water. For the analysis, flow data were acquired from the USGS for the Alamo and New Rivers and additional flow data were obtained from IID's Water Information System (WIS) for the Alamo and New Rivers and for agricultural drains. These data are summarized below and also in Table 1. Data were associated using a Geographical Information System (GIS) database to produce a map that shows WIS flow monitoring sites and metered and unmetered drains. This was done to indicate the distribution of drain water accretion and salt contributions to the New and Alamo Rivers by river reaches defined by drains. This provided the basis to estimate river flow and salt concentration at points that may be considered demand nodes for geothermal or other developments.

Data for Rivers

Alamo River

USGS Data

- Alamo River near Niland, Ca. Various intermittent water quality constituents and flow data for period of record of 1963-2007.
- No data for Alamo River near international border.

IID WIS Data

- Flow data includes "In" and "Out"; i.e., measured near the International Border and before entering the Salton Sea. Period of record of 1997-2009. Later WIS record for Alamo River Out site is USGS data.

New River

USGS Data

- New River near International Border. Various intermittent water quality constituents and flow data for period of record of 1961-2007.
- New River, near Westmorland, Ca. Various intermittent water quality constituents and flow data for period of record of 1963-1992.

IID WIS Data

- Flow data for New River "In" and "Out"; i.e., near International Border and before entering Salton Sea. Period of record of 1997-2009. Later WIS record for New River In and New River Out is USGS data.

Table 1. Alamo and New River Data Summary

	Period of Record	Average Flow (cfs)	Average Electrical Conductivity (µS/cm)
Source IID:			
Alamo River In	1997-2009	1.3	No Data
Alamo River Out	1997-2009	877	No Data
Source USGS:			
Alamo River (Intl. border)	No Data	No Data	No Data
Alamo River (near Niland)	1963-2007 (intermittent)	832	3,816
Source IID:			
New River In	1997-2009	181	No Data
New River Out	1997-2009	618	No Data
Source USGS:			
New River (Intl. border)	1961-2007 (intermittent)	165	7,186
New River (Westmorland)	1963-1992 (intermittent)	588	5,189

Note that USGS flow data are associated with water quality samples at the times these samples were taken and do not represent all USGS flow data for these monitoring locations. Although the period of records and density of flow measurements are not the same for USGS and WIS data, comparison of the average outflows (above) show that they are relatively consistent. Likewise, average specific conductivity for the outflows (USGS data only) for each river is expected to be consistent and also indicative of present conditions. The graphs (Figures 1-6) of the WIS river outflow data (below) show that outflows to the Salton Sea fluctuate in a stable fashion from year to year. Fluctuations in specific conductivity are expected to also be stable. Occasional jumps in flow probably correspond to rare peaks in local precipitation. The New River inflow from Mexico has recently dropped from an annual average of 151 cfs in 2003 to 119 cfs in 2008. The continuation of this trend will not have a significant impact on available water supplies for reclamation.

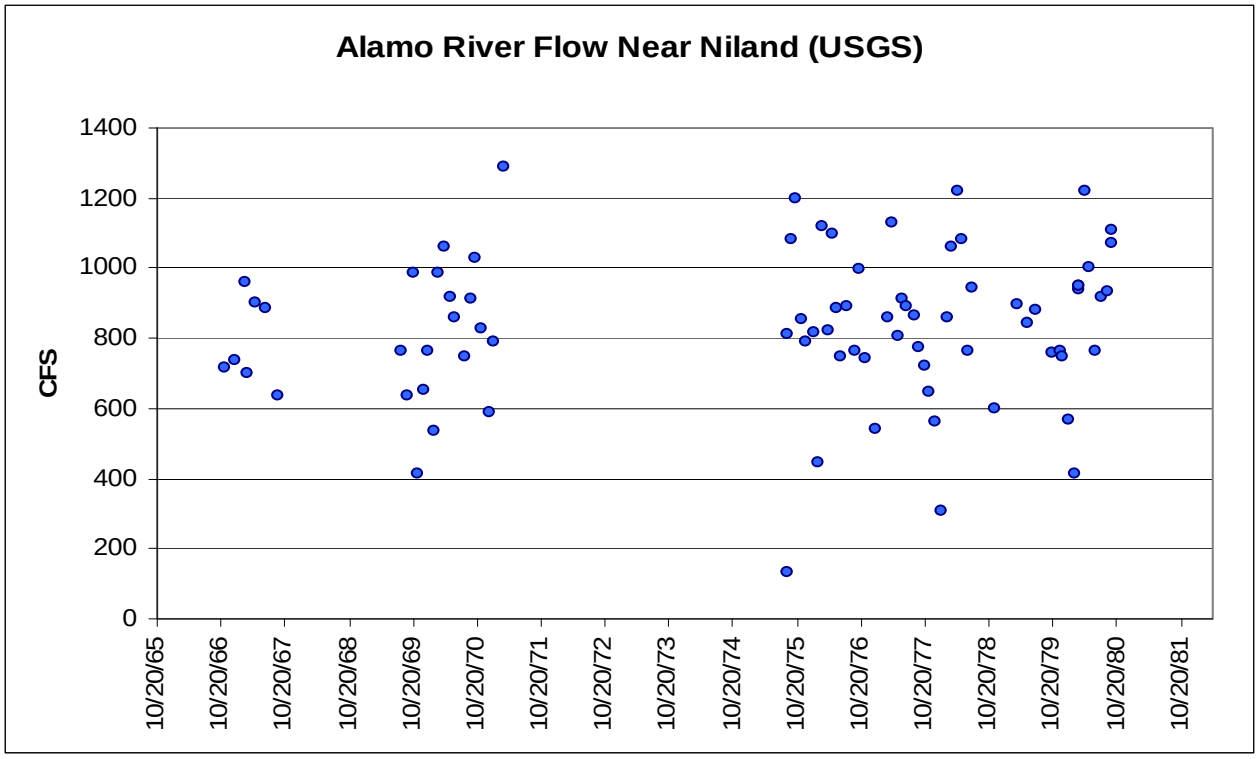

Figure 1: Daily Alamo River Flow measured near the Salton Sea from USGS.

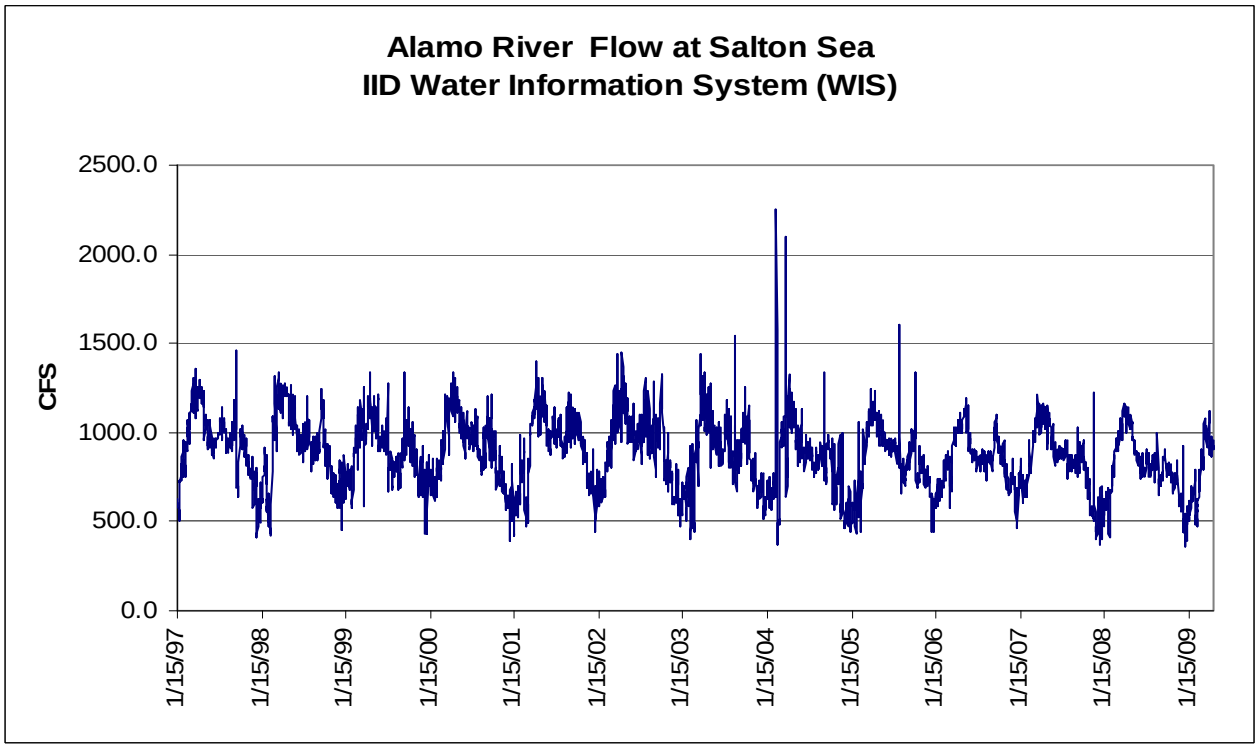

Figure 2: Daily Alamo River Flow measured near the Salton Sea from WIS.

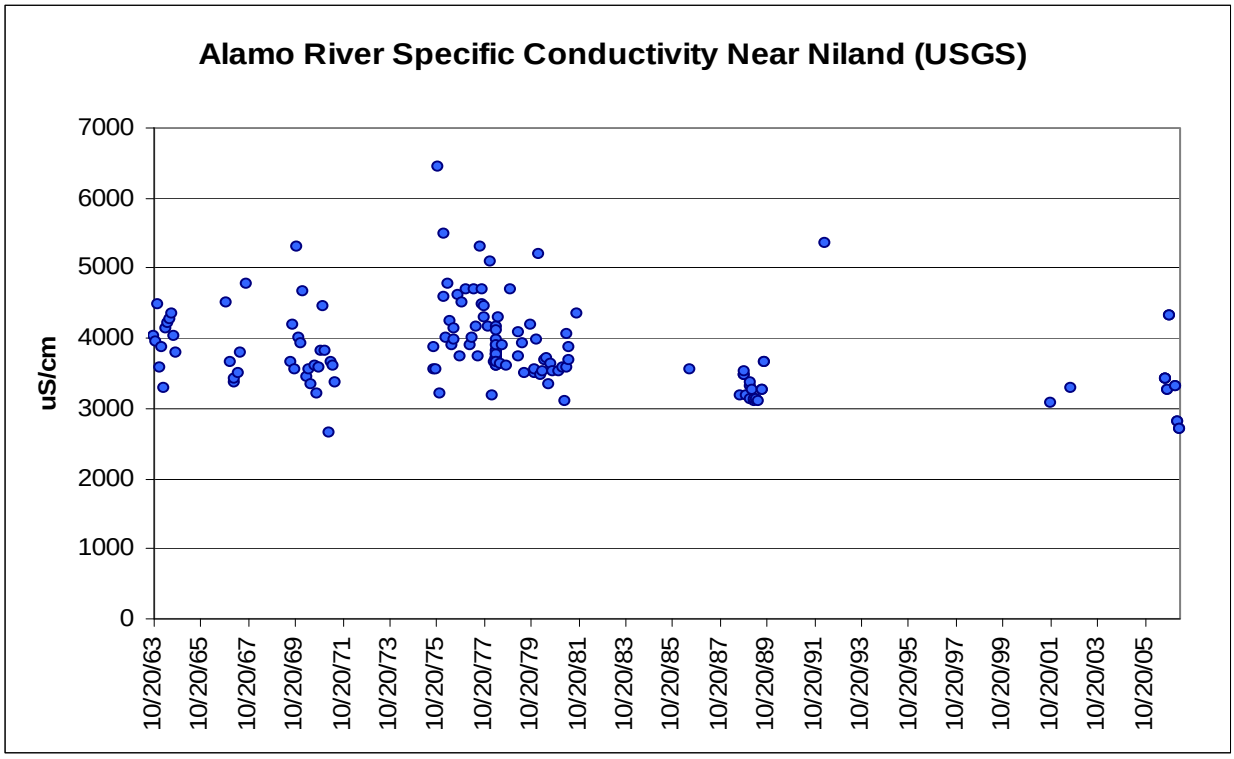

Figure 3: Daily Alamo River Specific Conductivity measured near the Salton Sea by USGS.

