Colton/San Bernardino
Regional Tertiary Treatment and Water Reclamation Authority

AGENDA –ADJOURNED REGULAR MEETING
COLTON/SAN BERNARDINO REGIONAL TERTIARY
TREATMENT AND WATER RECLAMATION AUTHORITY
at the
SAN BERNARDINO WATER RECLAMATION PLANT
399 CHANDLER PLACE
SAN BERNARDINO, CALIFORNIA

3:00 P.M., WEDNESDAY, APRIL 2, 2025

THE AUTHORITY ENCOURAGES THE PUBLIC TO VIEW THIS MEETING ONLINE. THE MEETING WILL BE LIVE STREAMED VIA YOUTUBE AT: https://bit.ly/YouTubeSBWater

MEMBERS OF THE PUBLIC WHO WISH TO COMMENT ON MATTERS BEFORE THE AUTHORITY MAY PARTICIPATE IN THE FOLLOWING WAYS:

1. IF ATTENDING IN PERSON, MAY PROVIDE COMMENT AT THE APPROPRIATE TIME DICTATED BY THE AGENDA AND BOARD PRESIDENT;

2. COMMENTS AND CONTACT INFORMATION MAY BE E-MAILED TO Comments@sbmwd.org BY 2:00 P.M. THE DAY OF THE SCHEDULED MEETING TO BE INCLUDED IN THE WRITTEN RECORD.

1. CALL TO ORDER: _____ a.m./p.m.

ROLL CALL:
DIRECTORS PRESENT: _____
DIRECTORS ABSENT:_____
OTHERS: _____
_____

2. **PUBLIC COMMENTS:** Members of the public may address the Authority on matters within its jurisdiction or may address the Authority during the consideration of a particular item on the agenda.

3. **ADDITIONS TO THE AGENDA:** (if any) in accordance with Section 54954.2 (b)(2) of the Government Code (Brown Act), a two-thirds vote (or a unanimous vote if less than two-thirds are present) is required to add an item for action provided that there is a need to take immediate action and that the need for action came to the attention of the agency after the agenda was posted.

MOTION:_____SECONDED:_____

4. **APPROVAL OF THE MINUTES:** It is recommended that the minutes for the Adjourned Regular Meeting of July 3, 2024, be approved.

MOTION:_____SECONDED:_____

5. **RIX OPERATIONAL/MAINTENANCE REPORT DECEMBER 16, 2024 TO MARCH 15, 2025** (INFORMATION ITEM – RECEIVE AND FILE).

6. **EXPENDITURES REPORT – THROUGH MARCH 25, 2025** (INFORMATION ITEM – RECEIVE AND FILE).

7. **MONTHLY COMPLIANCE REPORT – JUNE 26, 2024 – FEBRUARY 28, 2025** (INFORMATION ITEM – RECEIVE AND FILE).

8. **REPORTS**

9. **ADJOURNMENT:** The meeting adjourned at _____ a.m./p.m. It is recommended that the meeting be adjourned to Wednesday, July 2, 2025 at 3:00 p.m.

MINUTES OF THE ADJOURNED REGULAR MEETING OF THE COLTON/SAN BERNARDINO REGIONAL TERTIARY TREATMENT AND WATER RECLAMATION AUTHORITY BOARD OF DIRECTORS

July 3, 2024

The Adjourned Regular meeting of the Colton/San Bernardino Regional Tertiary Treatment and Water Reclamation Authority Board of Directors was called to order on Wednesday, July 3, 2024, at 3:02 p.m. by President Guerrero.

1. **ROLL CALL:** Roll call was taken by Recording Secretary Amy Smith with the following being present: Miguel Guerrero, President; Brian Dickinson, Director; and Wayne Hendrix, Director.

   Dr. Luis S. Gonzalez, Director, arrived at 3:11 p.m.

2. **PUBLIC COMMENTS:** President Guerrero invited members of the public to address the Board on matters within its jurisdiction. There were no public comments.

3. **ADDITIONS TO THE AGENDA:** President asked if there were any additions to the agenda. There being none, the matter was closed.

4. **APPROVAL OF THE MINUTES:** The minutes of the Regular Meeting of April 3, 2024, were presented for approval.

   The following motion was made by Director Hendrix and seconded by Director Gonzalez.

   MOVED *to approve the minutes of the Regular Meeting of April 3, 2024.*

   Motion passed.

5. **RIX OPERATIONAL/MAINTENANCE REPORT MARCH 16, 2024 TO JUNE 15, 2024** (INFORMATION ITEM – RECEIVE AND FILE).

6. **EXPENDITURES REPORT – THROUGH JUNE 14, 2024** (INFORMATION ITEM – RECEIVE AND FILE).

7. **MONTHLY COMPLIANCE REPORT – MARCH 27, 2024 – JUNE 25, 2024** (INFORMATION ITEM – RECEIVE AND FILE).

8. **REQUEST TO APPROVE RENTAL OF HEAVY EQUIPMENT FOR RIX BASIN MAINTENANCE:** The Rapid Infiltration and Extraction (RIX) Facility is jointly owned by the Cities of San Bernardino and Colton and operated exclusively by the San Bernardino Municipal Water Department.

   The treatment system consists of tertiary equivalent wastewater treatment, including rapid infiltration and extraction of the secondary effluent through a series of filtration basins or percolation ponds under conditions of wet and dry cycles.

Once each year, the basins must undergo a maintenance period. Proposals were solicited from four (4) local heavy equipment rentals companies for one (1) scraper, one (1) off-road water truck, and two (2) articulating dump trucks.

The total cost of equipment rentals was $39,820 per month. There was sufficient funding in Account 305025-5214, *Equipment Rental*, under the RIX Facility Fund.

The following motion was made by Director Dickinson and seconded by Director Hendrix:

MOTION:

Accept the proposal of C5 Equipment Rentals and authorize the issuance of a purchase order in the amount of THIRTY-FIVE THOUSAND FOUR HUNDRED FORTY AND 00/100 DOLLARS ($35,440.00) for the initial two (2) months of scaper rental for the purpose of RIX BASIN MAINTENANCE; and

Accept the proposal of Western Rentals and authorize the issuance of a purchase order in the amount of THIRTY-NINE THOUSAND TWO HUNDRED AND 00/100 DOLLARS ($39,200.00) for the initial two (2) months of dump truck rental for the purpose of RIX BASIN MAINTENANCE; and

Accept the proposal of Westrax Machinery and authorize the issuance of a purchase order in the amount of FIVE THOUSAND AND 00/100 DOLLARS ($5,000.00) for the initial two (2) months of water truck rental for the purpose of RIX BASIN MAINTENANCE.

MOVED *to accept the proposal of C5 Equipment Rentals and authorize the issuance of a purchase order in the amount of THIRTY-FIVE THOUSAND FOUR HUNDRED FORTY AND 00/100 DOLLARS ($35,440.00) for the initial two (2) months of scaper rental for the purpose of RIX BASIN MAINTENANCE; and*

Accept the proposal of Western Rentals and authorize the issuance of a purchase order in the amount of THIRTY-NINE THOUSAND TWO HUNDRED AND 00/100 DOLLARS ($39,200.00) for the initial two (2) months of dump truck rental for the purpose of RIX BASIN MAINTENANCE; and

Accept the proposal of Westrax Machinery and authorize the issuance of a purchase order in the amount of FIVE THOUSAND AND 00/100 DOLLARS ($5,000.00) for the initial two (2) months of water truck rental for the purpose of RIX BASIN MAINTENANCE.

Motion carried by a vote of 4-0.

9. BUDGET WORKSHOP AND ADOPTION OF RIX OPERATIONS AND MAINTENANCE BUDGET AND CAPITAL IMPROVEMENT PLAN BUDGET FOR FISCAL YEAR 2023-24: In accordance with Article VIII (General Administrative Budget) of the Joint Powers Agreement, dated August 2, 1994, the Operations and Maintenance Budget was to be adopted by the Board of Directors annually in the month of April. The Budget was taken to the RIX Board in July due to the City of Colton and San Bernardino Municipal Water Department adopting their respective budget after April.

Staff prepared and proposed the Operations and Maintenance Budget and Capital Improvement Plan Budget for FY 2023-24. This budget was approved by the Department's Water Board on June 13, 2023.

Funding for the RIX budget was shared between the San Bernardino Municipal Water Department and the City of Colton in terms outlined in the JPA.

Director Gonzalez asked if the Master Plan was completed annually or periodically.

President Guerrero stated that these types of plans were generally completed every five (5) years.

The following motion was made by Director Gonzalez and seconded by Director Hendrix:

MOTION: It is recommended that the Board of Directors approve and deviate from the JPA conditions of Article VIII, conduct a workshop on the July 5, 2023, to review the proposed 2023-24 combined budgets, and adopt the proposed budget.