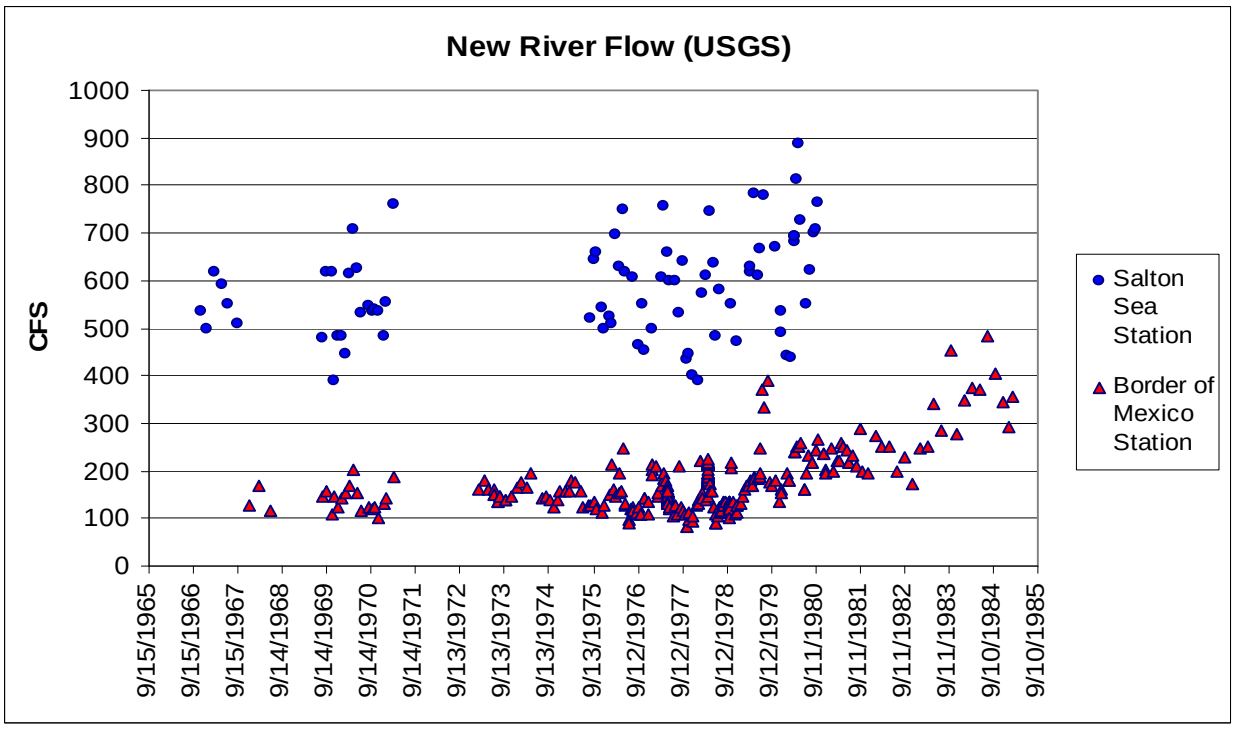

Figure 4: Daily New River Flow measured by USGS.

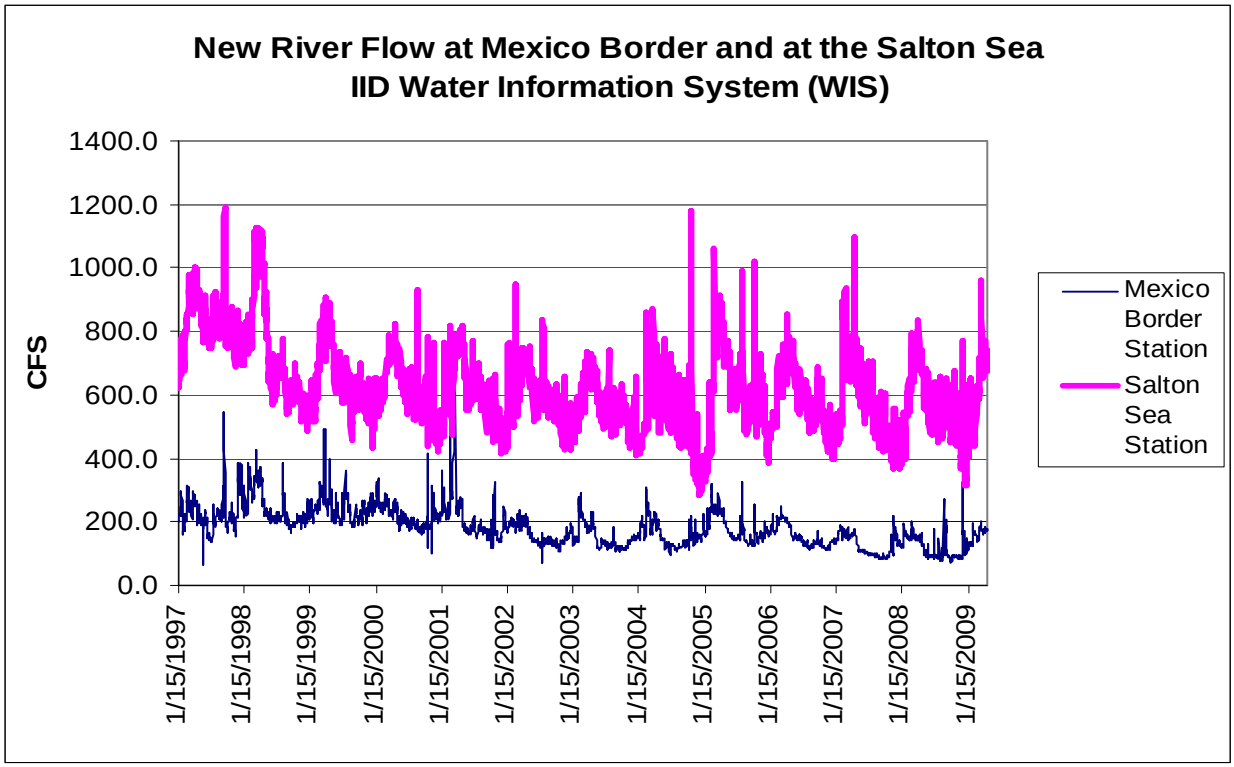

Figure 5: Daily New River Flow measured by WIS.

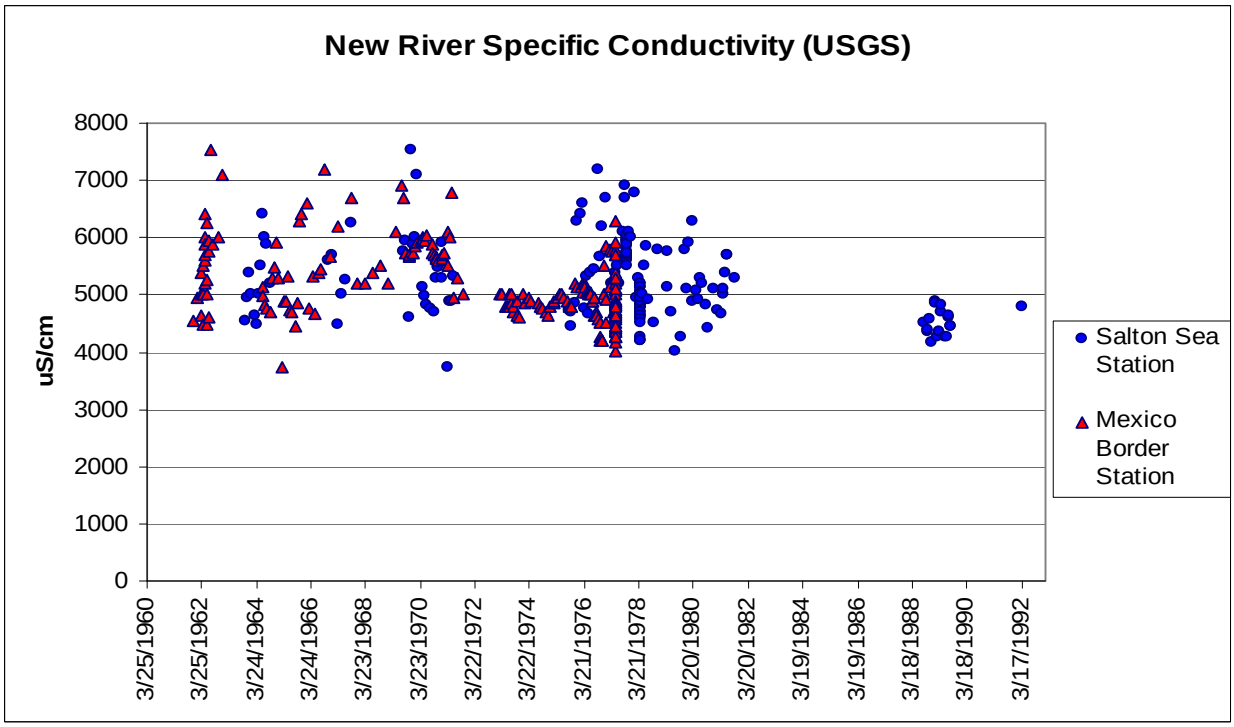

Figure 6: Daily New River Specific Conductivity Measured by USGS.

IID WIS Drain Data

WIS drain flow data, including data for the Alamo and New Rivers were acquired from IID. Locations, distances and areas associated with WIS (metered) drains and unmetered drains, within IID were plotted and mapped from a GIS database and map coverage obtained from IID.

WIS data include 43 actively metered drains within the IID system. The metered drains used in the analysis are indicated in the appendices (indicated by highlighted data in tables). A summary of IID's drains with flow data is contained in Table 2.

Table 2. Summary of IID Total Drains and Drains with Measured Flows.

Drainage	All Drains			WIS Metered Drains (used in Study)	
	Number of Drains	Acres	Miles	Number of Drains	Miles
IID Project	141	573,677	1,472.7	41	552.6
New River	62	174,499	399.9	10	292.2
Alamo River	84	335,438	918.1	14	159.4
Salton Sea	29	63,740	154.7	17	101.0

Use of Historical Drain Data

Historical drain data were used to estimate the drain inflow and salinity along the New and Alamo Rivers. These estimates are used to project the amount of drain water that may be available for present and future industrial uses such as geothermal power production. Also of interest are the salinity levels of the drain flows (potential water supplies) since the level of desalination required represents a cost.

Spatial and temporal distribution of drain flow into the New and Alamo Rivers were estimated by distributing flows along the rivers based on estimated and metered drain contribution. Unmetered drain flows were based on length of drains. The results provide monthly average and annual average flows.

USGS water quality data for the Alamo River and New River were used to estimate salt loading at each drain discharge point according to the flow contributions. Salt loading form Mexico was accounted based on the USGS measured salinity.. The determination of saltity for post-QSA conditions assumes a salt balance in the Valley and that salinity contribution from drainage across the Valley is uniform. It is known that there are some differences in salinity levels of drains due to soil difference that affect leaching. However, these conditions are expected to average out at the scale considered for characterizing drain water for future MCI water supply purposes.

The spatial association of flow data allows visual inspection of metered and un-metered drains and provides the means to estimate individual drain accretions to each river. This process also

allows the evaluation of changes in quantity and quality of river flows within river reaches and of those due to management induced changes resulting from water transfer and water conservation programs like the Quantified Settlement Agreement (QSA). Principal elements of concern are:

- Estimation of historical and post-QSA annual average and monthly average flows within drain based reaches of each river.
- Estimation of historical and post-QSA annual average and monthly average specific conductance and total dissolved solids within drain based reaches of each river.
- Of secondary concern are water quantity and quality associated with drains that discharge directly into the Salton Sea.

Available historical data were used to estimate discharge to rivers for unmetered drains based on uniform accretions and drain lengths. Total drainage to the Salton Sea included drainage flow associated with Alamo and New Rivers and that portion associated with drains that discharge directly to the Salton Sea. The post-QSA conditions are shown in Figure 2-4. Post-QSA conditions were estimated based on the following considerations.

- A 303,000 acre-foot reduction in water availability to IID as a result of QSA transfer reflects about 10% of the existing water supply to the Valley (Table 2), constituting about a 30% reduction in drain flow (approximately 303,000 acre-feet out of 1,000,000 acre-feet Salton Sea inflows from IID's Colorado River diversions).
- The 10% reduction in Colorado River inflow results in a corresponding reduction in salt into the Imperial Valley as a result of the QSA transfer.
- Impacts to salinity are accounted for by assuming that salt input to the Valley is reduced proportionately to the post-QSA water supply and that drainage conditions remain uniform and steady.
- Drain water and salt contributions to the rivers remain uniform from the International Border to the Salton Sea.

Table 3. Historic Deliveries to IID from the Colorado River.