MOVED *to approve and deviate from the JPA conditions of Article VIII, conduct a workshop on the July 5, 2023, to review the proposed 2023-24 combined budgets, and adopt the proposed budget.*

Motion carried by a vote of 4-0.

10. REPORTS: None.

11. ADJOURNMENT: The meeting adjourned at 3:34 p.m. until Wednesday, October 2, 2024 at 3:00 p.m. at the San Bernardino Water Reclamation Plant or via a teleconference meeting.

APPROVED: _____ DATE: _____
Miguel Guerrero, President

CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
INTEROFFICE MEMORANDUM

TO: Kevin Stewart P.E., Director of Water Reclamation

FROM: Ryan Nielsen, Water Reclamation RIX Supervisor

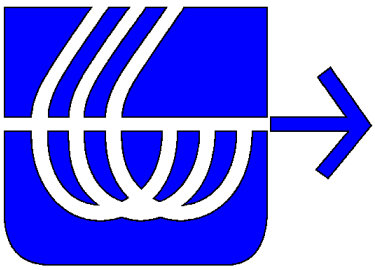
SUBJECT: **RIX FACILITY OPERATION/MAINTENANCE REPORT, December 16, 2024, to March 15, 2025**

DATE: March 15, 2025

COPIES: Hanford, Mendenhall, Shepardson, Razo, 'N'Drive

This report provides relevant information regarding the operation and maintenance of the Rapid Infiltration and Extraction (RIX) Facility. Included are the data on flows, percolation basin performance, process control information, sampling events, permit compliance, and operations and maintenance activities.

From December 16, 2024, to March 15, 2025 (90 days), the RIX facility received a total of 1740 million gallons (MG). The basins received a total flow of 1610 MG; 130 MG of water were processed through the facility's conventional filters. As of March 15, 2025, there was 10.75 MG of water stored in the percolation basins.



Monthly Flows (Influent/Discharge/Over-Extraction)

December 16, 2024, to March 15, 2025

Influent (mgd)	Discharge (mgd)	Extraction (mgd)	Over Extraction • (%)
19.34	21.11	19.66	10

Colton (mgd)	Colton (%)	San Bernardino (mgd)	San Bernardino (%)
4.75	24.73	14.55	75.27

Tertiary Feed (mg)	Tertiary Discharge (mg)	Tertiary Reject (mg)	Basin Feed (mgd)
133.17	130.65	2.52	17.88

- **Over extraction = (Basin feed MGD – (plant discharge MGD – tertiary discharge MGD))/basin feed MGD*100**

Monthly Facility Percolation Rates:

January Monthly Comparison

Year	2018	2019	2020	2021	2022	2023	2024	
Percolation Average	25.08	26.73	26.0	25.88	24.55	24.37	20.86	17.14
Basins in Service	4	4	4	4	5	6	6	5

February Monthly Comparison

Year	2018	2019	2020	2021	2022	2023	2024	
Percolation Average	24.68	24.74	25.48	24.81	24.95	22.09*	22.26*	16.25*
Basins in Service	5	5	3	5	5	5	5.4	5

March Monthly Comparison

Year	2018	2019	2020	2021	2022	2023	2024	
Percolation Average	24.75	25.80	24.29	24.45	25.18	18.34*	22.51	13.94*
Basins in Service	5	5	3	5	5	4.6	4.8	4

April Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	27.81	24.70	25.37	25.94	25.92	25.38	24.22	20.17
Basins in Service	4	5	4	4	5	5	4.9	4

May Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	28.11	26.12	25.57	24.30	26.03	26.32	24.93	20.00
Basins in Service	4	5	4	3	4	4	4.7	5

June Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	28.12	25.88	25.73	24.90	25.42	25.96	23.92	18.12
Basins in Service	4	6	4	3	4	4	4.7	4

July Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	28.56	25.76	26.68	24.33	26.10	25.97	24.83	19.27
Basins in Service	3	5	3	4	4	4	4.5	5

August Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	29.53	27.07	27.71	25.22	26.14	26.40	26.01	19.82
Basins in Service	3	4	3	4	3	3	5.1	4

September Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	27.91	26.71	27.79	25.22	25.83	25.79	25.80	20.07
Basins in Service	3	3	3	3	3	3	5	4

October Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	28.94	26.48	25.12	25.22	24.76	26.27	26.57	20.33
Basins in Service	4	3	4	3	3.7	3.7	4.7	4

November Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	26.64	26.46	25.75	25.34	25.27	25.80	25.77	19.71
Basins in Service	4	3	5	3	3.9	4.2	4.4	4