		--------QSA Conservation--------	
Year	**Diversion**	**Ac-Ft**	**% Conserved**
1970	2,848,565	303,000	10.6
1971	2,967,907	303,000	10.2
1972	2,965,910	303,000	10.2
1973	3,047,899	303,000	9.9
1974	3,171,977	303,000	9.6
1975	3,070,974	303,000	9.9
1976	2,876,984	303,000	10.5
1977	2,772,062	303,000	10.9
1978	2,757,199	303,000	11.0
1979	2,884,235	303,000	10.5
1980	2,845,779	303,000	10.6
1981	2,872,289	303,000	10.5
1982	2,595,578	303,000	11.7
1983	2,555,617	303,000	11.9
1984	2,666,535	303,000	11.4
1985	2,685,837	303,000	11.3
1986	2,686,875	303,000	11.3
1987	2,764,865	303,000	11.0
1988	2,947,581	303,000	10.3
1989	3,009,451	303,000	10.1
1990	3,054,188	303,000	9.9
1991	2,898,963	303,000	10.5
1992	2,572,659	303,000	11.8
1993	2,772,148	303,000	10.9
1994	3,048,076	303,000	9.9
1995	3,070,582	303,000	9.9
1996	3,159,609	303,000	9.6
1997	3,158,486	303,000	9.6
1998	3,101,548	303,000	9.8
1999	3,088,980	303,000	9.8
2000	2,931,251	303,000	10.3
2001	3,089,911	303,000	9.8
2002	3,152,984	303,000	9.6
2003	2,978,223	303,000	10.2
2004	2,743,909	303,000	11.0
2005	2,756,846	303,000	11.0
2006	2,909,680	303,000	10.4
2007	2,872,754	303,000	10.5
2008	2,826,539	303,000	10.7
Average	2,902,089		10.5
Max	3,171,977		11.9
Min	2,555,617		9.6
Median	2,898,963		10.5

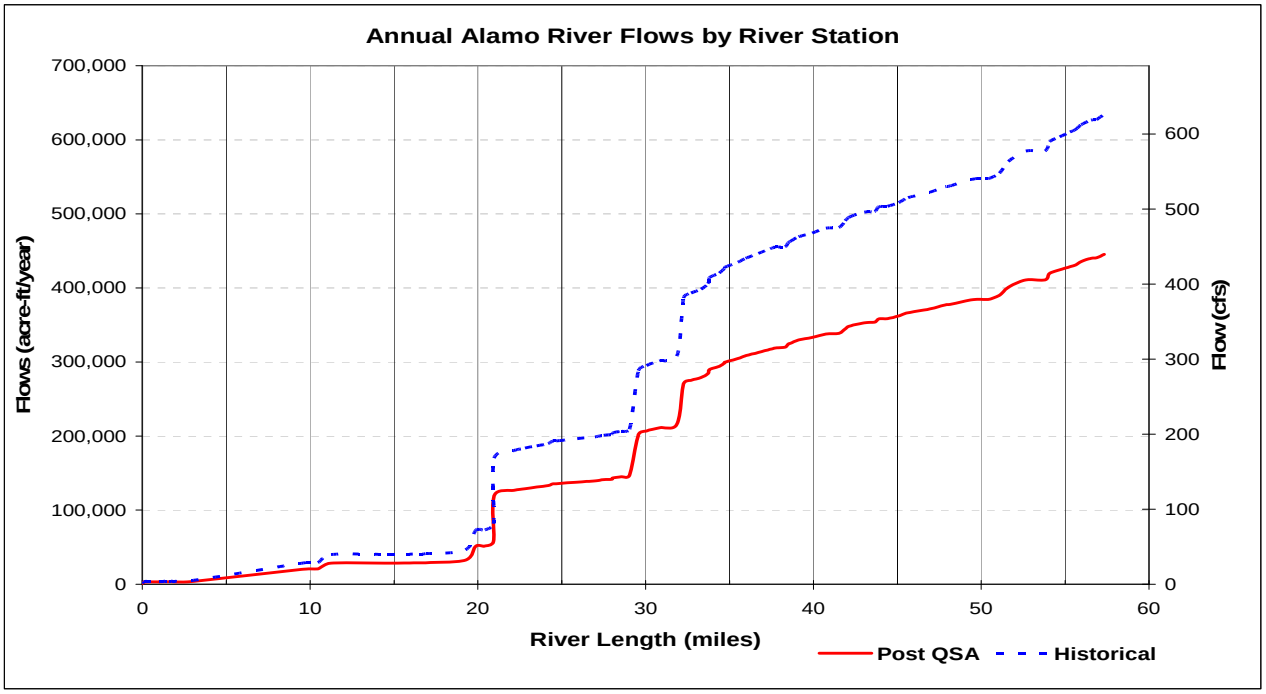

Figure 7: Annual Average Flow along reaches of the Alamo River from the International Border to the Salton Sea (post-QSA lower line).

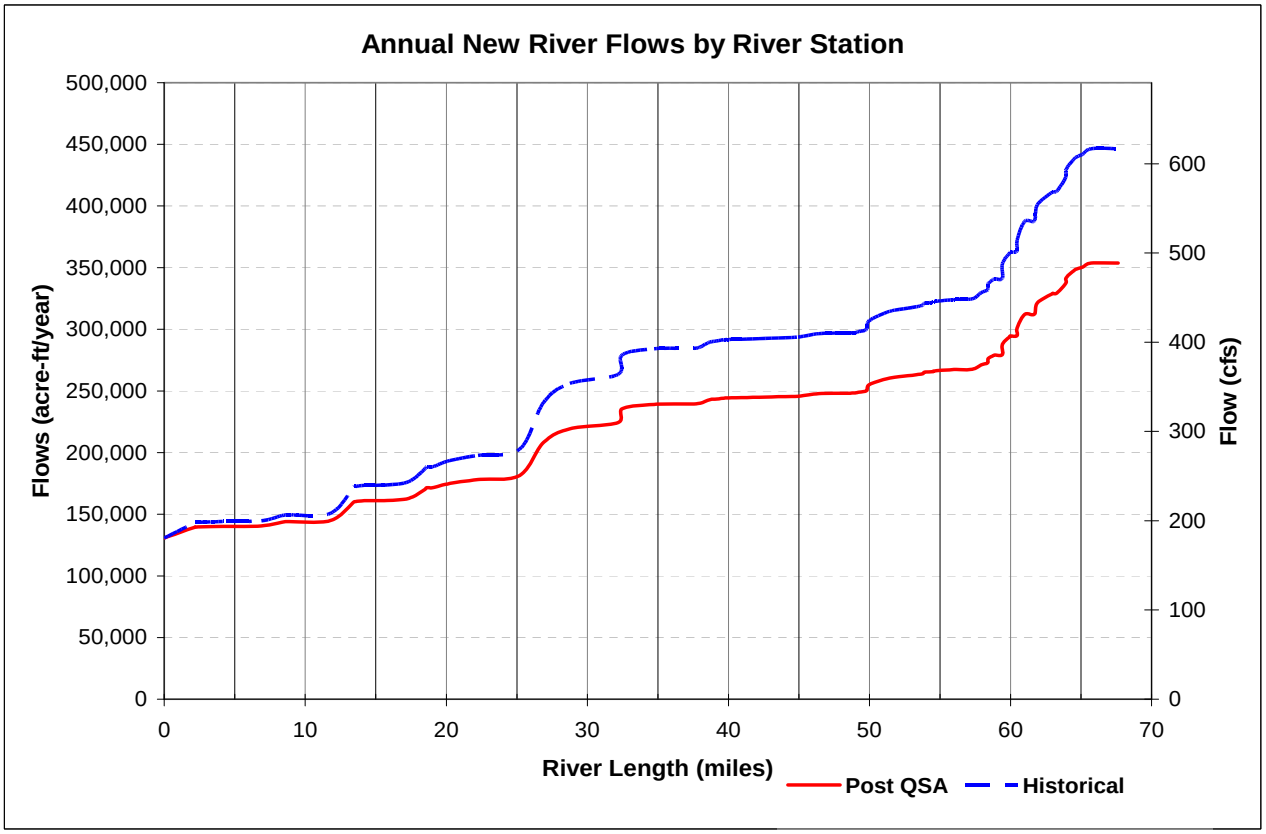

Figure 8: Annual Average Flow along reaches of the New River from the International Border to the Salton Sea (post-QSA lower line).

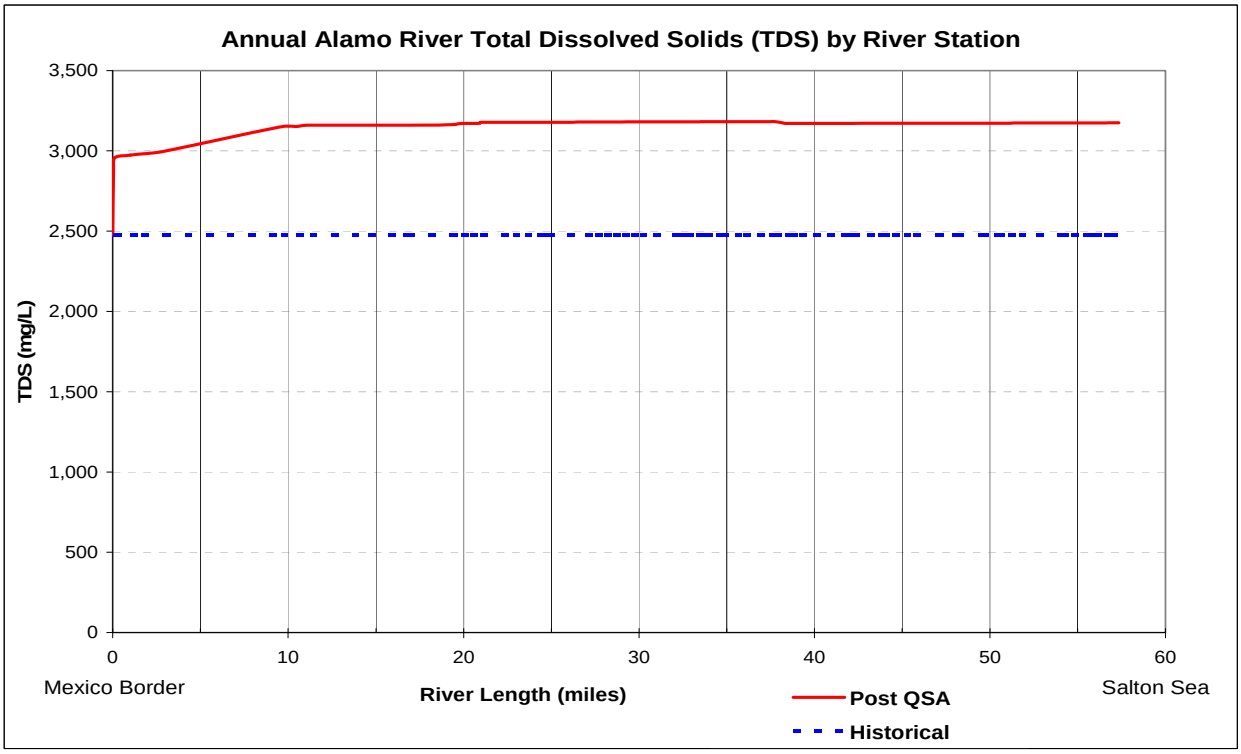

Figure 9: Annual Average TDS along reaches of the Alamo River (post-QSA upper line).

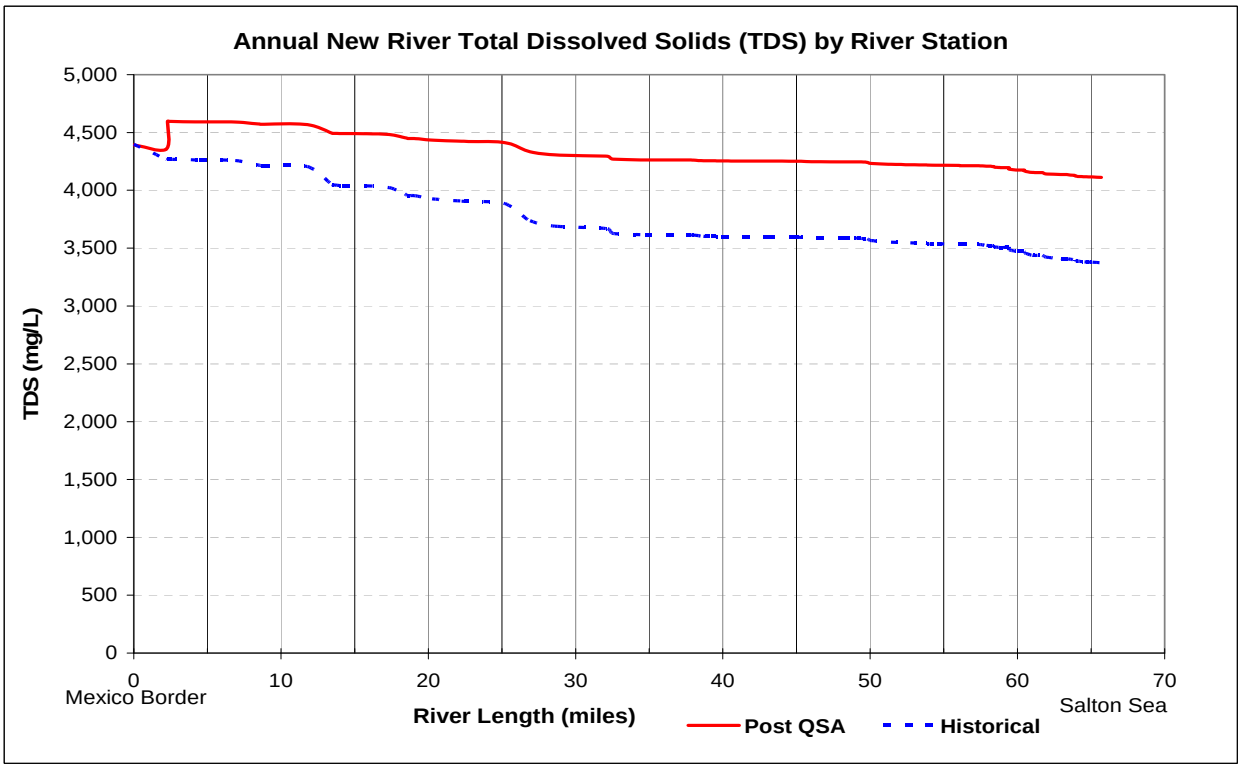

Figure 10: Annual Average TDS along reaches of the New River (post-QSA upper line).