December Monthly Comparison

Year	2017	2018	2019	2020	2021	2022	2023	2024
Percolation Average	26.00	26.4	25.64	25.39	25.74	24.99	22.03*	17.97
Basins in Service	4	3	5	4	5	4.5	5	5

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December 1 to 31, 2024

Basin	Average Percolation (mgd)	Average Percolation (ft/day)	Total Days in Service (No.)
1A	1.65	1.73	20
1B	2.06	2.16	18
2A	2.33	1.60	23
2B	2.06	2.89	17
3A	2.24	2.26	17
3B	2.61	2.50	16
4A	2.91	3.07	19
4B	2.99	1.47	17
5A	6.35	3.15	18
5B	5.77	2.73	17

January 1 to 31, 2025

Basin	Average Percolation (mgd)	Average Percolation (ft/day)	Total Days in Service (No.)
1A	1.70	1.78	19
1B	1.88	1.97	19
2A	2.33	1.60	19
2B	1.71	2.40	18
3A	1.85	1.86	19
3B	2.22	2.13	20
4A	2.72	2.87	18
4B	2.95	1.45	20
5A	5.34	2.65	20
5B	4.95	2.34	19

February 1 to 28, 2025

Basin	Average Percolation (mgd)	Average Percolation (ft/day)	Total Days in Service (No.)
1A	1.80	1.89	17
1B	2.23	2.33	16
2A	2.55	1.76	11
2B	1.83	2.57	16
3A	2.34	2.35	14
3B	2.27	2.18	17
4A	2.95	3.11	16
4B	3.17	1.56	18
5A	4.57	2.27	19
5B	4.06	1.92	17

March 1 to 15, 2025

Basin	Average Percolation (mgd)	Average Percolation (ft/day)	Total Days in Service (No.)
1A	1.51	1.58	7
1B	1.57	1.65	6
2A	3.12	2.15	9
2B	1.73	2.44	9
3A	2.25	2.27	9
3B	1.81	1.74	6
4A	2.84	2.99	5
4B	2.94	1.45	4
5A	5.42	2.69	9
5B	4.38	2.08	10