Post-QSA Average Monthly Salinity within Reaches of the Alamo and New Rivers

Consideration of river flow variability is important when studying the quantity of water that can be reclaimed for uses other than discharge into the Salton Sea. Variability in salinity is important when considering costs of treatment and of suitability of the water supply. Figures 11 through 16 show the expected maximum, minimum and average monthly flow and TDS levels based on paired values for historical and expected post-QSA conditions. Paired data are data in which a flow measurement is accompanied by a salinity measurement. It is noted that New River flows the International border will likely decrease with time. Generally a decrease in return/drain flows result in an increase in salinity.

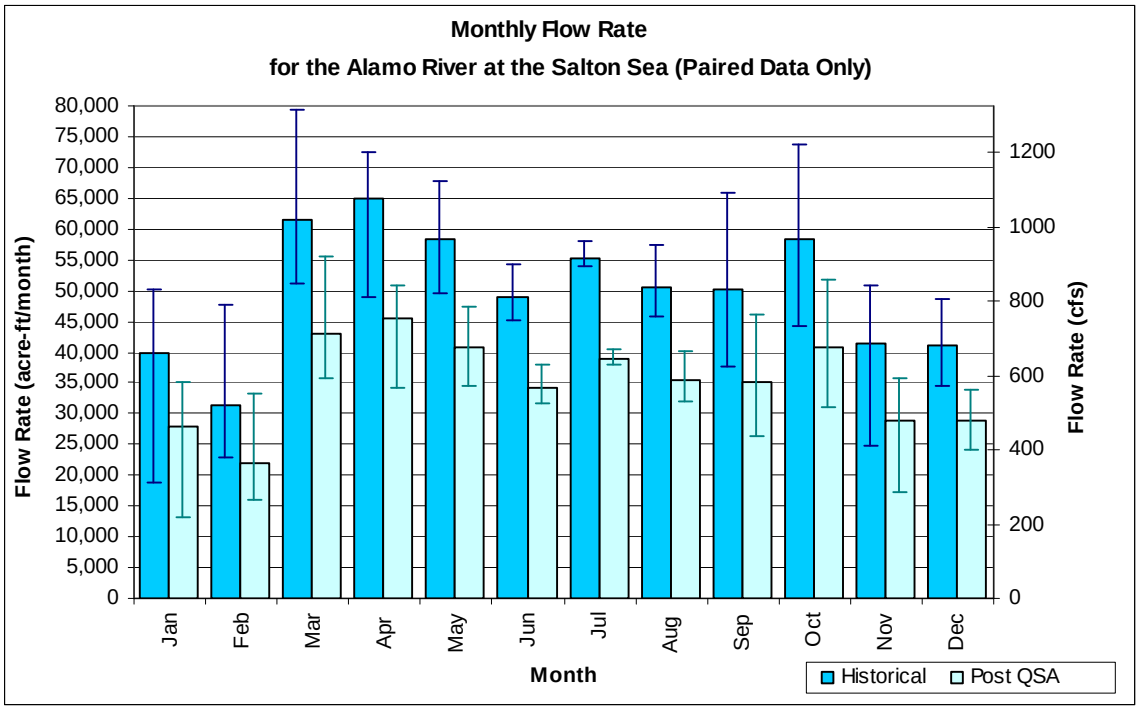

Figure 11: Maximum, Minimum, and Average Monthly Flow at the Salton Sea Station for the Alamo River.

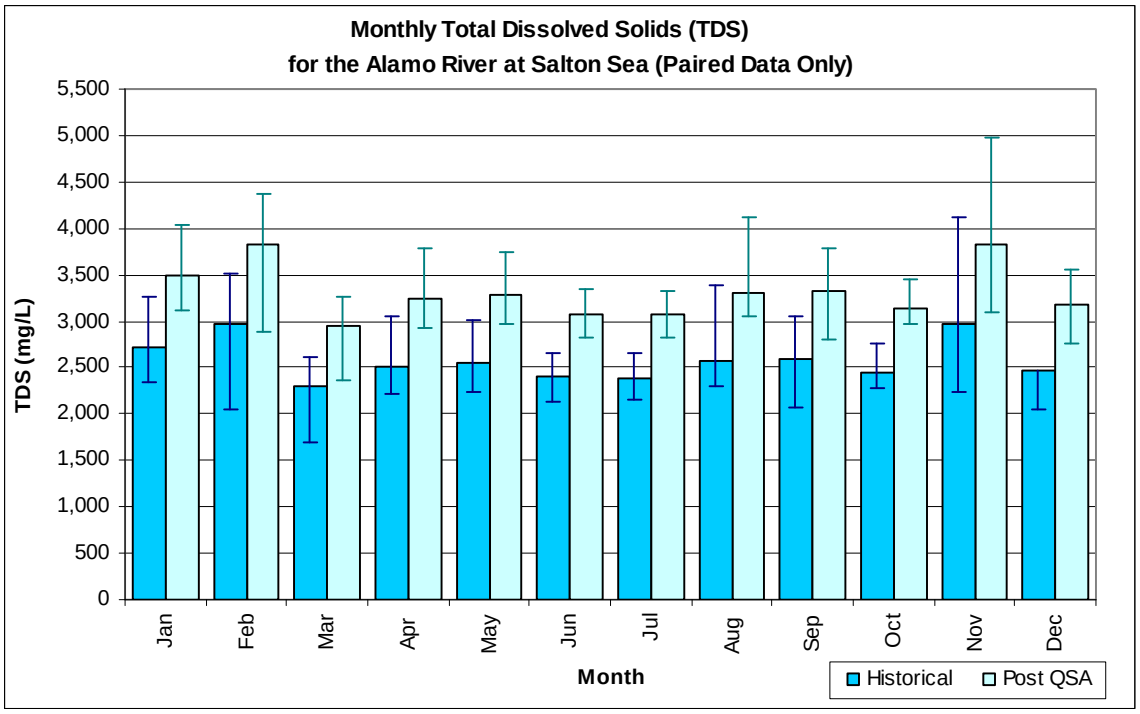

Figure12: Maximum, Minimum, and Average Monthly TDS at the Salton Sea Station for the Alamo River.

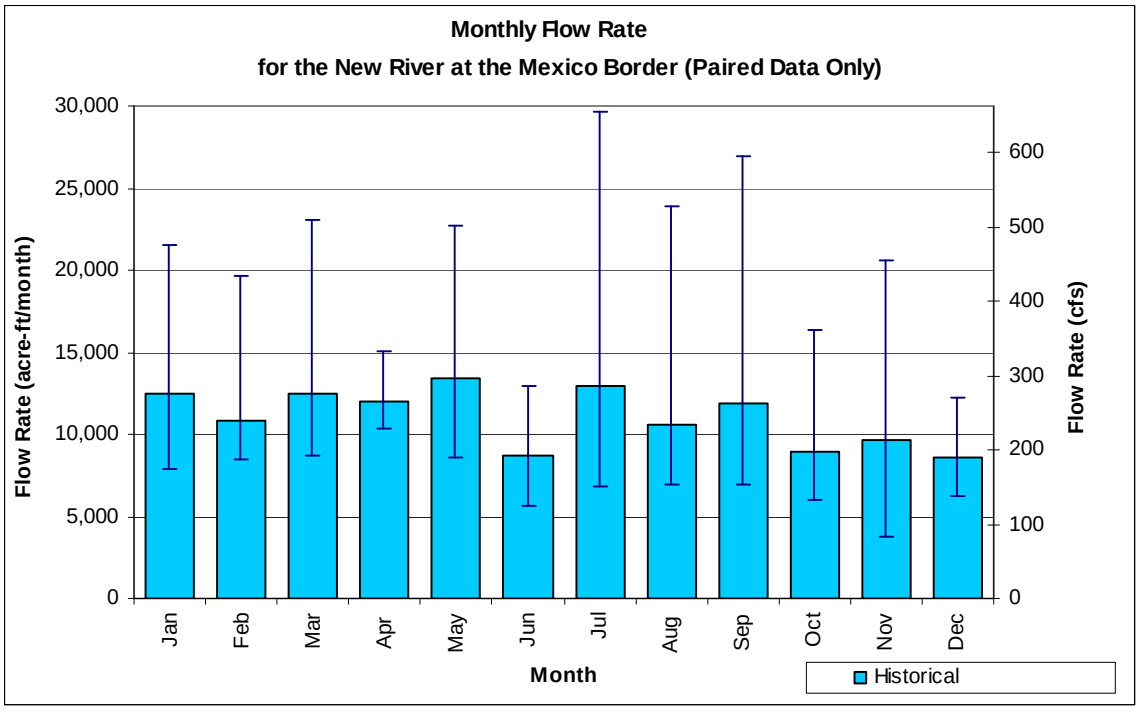

Figure 13: Maximum, Minimum, and Average Monthly Flow at the Mexico Border Station for the New River.

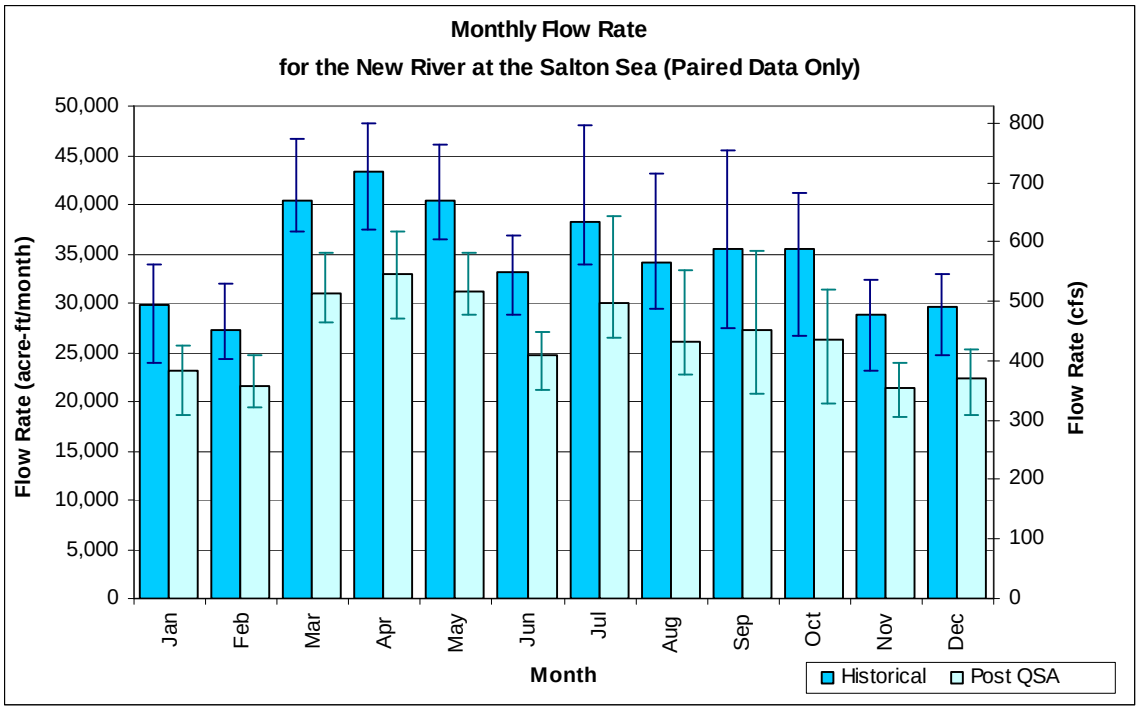

Figure 14: Max, Min and Average Monthly Flow at the Salton Sea Station for the New River.

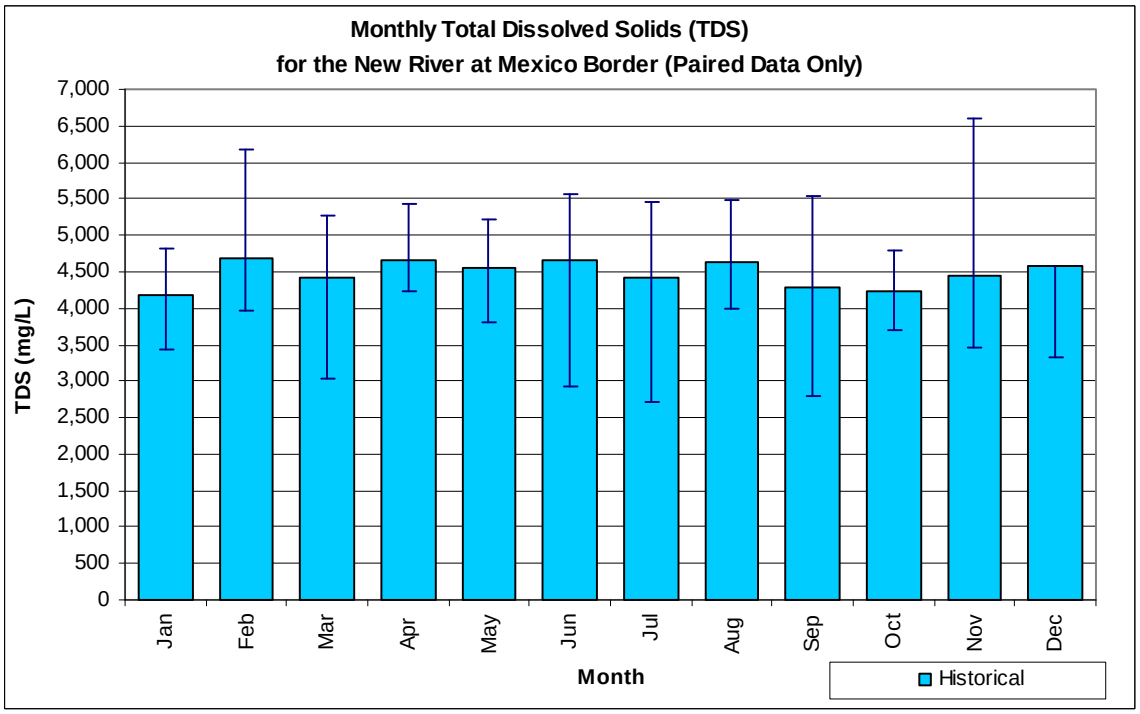

Figure 15: Maximum, Minimum, and Average Monthly TDS at the Mexico Border Station for the New River.

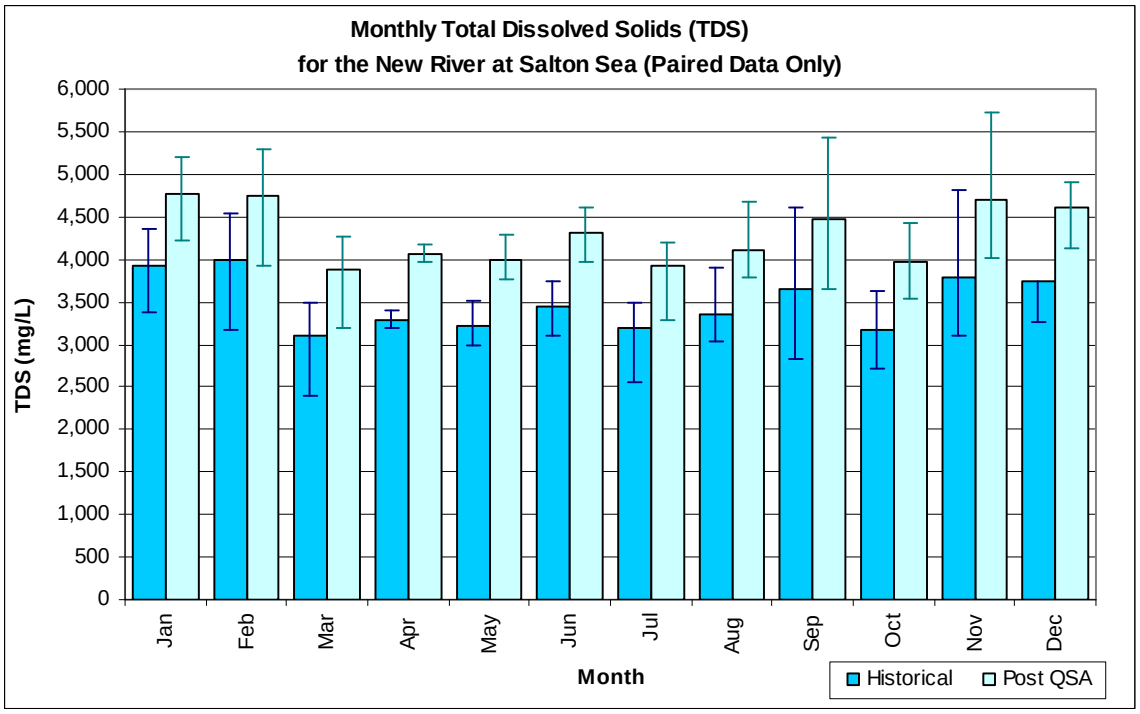

Figure 16: Maximum, Minimum, and Average Monthly TDS at the Salton Sea Station for the New River.

Tabular data associated with above figures and used in this analysis are found in the Appendices.

Utility of Specific Drains as Sources of Reclaimed Water

Drain data were reviewed to evaluate the potential of using reclaimed water for industrial use in the Keystone Industrial Development area (see Figure 17 and Plate 1). The potential of reclaiming water is from three larger drains, the Holtville Main, Central, and Rose drains. Estimated post-QSA drain flow and salinity at these locations is summarized in Table 4. The Holtville Main Drain has measured flows, flows for Rose and Central Drains were estimated as previously described. The three-drain system could reasonably provide about 90,000 acre-feet of water per year (70 percent of the low flow monthly average); with any two drains providing about 60,000 acre-feet per year The waste stream (brine) for water desalination would need to be deposed of by containment and evaporation or deep well injection are discussed in Chapter 7.

Table 4. Estimated Post-QSA Drain Flows and Salinity for Holtville Main, Rose, and Central Drains.

Drain	Average Annual (ac-ft)	Maximum Month (ac-ft)	Minimum Month (ac-ft)	Maximum TDS (mg/L)	Average TDS (mg/L)
Holtville Main Drain	55,600	5,800	3,300	3,670	3,190
Rose Drain	55,000	5,300	3,900	3,670	3,190
Central Drain upstream of Mesquite Drain Cut Off	59,900	6,300	3,600	3,670	3,190
TOTAL	**170,500**		**10,800**		

Existing drain systems can be modified by cross-connections to link and expand the usable and recoverable portion of drain water. In so doing, it will be necessary to re-grade existing channels to improve capacity and efficiency of drain flow concentration. One example consists of a linkage of the Central, Mesquite, Holtville Main and Rose drain systems, as shown on Plate 1. These combined drain systems could be used as a water supply for a Keystone Development area desalinization plant. In this case, a connection of the Central Drain would be constructed to tie into the upper Mesquite Drain system. Mesquite Drain capacity would need to be increased by about 60 cfs (3,600 ac-ft per month, which is the minimum flow at the Central Drain cut-off location). This capacity increase would require widening and deepening of the Mesquite Drain. This modified system could connect with Rose and Holtville Main Drains near Alamo River mile marker 30 as shown on Plate 1. To include water from the Holtville Main Drain, a conveyance system across the Alamo River would be required to connect to the combined system at the lower end of the Rose Drain, from where collected water will need to be transported to Keystone area.

Other options for reclaimed water supply would be from diverting water directly out of the New or Alamo River at the desired locations. All reclaimed water options are discussed in Section 7. Similar to water conservation measures that reduce flows in the drains and New and Alamo Rivers it is estimated that there will be an environmental mitigation cost of $90 per acre-foot.

Conclusions:

Reclamation of agricultural drain water represents a significant and potentially useful source of water for uses within the Valley. The flow of recoverable drain water is more than ample to meet the raw water feed requirements for a 50,000 acre-ft per year (product water) desalinization plant. The water quality, specifically salinity, within the drain system varies between 2,702 and 3,680 (mg/L), representing post QSA conditions. The combined average drain flow of the Holtville Main, Mesquite, Central, and Rose drains is 170,200 acre-ft of water per year, which is more than adequate to supply a 50,000 acre-ft per year (finished water) desalinization plant. An environmental assessment would need to be conducted for any use of reclaimed drain water. Reclaimed drainage water can be developed incrementally as demands increases, subject to appropriate environmental approval and/or mitigation. Cost of water reclamation alternatives are discussed in Section 7 – Capital Project Alternatives.

APPENDICES

Water Quality and Flow Data for Alamo and New Rivers and for Drains within the IID Project Area

- For all tables, All individual drain values are for drain system located in first column
- Blue colored cells indicate drain system described in first column are metered

Appendix A: Geographic Information on Drains on the Alamo River

Drain Station	Drain System Length (ft)	Length Between Systems (ft)	Cumulative Distance (ft)	Cumulative Distance from Mexico Border (mi)
Alamo at Border	-	-	0	0.0
All American Drain No 5	12000	200	220	0.0
All American Drain No 6	9000	300	510	0.1
Toland Drain	3000	4,900	5,380	1.0
South Alamo Pipeline Drain	1000	3,200	8,600	1.6
South Alamo Drain No 1	3000	6,900	15,480	2.9
Verde Drain Outlet	215000	35,200	50,720	9.6
Schali Pipeline Drain	4000	4,500	55,230	10.5
Warren Drain	80000	4,200	59,440	11.3
Barbara Worth Drain Spill	1000	17,500	76,970	14.6
Ash Drain	1000	5,900	82,870	15.7
Ash 20 Drain	2000	4,400	87,310	16.5
Holtville City Drain	1000	1,400	88,680	16.8
Barbara Worth Drain	39000	13,100	101,750	19.3
South Central Drain Outlet	236000	3,200	104,930	19.9
Ninth Street Drain	4000	2,800	107,760	20.4
Palmetto Drain	63000	2,800	110,530	20.9
Central Drain	650000	200	110,740	21.0
Peach Drain + Pampas Drain	54000	6,200	116,950	22.1
Plum Drain	25000	3,500	120,400	22.8
Pine Drain	24000	3,700	124,140	23.5
Palm Drain	21000	3,600	127,720	24.2
Pomelo Drain	24000	1,400	129,080	24.4
Graeser Drain	5000	1,700	130,790	24.8
Pepper Drain	20000	6,100	136,910	25.9
Township Drain	17000	5,500	142,460	27.0
Oat Drain	17000	2,700	145,190	27.5
Redwood 4 Drain	6000	2,600	147,770	28.0
Oasis Drain	17000	200	148,010	28.0
Orient Drain	17000	2,700	150,700	28.5
Occident Drain	17000	2,600	153,350	29.0
Holtville Main Drain	540000	2,800	156,120	29.6
Olive Drain	49000	2,600	158,710	30.1
Oxalis Drain	47000	4,100	162,770	30.8
Orange Drain	47000	5,500	168,270	31.9
Rose Drain Outlet	577000	2,100	170,330	32.3
Ohmar Drain	49000	2,400	172,730	32.7
Oleander Drain	49000	3,100	175,810	33.3
Bryant Drain	55000	2,200	178,010	33.7
Orita Drain	60000	500	178,500	33.8
Osage Drain	44000	3,100	181,610	34.4
Oak Drain	45000	1,600	183,170	34.7

Drain Station	Drain System Length (ft)	Length Between Systems (ft)	Cumulative Distance (ft)	Cumulative Distance from Mexico Border (mi)
Wills Drain	16000	200	183,380	34.7
Moss Drain	49000	4,000	187,410	35.5
Magnolia Drain + Moorhead Lateral 3 Spillway	49000	2,500	189,870	36.0
Mesquite Lateral Drain	46000	4,000	193,910	36.7
Maple Drain	47000	3,700	197,650	37.4
Darling Drain	18000	1,800	199,400	37.8
Moorhead Pipeline Drain	12000	2,900	202,330	38.3
Mullen Drain	43000	900	203,270	38.5
Moorhead Pipeline Drain	12000	700	203,930	38.6
Myrtle Drain	46000	2,700	206,590	39.1
Munyon Drain	47000	4,300	210,870	39.9
Mulberry Drain	48000	4,200	215,110	40.7
Lewis Drain	8000	4,100	219,190	41.5
Malva 2 Drain	65000	2,100	221,260	41.9
Mayflower Drain	53000	1,300	222,540	42.1
Marigold Drain	49000	4,700	227,250	43.0
Jones Drain	6000	3,200	230,460	43.6
Standard Drain	63000	1,400	231,840	43.9
Bailey Drain	3000	2,700	234,530	44.4
Narcissus Drain	53000	3,500	238,040	45.1
Nettle Drain	52000	3,000	240,990	45.6
Nutmeg Drain	54000	6,900	247,840	46.9
Nectarine Drain	56000	4,900	252,730	47.9
Rockwood Drain	5000	1,400	254,140	48.1
C Drain + B Drain	59000	7,300	261,470	49.5
C Lateral 1 Spill	1000	3,800	265,320	50.2
Vail 1 Drain	4000	1,100	266,430	50.5
D Drain	53000	3,300	269,720	51.1
E Drain + F Drain	116000	2,900	272,570	51.6
G Drain + H Drain	104000	5,500	278,080	52.7
Vail 1 Spill	1000	6,100	284,130	53.8
I Drain	57000	1,400	285,550	54.1
J Drain	50000	3,100	288,660	54.7
K Drain	47000	3,300	291,970	55.3
Vail 2 Spill + Pumice Drain	25000	1,900	293,830	55.7
L Drain	49000	1,700	295,490	56.0
M Drain	44000	3,100	298,590	56.6
Vail 2A Drain	8000	1,800	300,410	56.9
N Drain	44000	2,300	302,760	57.3
Alamo at Salton Sea	-	7,200	309,940	58.7