Monthly RIX Electrical Costs

Year	January	February	March	April	May	June	July	August	September	October	November	December
2024	credit	$27,404.40	$24,453.60	$48,481.20	$88,761.60	$64,641.60	$45,828.00	$46,069.20	$51,616.80	$44,380.80	$43,898.40	$40,521.60
KWh		481,500	322,500	301,500	250,500	402,000	285,000	286,500	321,000	276,000	273,000	252,000
2023	$31,040.10	$28,652.40	$39,453.90	$69,224.40	$52,099.20	$51,858.00	$58,370.40	$59,817.60	$64,400.40	$60,058.80	$64,159.20	$26,923.20
KWh	409,500	243,000	520,500	430,500	324,000	279,300	363,000	372,000	400,500	373,500	399,000	354,000
2022	$30,812.70	$27,629.10	$25,127.70	$31,267.50	$26,151.00	$27,174.30	$29,220.90	$28,197.60	$29,220.90	$28,879.80	$27,060.60	$26,151.00
KWh	406,500	364,500	331,500	412,500	345,000	358,500	385,500	320,700	336,900	381,000	357,000	345,000
2021	$29,448.30	$30,130.50	$29,107.20	$32,177.10	$27,742.80	$31,949.70	$31,153.80	$31,267.50	$29,562.00	$30,244.20	$30,699.00	$28,993.50
KWh	388,500	397,500	384,000	424,500	366,000	421,500	411,000	412,500	390,000	399,000	405,000	382,500
2020	$31,381.20	$29,675.70	$30,585.30	$31,040.10	$23,422.20	$32,518.20	$31,494.90	$28,538.70	$29,675.70	$31,494.90	$32,973.00	$34,223.70
KWh	414,000	391,500	483,000	409,500	309,000	429,000	415,500	376,500	391,500	415,500	435,000	451,500
2019	$30,694.95	$37,857.11	$24,783.33	$27,511.77	$27,739.14	$28,993.50	$29,334.60	$32,859.30	$30,357.90	$29,334.60	$35,701.80	$31,494.90
KWh	405,000	499,500	327,000	363,000	366,000	382,500	387,000	433,500	400,500	387,000	471,000	183,300
2018	$39,448.70	$38,539.22	$34,446.56	$44,450.84	$28,762.31	$38,766.59	$38,539.22	$39,789.75	$40,471.86	$33,878.13	$31,718.12	$28,421.25
KWh	520,500	508,500	454,500	586,500	447,000	511,500	508,500	525,000	534,000	447,000	418,500	375,000
2017	$39,562.38	$39,562.38	$35,356.04	$44,450.84	$40,585.55	$42,177.14	$43,541.36	$43,313.99	$43,086.62	$42,745.56	$45,701.37	$38,539.22
KWh	522,000	522,000	466,500	586,500	535,500	556,500	574,500	571,500	568,500	564,000	603,000	508,500
2016	$38,880.27	$40,812.92	$37,288.68	$37,743.42	$37,516.05	$33,878.13	$46,042.43	$40,471.86	$34,179.59	$41,836.08	$42,404.51	$40,585.55
KWh	513,000	538,500	492,000	498,000	495,000	447,000	607,500	534,000	541,500	552,000	559,500	535,500
2015	$40,471.86	$33,309.71	$28,421.25	$38,880.27	$30,353.90	$35,469.72	$40,699.23	$42,631.88	$45,587.69	$44,905.58	$40,471.86	$49,680.35
KWh	534,000	439,500	375,000	513,000	400,500	468,000	537,000	562,500	601,500	592,500	534,000	655,500
2014	$47,747.70	$48,657.18	$43,313.99	$46,951.91	$41,836.08	$42,745.56	$33,082.34	$39,107.64	$36,038.15	$40,244.49	$36,720.26	$42,972.93
KWh	630,000	642,000	571,500	619,500	552,000	564,000	436,500	516,000	475,500	531,000	484,500	567,000
2013	$48,998.24	$48,657.18	$45,815.06	$51,271.94	$49,566.66	$50,589.83	$49,566.66	$40,926.60	$39,335.01	$37,629.74	$36,833.94	$37,516.05
KWh	646,500	642,000	604,500	676,500	654,000	667,500	654,000	540,000	519,000	496,500	486,000	495,000
2012	$49,111.92	$50,248.77	$47,861.39	$51,158.25	$50,021.40	$51,954.05	$47,065.59	$38,425.53	$39,789.75	$45,132.95	$50,817.20	$48,770.87
KWh	270,000	663,000	631,500	675,000	660,000	685,500	295,500	507,000	525,000	595,500	670,500	643,500
2011	$51,954.05	$52,636.16	$48,770.87	$47,975.07	$48,316.13	$49,339.29	$49,680.35	$48,429.81	$36,606.57	$35,242.35	$37,175.00	$84,354.28
KWh	685,500	694,500	643,500	633,000	637,500	651,000	655,500	639,000	483,000	465,000	490,500	622,500
2010	$50,883.84	$51,792.48	$47,135.70	$53,382.60	$51,792.48	$47,362.86	$39,866.58	$42,138.18	$40,207.32	$38,019.30	$45,772.74	$45,659.16
KWh	672,000	684,000	622,500	705,000	684,000	625,500	526,500	556,500	531,000	502,500	604,500	603,000
2009	$49,975.20	$51,906.06	$48,044.34	$51,338.16	$48,612.24	$51,111.00	$51,565.32	$44,750.52	$44,523.36	$44,636.94	$53,269.02	$51,111.00
KWh	660,000	685,500	634,500	678,000	642,000	675,000	681,000	591,000	588,000	589,500	703,500	675,000
2008	$51,565.32	$52,473.96	$52,360.38	$56,449.26	$50,770.26	$54,064.08	$51,906.06	$53,609.76	$52,928.28	$51,224.58	$52,587.54	$49,520.88
KWh	681,000	693,000	691,500	745,500	670,500	714,000	685,500	708,000	699,000	676,500	694,500	654,000
2007	$57,471.48	$56,335.68	$50,997.42	$56,790.00	$54,404.82	$55,994.94	$53,269.02	$53,609.76	$54,404.82	$52,133.22	$52,473.96	$52,360.38
KWh	759,000	744,000	673,500	750,000	718,500	739,500	703,500	708,000	718,500	688,500	693,000	691,500
2006	$57,585.06	$56,335.68	$49,180.14	$53,269.02	$50,543.10	$53,836.92	$53,723.34	$55,313.46	$55,881.36	$55,086.30	$55,994.94	$55,199.88
KWh	760,500	744,000	399,000	703,500	667,500	711,000	709,500	730,500	738,000	577,500	739,500	729,000
2005	$108,184.92	$56,335.68	$39,412.26	$83,481.30	$53,382.60	$54,291.24	$55,817.76	$59,175.18	$53,221.32	$46,200.00	$55,767.78	$54,972.72
KWh	718,500	744,000	520,500	384,000	705,000	717,000	751,500	781,500	718,500	577,500	736,500	726,000
2004	$61,235.13	$63,676.76	$59,527.06	$61,341.87	$62,553.64	$67,714.73	$62,829.21	$64,185.42	$74,183.50	$58,746.78	$45,047.41	$53,780.10
KWh	758,591	789,000	709,500	760,500	760,500	822,000	765,000	780,000	765,000	715,500	768,000	709,500