Appendix B: Historical Flow and Salt Contribution from Drains on the Alamo River

Drain Station	Cumulative Distance from Mexico Border	Flow from Drain	Cumulative Flow	Cumulative Flow	Total Annual TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
Alamo at Border	0.0	1,000	1,000	0	2,500
All American Drain No 5	0.0	1,700	2,600	0	2,500
All American Drain No 6	0.1	1,200	3,800	10	2,500
Toland Drain	1.0	400	4,200	10	2,500
South Alamo Pipeline Drain	1.6	200	4,300	10	2,500
South Alamo Drain No 1	2.9	400	4,800	10	2,500
Verde Drain Outlet	9.6	24,000	28,700	40	2,500
Schali Pipeline Drain	10.5	500	29,300	40	2,500
Warren Drain	11.3	10,900	40,200	60	2,500
Barbara Worth Drain Spill	14.6	200	40,400	60	2,500
Ash Drain	15.7	200	40,600	60	2,500
Ash 20 Drain	16.5	300	40,900	60	2,500
Holtville City Drain	16.8	100	41,000	60	2,500
Barbara Worth Drain	19.3	5,300	46,300	60	2,500
South Central Drain Outlet	19.9	26,500	72,800	100	2,500
Ninth Street Drain	20.4	500	73,300	100	2,500
Palmetto Drain	20.9	8,500	81,800	110	2,500
Central Drain	21.0	88,400	170,200	240	2,500
Peach Drain + Pampas Drain	22.1	10,200	180,400	250	2,500
Plum Drain	22.8	3,300	183,800	250	2,500
Pine Drain	23.5	3,200	187,000	260	2,500
Palm Drain	24.2	2,900	189,900	260	2,500
Pomelo Drain	24.4	3,200	193,200	270	2,500
Graeser Drain	24.8	600	193,800	270	2,500
Pepper Drain	25.9	2,800	196,500	270	2,500
Township Drain	27.0	2,300	198,900	270	2,500
Oat Drain	27.5	2,300	201,200	280	2,500
Redwood 4 Drain	28.0	900	202,100	280	2,500
Oasis Drain	28.0	2,300	204,400	280	2,500
Orient Drain	28.5	2,400	206,800	290	2,500
Occident Drain	29.0	2,300	209,100	290	2,500
Holtville Main Drain	29.6	79,400	288,500	400	2,500
Olive Drain	30.1	6,700	295,200	410	2,500
Oxalis Drain	30.8	6,400	301,500	420	2,500
Orange Drain	31.9	6,300	307,900	430	2,500
Rose Drain Outlet	32.3	78,500	386,400	530	2,500
Ohmar Drain	32.7	6,700	393,100	540	2,500
Oleander Drain	33.3	5,200	398,300	550	2,500
Bryant Drain	33.7	7,400	405,800	560	2,500
Orita Drain	33.8	8,100	413,900	570	2,500
Osage Drain	34.4	6,000	419,900	580	2,500
Oak Drain	34.7	6,100	426,000	590	2,500

Drain Station	Cumulative Distance from Mexico Border	Flow from Drain	Cumulative Flow	Cumulative Flow	Total Annual TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
Wills Drain	34.7	2,100	428,100	590	2,500
Moss Drain	35.5	6,600	434,700	600	2,500
Magnolia Drain + Moorhead Lateral 3 Spillway	36.0	5,500	440,200	610	2,500
Mesquite Lateral Drain	36.7	6,300	446,500	620	2,500
Maple Drain	37.4	6,400	452,800	630	2,500
Darling Drain	37.8	2,400	455,300	630	2,500
Moorhead Pipeline Drain	38.3	1,600	455,300	630	2,500
Mullen Drain	38.5	5,800	461,100	640	2,500
Moorhead Pipeline Drain	38.6	1,600	462,700	640	2,500
Myrtle Drain	39.1	6,300	469,000	650	2,500
Munyon Drain	39.9	5,000	474,100	650	2,500
Mulberry Drain	40.7	6,600	480,600	660	2,500
Lewis Drain	41.5	1,100	481,700	670	2,500
Malva 2 Drain	41.9	8,900	490,600	680	2,500
Mayflower Drain	42.1	5,100	495,700	680	2,500
Marigold Drain	43.0	6,600	502,400	690	2,500
Jones Drain	43.6	800	503,200	700	2,500
Standard Drain	43.9	6,600	509,700	700	2,500
Bailey Drain	44.4	400	510,200	700	2,500
Narcissus Drain	45.1	5,200	515,400	710	2,500
Nettle Drain	45.6	6,300	521,700	720	2,500
Nutmeg Drain	46.9	7,300	529,000	730	2,500
Nectarine Drain	47.9	7,700	536,700	740	2,500
Rockwood Drain	48.1	700	537,400	740	2,500
C Drain + B Drain	49.5	9,500	546,900	760	2,500
C Lateral 1 Spill	50.2	200	547,100	760	2,500
Vail 1 Drain	50.5	600	547,600	760	2,500
D Drain	51.1	7,200	554,900	770	2,500
E Drain + F Drain	51.6	15,800	570,600	790	2,500
G Drain + H Drain	52.7	14,200	584,800	810	2,500
Vail 1 Spill	53.8	200	584,900	810	2,500
I Drain	54.1	12,300	597,300	830	2,500
J Drain	54.7	6,900	604,100	830	2,500
K Drain	55.3	6,300	610,500	840	2,500
Vail 2 Spill + Pumice Drain	55.7	3,400	613,900	850	2,500
L Drain	56.0	6,600	620,500	860	2,500
M Drain	56.6	6,000	626,500	870	2,500
Vail 2A Drain	56.9	1,100	627,600	870	2,500
N Drain	57.3	6,800	634,400	880	2,500
Alamo at Salton Sea	58.7	6,800	634,400	880	2,500

Appendix C: Post QSA Flow and Salt Contribution from Drains on the Alamo River

Drain Station	Cumulative Distance from Mexico Border	Post QSA Drainage Flow	Post QSA Cumulative Flow	Post QSA Cumulative Flow	Post QSA Cumulative TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
Alamo at Border	0.0	1,000	1,000	0	2,500
All American Drain No 5	0.0	1,200	2,000	0	2,900
All American Drain No 6	0.1	800	3,000	0	3,200
Toland Drain	1.0	200	3,000	0	3,200
South Alamo Pipeline Drain	1.6	100	3,000	0	3,200
South Alamo Drain No 1	2.9	300	4,000	10	3,200
Verde Drain Outlet	9.6	16,800	20,000	30	3,200
Schali Pipeline Drain	10.5	400	21,000	30	3,200
Warren Drain	11.3	7,600	28,000	40	3,200
Barbara Worth Drain Spill	14.6	100	29,000	40	3,200
Ash Drain	15.7	100	29,000	40	3,200
Ash 20 Drain	16.5	200	29,000	40	3,200
Holtville City Drain	16.8	100	29,000	40	3,200
Barbara Worth Drain	19.3	3,700	33,000	50	3,200
South Central Drain Outlet	19.9	18,500	51,000	70	3,200
Ninth Street Drain	20.4	300	52,000	70	3,200
Palmetto Drain	20.9	6,000	58,000	80	3,200
Central Drain	21.0	61,900	119,000	160	3,200
Peach Drain + Pampas Drain	22.1	7,100	127,000	180	3,200
Plum Drain	22.8	2,300	129,000	180	3,200
Pine Drain	23.5	2,300	131,000	180	3,200
Palm Drain	24.2	2,000	133,000	180	3,200
Pomelo Drain	24.4	2,300	135,000	190	3,200
Graeser Drain	24.8	400	136,000	190	3,200
Pepper Drain	25.9	1,900	138,000	190	3,200
Township Drain	27.0	1,600	140,000	190	3,200
Oat Drain	27.5	1,600	141,000	190	3,200
Redwood 4 Drain	28.0	600	142,000	200	3,200
Oasis Drain	28.0	1,600	143,000	200	3,200
Orient Drain	28.5	1,600	145,000	200	3,200
Occident Drain	29.0	1,600	147,000	200	3,200
Holtville Main Drain	29.6	55,600	202,000	280	3,200
Olive Drain	30.1	4,700	207,000	290	3,200
Oxalis Drain	30.8	4,400	211,000	290	3,200
Orange Drain	31.9	4,400	216,000	300	3,200
Rose Drain Outlet	32.3	55,000	271,000	370	3,200
Ohmar Drain	32.7	4,700	275,000	380	3,200
Oleander Drain	33.3	3,700	279,000	390	3,200
Bryant Drain	33.7	5,200	284,000	390	3,200

Drain Station	Cumulative Distance from Mexico Border	Post QSA Drainage Flow	Post QSA Cumulative Flow	Post QSA Cumulative Flow	Post QSA Cumulative TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
Orita Drain	33.8	5,700	290,000	400	3,200
Osage Drain	34.4	4,200	294,000	410	3,200
Oak Drain	34.7	4,200	298,000	410	3,200
Wills Drain	34.7	1,500	300,000	410	3,200
Moss Drain	35.5	4,600	305,000	420	3,200
Magnolia Drain + Moorhead Lateral 3 Spillway	36.0	3,800	308,000	430	3,200
Mesquite Lateral Drain	36.7	4,400	313,000	430	3,200
Maple Drain	37.4	4,500	317,000	440	3,200
Darling Drain	37.8	1,700	319,000	440	3,200
Moorhead Pipeline Drain	38.3	1,100	320,000	440	3,200
Mullen Drain	38.5	4,100	324,000	450	3,200
Moorhead Pipeline Drain	38.6	1,100	325,000	450	3,200
Myrtle Drain	39.1	4,400	330,000	460	3,200
Munyon Drain	39.9	3,500	333,000	460	3,200
Mulberry Drain	40.7	4,600	338,000	470	3,200
Lewis Drain	41.5	800	339,000	470	3,200
Malva 2 Drain	41.9	6,200	345,000	480	3,200
Mayflower Drain	42.1	3,600	348,000	480	3,200
Marigold Drain	43.0	4,600	353,000	490	3,200
Jones Drain	43.6	500	354,000	490	3,200
Standard Drain	43.9	4,600	358,000	490	3,200
Bailey Drain	44.4	300	359,000	500	3,200
Narcissus Drain	45.1	3,600	362,000	500	3,200
Nettle Drain	45.6	4,400	367,000	510	3,200
Nutmeg Drain	46.9	5,100	372,000	510	3,200
Nectarine Drain	47.9	5,400	377,000	520	3,200
Rockwood Drain	48.1	500	378,000	520	3,200
C Drain + B Drain	49.5	6,600	384,000	530	3,200
C Lateral 1 Spill	50.2	100	384,000	530	3,200
Vail 1 Drain	50.5	400	385,000	530	3,200
D Drain	51.1	5,100	390,000	540	3,200
E Drain + F Drain	51.6	11,000	401,000	550	3,200
G Drain + H Drain	52.7	9,900	411,000	570	3,200
Vail 1 Spill	53.8	100	411,000	570	3,200
I Drain	54.1	8,600	419,000	580	3,200
J Drain	54.7	4,800	424,000	590	3,200
K Drain	55.3	4,400	429,000	590	3,200
Vail 2 Spill + Pumice Drain	55.7	2,400	431,000	600	3,200
L Drain	56.0	4,600	436,000	600	3,200
M Drain	56.6	4,200	440,000	610	3,200
Vail 2A Drain	56.9	800	441,000	610	3,200
N Drain	57.3	4,800	445,000	610	3,200
Alamo at Salton Sea	58.7	-	445,000	610	3,200