General Operations and Maintenance activities:

- Basin Performance has declined drastically due to an extended period of low-quality water coming into the RIX. Basin 5A and Basin 3B were completed in mid-October.
    - Basins 1A, 1B, 2B, 3B, 4A, and 5B have all been rehabilitated and returned to their original elevations. Unfortunately, the percolation rates have decreased since the additional sand was added.
    - We have a distribution pipe in Basin 2D (linked to Basin 2B) that needs to be repaired to prevent water from going into the basin when 2B is online; a plug has been installed for the time being, which will allow us to use Basin 2B.

- During this reporting period, the RIX facility received 5.2 inches of rain. San Bernardino WRP diverted Zero (0) MG to the Santa Ana River (SAR) using the 20 to 1 diversion option.

- RIX operations and maintenance staff, as always, continue to work on minimizing plant shutdowns. During this reporting period, there were three (3) RIX plant shutdown(s).

- The operations staff is currently performing extraction well performance and efficiency testing on all the RIX extraction wells. All the XC wells have been tested, and we are now working on the XR wells when time and manpower are available.

- XR-53 faulted on July 22, 2023, due to an electrical issue with the underground power feed; this is currently under investigation. Roads are being excavated to find electrical ground faults.

- Operations staff continue to perform plant cleanup. Weeds and shrubs have been removed from several areas around the facility. The perimeter fences are being cleared of all weeds and debris. Multiple trees have been trimmed.

- New level radars have been installed on Basins 1A,1B,2A,2B,3A,3B,4A,4B,5A,5B. The SCADA program was modified to allow for more precise calibration. Plan to install new radar sensors on Basin weirs to replace ultrasonic

sensors for flow readings. A new flow radar has been installed on Basin 5B, and we are currently testing it for accuracy.

- During this reporting period 2 UV AC units had to be removed for repair. We currently have 3 of the 4 standby units ready if needed. Currently getting quotes on replacement units as we approach 10+ years of use on the current units.

- The bank 3 lamps on all UV channels were replaced.

- Aquadisk Filter was placed online on February 18, 2025, and is currently online.

RIX ES and De-Minimis permit

- The RIX expansion site wells were in AUTO stand-by mode during this reporting period. The RIXES system will activate whenever the RIX extraction system shuts down or the final effluent flow falls below 10 MGD.

- During this reporting period, the RIXES wells were activated (3) three times during shutdowns and (4) four times for maintenance purposes.

- The RIX ES site has been cleaned up and is being maintained. K-rails have been installed on the property line to discourage access. Additional K-Rails were placed on the expansion site property to discourage encampments.
-

TOTAL RIXES FLOWS DISCHARGED IN THIS REPORTING PERIOD: 8.869 MG

- A UV control logic modification to allow automatic and reliable operation of the UV system in 3-Channel mode has been in operation. The program allows the UV system to be operated in auto with 1 bank on-line in each of the three online channels, with the 2 remaining UV banks in stand-by. The stand-by banks will automatically come on as required to maintain dosage requirements depending on flow and effluent quality parameters. The RIX was already reducing electrical costs by operating the system in 3-channel 9-bank manual mode. However, the system would shut down if there were 2 major UV alarms and 2 banks without a major alarm was required in the

old program. The new automatic mode of operation will not shut the plant down if 1 bank remains on-line without a major alarm and the program will automatically bring on the other banks if needed. This greatly reduces the frequency of shutdowns caused by UV alarms, in addition to further reducing energy consumption and greatly reducing UV maintenance costs by extending the time between lamp change outs. When compared to 5-channel 15-bank mode of operation, the savings in energy alone was approximately $441,000 per year.