Appendix D: Geographic Information on Drains on the New River

Drain Station	Drain System Length	Length Between Systems	Cumulative Distance from Mexico Border	Cumulative Distance from Mexico Border
	(ft)	(ft)	(ft)	(mi)
New River at Border	0	11,600	12,000	2.20
All American Drain No 9	74,000	500	12,000	2.29
All American Drain No 9	74,000	800	13,000	2.44
All American Drain No 14	1,000	10,500	23,000	4.43
Birch No 3 Pipeline Drain	4,000	13,000	36,000	6.89
Beech Spill	3,000	8,400	45,000	8.47
Beech Drain	27,000	1,500	46,000	8.75
Dahlia Spill	3,000	16,000	62,000	11.79
Elder Drain No 1	6,000	8,700	71,000	13.44
Greeson Drain	224,000	700	72,000	13.57
Elder Drain No 3 Pipeline	2,000	3,300	75,000	14.19
Blue Lake Drain	5,000	8,500	83,000	15.80
Elder Spill	2,000	8,200	92,000	17.35
Wormwood 7 Drain	15,000	5,600	97,000	18.41
Fig Drain	43,000	1,100	98,000	18.61
Wixom Drain	15,000	2,300	101,000	19.04
Elder Lateral 7 Spill	0	6,400	107,000	20.25
Seeley Drain	29,000	10,500	117,000	22.25
Bullhead Slough	4,000	15,600	133,000	25.20
Elder 14 Drain	28,000	9,000	142,000	26.91
Salt Creek	223,000	9,700	152,000	28.75
Flax Drain	89,000	18,100	170,000	32.17
Fillaree Drain	43,000	1,600	171,000	32.47
Rice 3 Drain	172,000	11,900	183,000	34.73
Rice Drain	59,000	14,900	198,000	37.55
Sumac 1 Spill	2,000	2,400	201,000	38.00
Sumac Drain	6,000	3,600	204,000	38.69
North Central Drain	68,000	2,600	207,000	39.17
Sumac Drain No 2	4,000	3,900	211,000	39.91
Cook Drain	7,000	7,500	218,000	41.33
Lilac 4 Spill	3,000	9,300	227,000	43.08
Malan Drain	4,000	9,700	237,000	44.93
Mansfield Tile Drain	5,000	7,800	245,000	46.41
Gardner Drain	17,000	9,100	254,000	48.14
Smilax Spill	3,000	4,100	258,000	48.92
Stanley Lateral 1 Spill	1,000	1,800	260,000	49.26
Spruce 1 Drain	6,000	2,800	263,000	49.80
Spruce 3 Drain	10,000	900	264,000	49.98
Livesley Drain	42,000	7,600	271,000	51.42
Spruce Drain	56,000	6,900	278,000	52.73
Best Drain	16,000	5,500	284,000	53.77

Drain Station	Drain System Length	Length Between Systems	Cumulative Distance from Mexico Border	Cumulative Distance from Mexico Border
	(ft)	(ft)	(ft)	(mi)
Cole Drain	13,000	600	284,000	53.88
Baughman Drain	10,000	3,400	288,000	54.52
Meserve Drain	4,000	100	288,000	54.54
Spruce 4 Drain	4,000	7,900	296,000	56.04
Raymond Drain	10,000	200	296,000	56.07
Spruce 6 Spill	1,000	6,400	302,000	57.28
Spruce Spill	1,000	3,300	306,000	57.90
Pinner Drain	28,000	2,500	308,000	58.38
Gerrard Drain	15,000	100	308,000	58.40
Tamarack Drain	27,000	2,100	310,000	58.79
Timothy 1 Drain	22,000	600	311,000	58.90
Riley 11 Pipeline Drain	3,000	2,800	314,000	59.42
Reed 13 Pipeline Drain	3,000	0	314,000	59.42
Timothy 2 Drain	72,000	2,800	317,000	59.95
Trifolium 3 Drain	51,000	100	317,000	59.97
Reed 15 Pipeline Drain	3,000	2,600	319,000	60.46
O'Brien Drain	4,000	0	319,000	60.47
Trifolium 4 Drain	52,000	2,900	322,000	61.01
Trifolium 6 Drain	89,000	3,600	326,000	61.69
Trifolium 6 Spill	2,000	1,100	327,000	61.91
Trifolium 7 Drain	76,000	5,600	333,000	62.98
Trifolium 8 Drain	61,000	0	333,000	62.98
O'Brien Spill	2,000	1,600	334,000	63.28
Thompson Drain	2,000	3,300	337,000	63.92
Trifolium 9 Drain	66,000	100	338,000	63.94
Vail Drain	36,000	3,200	341,000	64.55
Trifolium 10 Drain	61,000	2,900	344,000	65.09
Trifolium 11 Drain	31,000	3,200	347,000	65.70
Trifolium 12 Drain	56,000	10,200	357,000	67.62
New River at Salton Sea	-	0	0	-

Appendix E: Historical Flow and Salt Contribution from Drains on the New River

Drain Station	Cumulative Distance from Mexico Border	Flow from Drain	Cumulative Flow	Cumulative Flow	Cumulative Total Annual TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
New River at Border	2.20	130,700	131,000	180	4,400
All American Drain No 9	2.29	12,700	143,000	200	4,300
All American Drain No 9	2.44	12,700	143,000	200	4,300
All American Drain No 14	4.43	200	144,000	200	4,300
Birch No 3 Pipeline Drain	6.89	600	144,000	200	4,300
Beech Spill	8.47	500	145,000	200	4,300
Beech Drain	8.75	4,600	149,000	210	4,200
Dahlia Spill	11.79	500	150,000	210	4,200
Elder Drain No 1	13.44	1,000	151,000	210	4,200
Greeson Drain	13.57	21,500	172,000	240	4,000
Elder Drain No 3 Pipeline	14.19	400	173,000	240	4,000
Blue Lake Drain	15.80	900	174,000	240	4,000
Elder Spill	17.35	300	174,000	240	4,000
Wormwood 7 Drain	18.41	2,500	176,000	240	4,000
Fig Drain	18.61	9,500	186,000	260	4,000
Wixom Drain	19.04	2,600	188,000	260	4,000
Elder Lateral 7 Spill	20.25	100	188,000	260	4,000
Seeley Drain	22.25	5,100	194,000	270	3,900
Bullhead Slough	25.20	4,300	198,000	270	3,900
Elder 14 Drain	26.91	4,800	203,000	280	3,900
Salt Creek	28.75	38,200	241,000	330	3,700
Flax Drain	32.17	15,300	256,000	350	3,700
Fillaree Drain	32.47	7,300	263,000	360	3,700
Rice 3 Drain	34.73	15,800	279,000	390	3,600
Rice Drain	37.55	5,100	284,000	390	3,600
Sumac 1 Spill	38.00	400	285,000	390	3,600
Sumac Drain	38.69	1,000	286,000	400	3,600
North Central Drain	39.17	4,100	290,000	400	3,600
Sumac Drain No 2	39.91	800	290,000	400	3,600
Cook Drain	41.33	1,200	292,000	400	3,600
Lilac 4 Spill	43.08	400	292,000	400	3,600
Malan Drain	44.93	600	293,000	400	3,600
Mansfield Tile Drain	46.41	900	294,000	410	3,600
Gardner Drain	48.14	2,800	296,000	410	3,600
Smilax Spill	48.92	600	297,000	410	3,600
Stanley Lateral 1 Spill	49.26	200	297,000	410	3,600

Spruce 1 Drain	49.80	1,000	298,000	410	3,600
Spruce 3 Drain	49.98	1,600	300,000	410	3,600
Livesley Drain	51.42	7,100	307,000	420	3,600
Spruce Drain	52.73	7,500	314,000	430	3,600
Best Drain	53.77	2,700	317,000	440	3,500
Cole Drain	53.88	2,200	319,000	440	3,500
Baughman Drain	54.52	1,800	321,000	440	3,500
Meserve Drain	54.54	700	322,000	440	3,500
Spruce 4 Drain	56.04	600	322,000	440	3,500
Raymond Drain	56.07	1,700	324,000	450	3,500
Spruce 6 Spill	57.28	200	324,000	450	3,500
Spruce Spill	57.90	200	325,000	450	3,500
Pinner Drain	58.38	4,900	330,000	460	3,500
Gerrard Drain	58.40	2,500	332,000	460	3,500
Tamarack Drain	58.79	4,700	337,000	470	3,500
Timothy 1 Drain	58.90	3,700	340,000	470	3,500
Riley 11 Pipeline Drain	59.42	400	341,000	470	3,500
Reed 13 Pipeline Drain	59.42	400	341,000	470	3,500
Timothy 2 Drain	59.95	11,900	353,000	490	3,500
Trifolium 3 Drain	59.97	8,800	362,000	500	3,500
Reed 15 Pipeline Drain	60.46	600	363,000	500	3,500
O'Brien Drain	60.47	700	363,000	500	3,500
Trifolium 4 Drain	61.01	8,900	372,000	510	3,500
Trifolium 6 Drain	61.69	15,300	387,000	530	3,400
Trifolium 6 Spill	61.91	300	388,000	540	3,400
Trifolium 7 Drain	62.98	13,100	401,000	550	3,400
Trifolium 8 Drain	62.98	10,400	411,000	570	3,400
O'Brien Spill	63.28	400	412,000	570	3,400
Thompson Drain	63.92	300	412,000	570	3,400
Trifolium 9 Drain	63.94	11,300	423,000	580	3,400
Vail Drain	64.55	6,200	429,000	590	3,400
Trifolium 10 Drain	65.09	9,200	439,000	610	3,400
Trifolium 11 Drain	65.70	3,100	442,000	610	3,400
Trifolium 12 Drain	67.62	4,800	446,000	620	3,400
New River at Salton Sea	-	-	446,000	620	3,400

Appendix F: Post QSA Flow and Salt Contribution from Drains on the New River

Drain Station	Cumulative Distance from Mexico Border	Post QSA Drainage Flow	Post QSA Cumulative Flow	Post QSA Cumulative Flow	Post QSA Cumulative TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
New River at Border	2.20	130,700	131,000	180	4,400
All American Drain No 9	2.29	8,900	140,000	190	4,400
All American Drain No 9	2.44	8,900	140,000	190	4,600
All American Drain No 14	4.43	100	140,000	190	4,600
Birch No 3 Pipeline Drain	6.89	400	140,000	190	4,600
Beech Spill	8.47	300	140,000	190	4,600
Beech Drain	8.75	3,200	144,000	200	4,600
Dahlia Spill	11.79	300	144,000	200	4,600
Elder Drain No 1	13.44	700	145,000	200	4,600
Greeson Drain	13.57	15,000	160,000	220	4,500
Elder Drain No 3 Pipeline	14.19	300	160,000	220	4,500
Blue Lake Drain	15.80	700	161,000	220	4,500
Elder Spill	17.35	200	161,000	220	4,500
Wormwood 7 Drain	18.41	1,800	163,000	230	4,500
Fig Drain	18.61	6,600	169,000	230	4,500
Wixom Drain	19.04	1,800	171,000	240	4,400
Elder Lateral 7 Spill	20.25	0	171,000	240	4,400
Seeley Drain	22.25	3,500	175,000	240	4,400
Bullhead Slough	25.20	3,000	178,000	250	4,400
Elder 14 Drain	26.91	3,300	181,000	250	4,400
Salt Creek	28.75	26,800	208,000	290	4,300
Flax Drain	32.17	10,700	218,000	300	4,300
Fillaree Drain	32.47	5,100	224,000	310	4,300
Rice 3 Drain	34.73	11,000	235,000	320	4,300
Rice Drain	37.55	3,500	238,000	330	4,300
Sumac 1 Spill	38.00	300	238,000	330	4,300
Sumac Drain	38.69	700	239,000	330	4,300
North Central Drain	39.17	2,800	242,000	330	4,300
Sumac Drain No 2	39.91	500	243,000	340	4,300
Cook Drain	41.33	900	243,000	340	4,300
Lilac 4 Spill	43.08	300	244,000	340	4,300
Malan Drain	44.93	400	244,000	340	4,300
Mansfield Tile Drain	46.41	600	245,000	340	4,300
Gardner Drain	48.14	2,000	247,000	340	4,200
Smilax Spill	48.92	400	247,000	340	4,200
Stanley Lateral 1 Spill	49.26	100	247,000	340	4,200
Spruce 1 Drain	49.80	700	248,000	340	4,200
Spruce 3 Drain	49.98	1,100	249,000	340	4,200
Livesley Drain	51.42	5,000	254,000	350	4,200
Spruce Drain	52.73	5,200	259,000	360	4,200
Best Drain	53.77	1,900	261,000	360	4,200
Cole Drain	53.88	1,500	263,000	360	4,200