Process Control:

During this reporting period, staff continued with the following operational strategies:

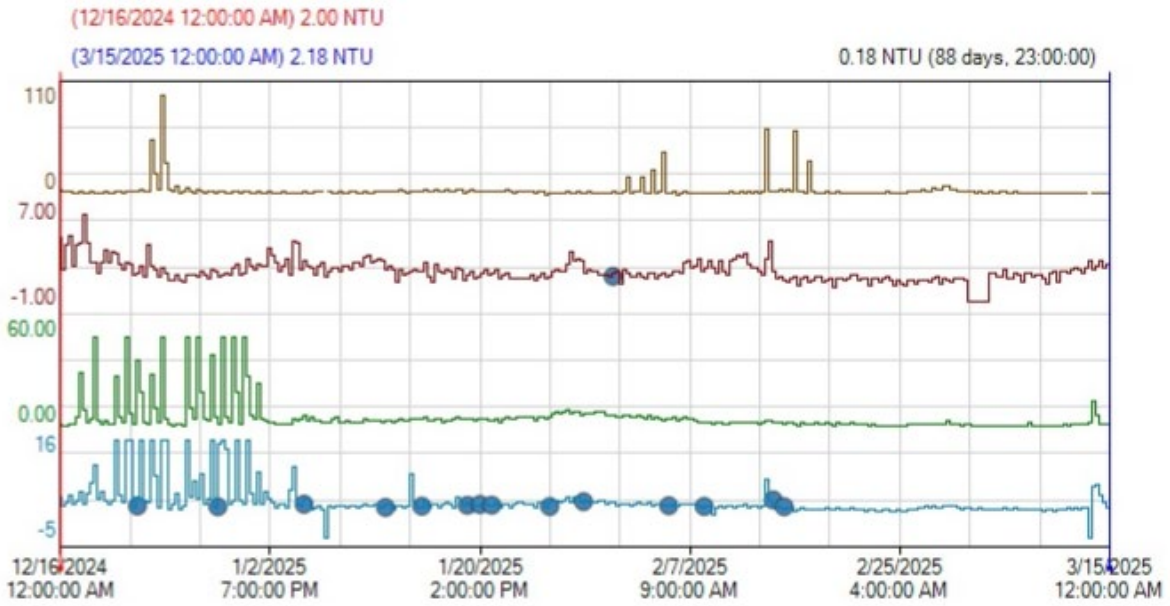
- Bladder plug valves remain in place in standpipe overflow structures at Percolation Basins Nos. 4 and 5.
- Continue to optimize extraction rates from the Extraction Containment (XC) and Extraction Relief (XR) wells to maintain prescribed percolation basin performance while saving energy.
- Maintaining a three to five-day basin rotation schedule, when possible, with levels maintained at or below percolation rates.
- Operating the UV system in 5-channel/15-bank mode whenever the conventional filters are online. Whenever the conventional filters are not in use, the UV system is operated in 3-channel/3-bank auto mode of operation in accordance with the UVDOP.
- Over extraction rates are currently targeted at 7%.
- All weekly and monthly ground water levels and pumping water levels (PWLs) were measured and recorded. Currently, the PWLs are at/or below the 40 feet target. All monitoring well levels increased this past quarter.

Discharge Sampling:

- All required sampling for this reporting period has been collected and processed.

- Grab samples of RIX final effluent for January, February, and March 2025. Whole Effluent Toxicity (WET) tests were collected and sent to Nautilus laboratory as scheduled, with a split sample sent to ES Babcock labs.