Drain Station	Cumulative Distance from Mexico Border	Post QSA Drainage Flow	Post QSA Cumulative Flow	Post QSA Cumulative Flow	Post QSA Cumulative TDS
	(mi)	(acre-ft)	(acre-ft)	(cfs)	(mg/L)
Baughman Drain	54.52	1,300	264,000	360	4,200
Meserve Drain	54.54	500	264,000	360	4,200
Spruce 4 Drain	56.04	500	265,000	370	4,200
Raymond Drain	56.07	1,200	266,000	370	4,200
Spruce 6 Spill	57.28	200	266,000	370	4,200
Spruce Spill	57.90	200	266,000	370	4,200
Pinner Drain	58.38	3,400	270,000	370	4,200
Gerrard Drain	58.40	1,800	272,000	380	4,200
Tamarack Drain	58.79	3,300	275,000	380	4,200
Timothy 1 Drain	58.90	2,600	277,000	380	4,200
Riley 11 Pipeline Drain	59.42	300	278,000	380	4,200
Reed 13 Pipeline Drain	59.42	300	278,000	380	4,200
Timothy 2 Drain	59.95	8,300	286,000	400	4,200
Trifolium 3 Drain	59.97	6,200	293,000	400	4,200
Reed 15 Pipeline Drain	60.46	400	293,000	400	4,200
O'Brien Drain	60.47	500	293,000	400	4,200
Trifolium 4 Drain	61.01	6,200	300,000	410	4,200
Trifolium 6 Drain	61.69	10,700	310,000	430	4,200
Trifolium 6 Spill	61.91	200	311,000	430	4,200
Trifolium 7 Drain	62.98	9,200	320,000	440	4,100
Trifolium 8 Drain	62.98	7,300	327,000	450	4,100
O'Brien Spill	63.28	300	327,000	450	4,100
Thompson Drain	63.92	200	328,000	450	4,100
Trifolium 9 Drain	63.94	7,900	336,000	460	4,100
Vail Drain	64.55	4,300	340,000	470	4,100
Trifolium 10 Drain	65.09	6,400	346,000	480	4,100
Trifolium 11 Drain	65.70	2,100	348,000	480	4,100
Trifolium 12 Drain	67.62	3,400	352,000	490	4,100
New River at Salton Sea	-	-	384,000	530	4,100

Appendix G –IID Current Active Metered Drains in the Water Information System

Drain Name	Beginning Record
C Drain	3/13/2007
Central Drain Drop 2	1/1/1996
Fig Drain	1/1/1996
Greeson Drain	1/1/1996
Holtville Main Drain	1/1/1996
I Drain	1/28/2008
Magnolia Drain	3/13/2007
Mayflower Drain	6/2/1994
Munyon Drain	3/13/2007
N Drain	3/13/2007
Narcissus Drain	6/10/1994
Nettle Drain	2/6/2008
Niland Drain 1	1/1/1996
Niland Drain 2	1/1/1996
Niland Drain 3	1/1/1996
Niland Drain 4	1/1/1996
Niland Drain 5	1/1/1996
North Central Drain	2/6/2008
O Drain	1/1/1996
Oleander Drain	3/13/2007
P Drain	1/1/1996
Peach Drain	2/7/2008
Pumice Drain UFM	3/19/2007
Q Drain	1/1/1996
R Drain	1/1/1996
Rice 3 Drain	1/1/1996
Rice Drain	1/1/1996
Rose Drain Outlet	1/1/1996
S Drain	1/1/1996
South Central Drain Outlet	1/1/1996
Standard Drain	5/4/1994
T Drain	1/1/1996
Timothy 2 Drain	1/28/2008
Trifolium 10 Drain	1/1/1996
Trifolium 11 Drain	1/1/1996
Trifolium 12 Drain	1/15/2008
Trifolium 20 Drain	7/6/1996
Trifolium 20A Drain	1/1/1996
Trifolium Drain No. 1	1/1/1996
U Drain	1/1/1996
Verde Drain Outlet	1/1/1996
W+Y Drain	1/1/1996
Z Drain	1/1/1996

Appendix H: Average Monthly Flow for the Alamo River at the Salton Sea

Alamo River		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historic (cfs)	Max	820	860	1,290	1,220	1,100	910	940	930	1,110	1,200	860	790
	Min	310	410	830	820	810	760	880	750	640	720	420	560
	Average	650	560	1,000	1,090	950	820	900	820	840	950	700	670
Historic (acre-ft/month)	Max	50,000	48,000	79,000	73,000	68,000	54,000	58,000	57,000	66,000	74,000	51,000	49,000
	Min	19,000	23,000	51,000	49,000	49,000	45,000	54,000	46,000	38,000	44,000	25,000	34,000
	Average	40,000	31,000	61,000	65,000	58,000	49,000	55,000	51,000	50,000	58,000	41,000	41,000
Post QSA (cfs)	Max	570	600	900	850	770	640	660	650	780	840	600	550
	Min	210	290	580	580	560	530	620	520	440	500	290	390
	Average	450	390	700	760	660	580	630	580	590	660	490	470
Post QSA (acre-ft/month)	Max	35,000	33,000	56,000	51,000	47,000	38,000	41,000	40,000	46,000	52,000	36,000	34,000
	Min	13,000	16,000	36,000	34,000	35,000	32,000	38,000	32,000	26,000	31,000	17,000	24,000
	Average	28,000	22,000	43,000	45,000	41,000	34,000	39,000	35,000	35,000	41,000	29,000	29,000

Appendix I: Average Monthly Salinity for the Alamo River at Salton Sea

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Alamo River		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Historic (µS/cm)	Max	5,100	5,500	4,100	4,800	4,700	4,200	4,100	5,300	4,800	4,300	6,500	4,500
	Min	3,700	3,200	2,700	3,500	3,500	3,300	3,400	3,600	3,200	3,600	3,500	3,200
	Average	4,300	4,600	3,600	3,900	4,000	3,700	3,700	4,000	4,000	3,800	4,700	3,900
Historic (mg/L)	Max	3,300	3,500	2,600	3,100	3,000	2,700	2,600	3,400	3,000	2,800	4,100	2,900
	Min	2,300	2,000	1,700	2,200	2,200	2,100	2,100	2,300	2,100	2,300	2,200	2,000
	Average	2,700	3,000	2,300	2,500	2,600	2,400	2,400	2,600	2,600	2,400	3,000	2,500
Historic (tons/month)	Max	202,000	132,000	240,000	246,000	250,000	196,000	197,000	245,000	202,000	228,000	286,000	142,000
	Min	84,000	103,000	151,000	190,000	169,000	143,000	164,000	144,000	138,000	165,000	114,000	124,000
	Average	144,000	119,000	190,000	219,000	203,000	160,000	180,000	178,000	173,000	191,000	167,000	136,000
Post QSA (µS/cm)	Max	6,600	7,100	5,200	6,100	6,000	5,300	5,300	6,800	6,100	5,500	8,300	5,700
	Min	4,700	4,100	3,400	4,400	4,500	4,300	4,300	4,600	4,100	4,600	4,500	4,100
	Average	5,500	6,000	4,600	5,100	5,100	4,800	4,800	5,200	5,200	4,900	6,000	5,000
Post QSA (mg/L)	Max	4,200	4,500	3,400	3,900	3,900	3,400	3,400	4,400	3,900	3,500	5,300	3,700
	Min	3,000	2,600	2,200	2,800	2,900	2,700	2,800	3,000	2,600	2,900	2,900	2,600
	Average	3,500	3,800	3,000	3,200	3,300	3,100	3,100	3,300	3,300	3,100	3,800	3,200
Post QSA (tons/month)	Max	181,000	119,000	216,000	222,000	225,000	176,000	177,000	221,000	182,000	205,000	257,000	127,000
	Min	75,000	93,000	136,000	171,000	152,000	129,000	148,000	130,000	124,000	149,000	103,000	112,000
	Average	130,000	107,000	171,000	197,000	182,000	144,000	162,000	160,000	155,000	172,000	150,000	123,000

Appendix J: Average Monthly Flow for the New River

New River		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
at International Border (CFS)	Max	350	350	380	250	370	220	480	390	450	270	350	200
	Min	130	150	140	170	140	100	110	110	120	100	60	100
	Average	200	190	200	200	220	150	210	170	200	140	160	140
at International Border (acre-ft/month)	Max	22,000	20,000	23,000	15,000	23,000	13,000	30,000	24,000	27,000	16,000	21,000	12,000
	Min	8,000	8,000	9,000	10,000	9,000	6,000	7,000	7,000	7,000	6,000	4,000	6,000
	Average	12,000	11,000	12,000	12,000	13,000	9,000	13,000	11,000	12,000	9,000	10,000	9,000
Historic at Salton Sea (cfs)	Max	550	570	760	810	750	620	780	700	770	670	540	540
	Min	390	440	610	630	590	480	550	480	460	430	390	400
	Average	480	490	660	730	660	560	620	560	600	580	480	480
Historic at Salton Sea (acre-ft/month)	Max	34,000	32,000	47,000	48,000	46,000	37,000	48,000	43,000	46,000	41,000	32,000	33,000
	Min	24,000	24,000	37,000	37,000	36,000	29,000	34,000	29,000	28,000	27,000	23,000	25,000
	Average	30,000	27,000	40,000	43,000	40,000	33,000	38,000	34,000	35,000	36,000	29,000	30,000
Post-QSA at Salton Sea (cfs)	Max	420	450	570	630	570	450	630	540	590	510	400	410
	Min	300	350	450	480	470	360	430	370	350	320	310	300
	Average	380	390	500	550	510	410	490	420	460	430	360	360
Post QSA at Salton Sea (acre-ft/month)	Max	26,000	25,000	35,000	37,000	35,000	27,000	39,000	33,000	35,000	31,000	24,000	25,000
	Min	19,000	19,000	28,000	28,000	29,000	21,000	26,000	23,000	21,000	20,000	18,000	19,000
	Average	23,000	22,000	31,000	33,000	31,000	25,000	30,000	26,000	27,000	26,000	21,000	22,000

Appendix K: Average Monthly Salinity for the New River

New River		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Border (µS/cm)	Max	7,500	9,600	8,300	8,500	8,100	8,700	8,500	8,600	8,600	7,500	10,300	10,700
	Min	5,400	6,200	4,800	6,600	5,900	4,600	4,200	6,300	4,400	5,800	5,400	5,200
	Average	6,500	7,300	6,900	7,300	7,100	7,300	6,900	7,200	6,700	6,600	6,900	7,200
Border (mg/L)	Max	4,800	6,200	5,300	5,400	5,200	5,600	5,500	5,500	5,500	4,800	6,600	6,800
	Min	3,400	4,000	3,000	4,200	3,800	2,900	2,700	4,000	2,800	3,700	3,500	3,300
	Average	4,200	4,700	4,400	4,700	4,500	4,700	4,400	4,600	4,300	4,200	4,400	4,600
Border (tons/month)	Max	101,000	71,000	114,000	95,000	117,000	80,000	129,000	171,000	112,000	83,000	109,000	73,000
	Min	49,000	49,000	48,000	64,000	55,000	40,000	49,000	43,000	41,000	33,000	35,000	36,000
	Average	68,000	61,000	74,000	76,000	81,000	54,000	72,000	68,000	64,000	50,000	61,000	53,000
Historic at Salton Sea (µS/cm)	Max	6,800	7,100	5,500	5,300	5,500	5,900	5,400	6,100	7,200	5,700	7,500	6,300
	Min	5,300	5,000	3,800	5,000	4,700	4,800	4,000	4,700	4,400	4,300	4,900	5,100
	Average	6,100	6,200	4,800	5,100	5,000	5,400	5,000	5,200	5,700	5,000	5,900	5,800
Historic at Salton Sea (mg/L)	Max	4,400	4,500	3,500	3,400	3,500	3,700	3,500	3,900	4,600	3,600	4,800	4,000
	Min	3,400	3,200	2,400	3,200	3,000	3,100	2,600	3,000	2,800	2,700	3,100	3,300
	Average	3,900	4,000	3,100	3,300	3,200	3,400	3,200	3,300	3,600	3,200	3,800	3,700
Historic at Salton Sea (tons/month)	Max	179,000	162,000	182,000	213,000	191,000	173,000	177,000	181,000	222,000	166,000	155,000	168,000
	Min	139,000	134,000	148,000	173,000	153,000	133,000	153,000	131,000	130,000	127,000	136,000	129,000
	Average	158,000	147,000	168,000	194,000	176,000	155,000	165,000	155,000	173,000	151,000	146,000	150,000
Post-QSA at Salton Sea (µS/cm)	Max	8,200	8,600	6,700	6,600	6,900	7,400	6,900	7,400	8,900	7,100	9,000	7,700
	Min	6,500	6,000	4,600	6,200	5,700	6,100	4,700	5,900	5,400	5,300	6,100	6,300
	Average	7,400	7,400	6,100	6,300	6,200	6,700	6,100	6,400	7,000	6,200	7,300	7,200
Post-QSA at Salton Sea (mg/L)	Max	5,200	5,500	4,300	4,200	4,400	4,700	4,400	4,800	5,700	4,500	5,800	4,900
	Min	4,200	3,900	3,000	4,000	3,700	3,900	3,000	3,800	3,400	3,400	3,900	4,000
	Average	4,800	4,800	3,900	4,100	4,000	4,300	3,900	4,100	4,500	4,000	4,700	4,600
Post-QSA at Salton Sea (tons/month)	Max	169,000	153,000	171,000	201,000	183,000	160,000	164,000	170,000	205,000	153,000	144,000	155,000
	Min	132,000	127,000	142,000	163,000	144,000	124,000	143,000	123,000	121,000	118,000	126,000	120,000
	Average	149,000	139,000	161,000	182,000	169,000	144,000	157,000	145,000	162,000	140,000	135,000	139,000

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