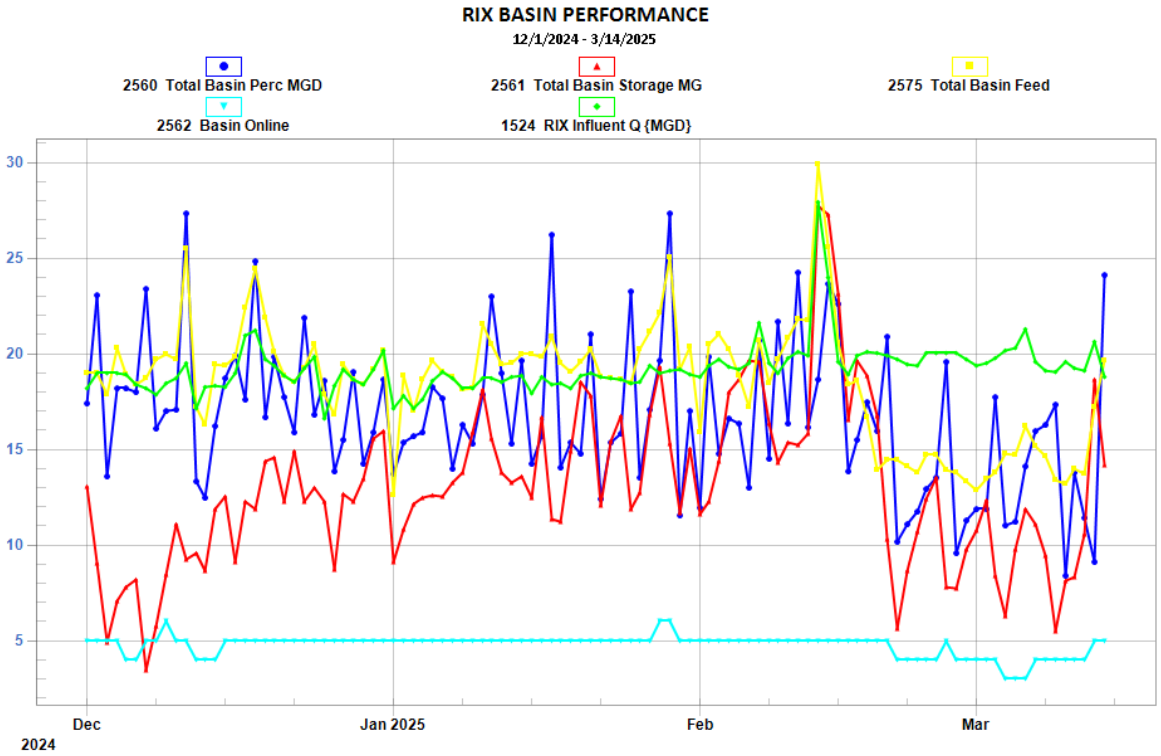
RIX Facility Influent Turbidity Trends:



INSQL1-2013:Outfal_Trbid_West [Cyclic - 00 07:13:10.398]

Tag Name	Description	Number	Server	Color	Units	Minimum	Maximum	IO
COLTON_EFFL_TURB_ME...	Colton Effluent Turbidity ...	5	INSQL1-2013		NTU	0	110	\\
Outfal_Trbid_East	Unit 2 Effluent Turbidity	2	INSQL1-2013		NTU	-1.00	7.00	\\
Outfal_Trbid_West	Unit 1 Effluent Turbidity	3	INSQL1-2013		NTU	0.00	60.00	\\
SAND_FLTR_INFL_TURB	Sand Filter Influent Turbi...	4	INSQL1-2013		NTU	-5	16	\\

Percolation Basin Performance Trends:



CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
INTEROFFICE MEMORANDUM

TO: Miguel J. Guerrero, P.E., President, RIX JPA Board of Directors

FROM: Kevin T. Stewart, P.E., Water Reclamation Director, City of San Bernardino Municipal Water Department

SUBJECT: **EXPENDITURES REPORT – THROUGH March 25, 2025**

DATE: March 25, 2025

COPIES: File

BACKGROUND:

The attached monthly expenditures and accounting report is for the period of July 1, 2024, through March 25, 2025. This report is not an audited account of the financial position of the JPA. Based on the latest financial information provided by the City of San Bernardino Municipal Water Department's Finance Section, below is a summary of the operation & maintenance (O&M) expenditures and encumbrances through March 25, 2025.

O&M

$1,365,623.87 spent	28.08% actual to budget
$2,720,556.00 budgeted	56% through the fiscal year

O&M with Personnel

$2,375,670.93 spent	41.84% actual to budget
$4,240,577.00 budgeted	56% through the fiscal year

Capital

$261,046.05 encumbered	11.84% encumbered to budget
$48,085.13 YTD Actual	2% actual to budget
$2,205,000.00 budgeted	56% through the fiscal year

RECOMMENDATION:

Informational items only, no formal action is required. Receive and File.

/jbl/dr

Attachment: Financial Spreadsheet

City of San Bernardino Municipal Water Department 7/1/2024 % of Budget Year Elapsed

RIX Facility Appropriations Report - Section 305025 Report Date: 03/25/25 73%

Fiscal Year 2024 - 2025 Payroll through: 02/23/25 65%

Approximate Budget Expended (not including Capital Outlay): 56%

Expense Type	Account Number	Account Long Description	Revised Budget	Amount Encumbered	YTD Actual	Balance	% Used
300	305025-5010	REGULAR SALARY	$ 966,723.00	0	$ 593,015.04	$ 781,051.22	61%
300	305025-5011	PART TIME SALARY	$ 11,279.00	0	$ -	$ 11,279.00	0%
300	305025-5012	OVERTIME	$ 15,000.00	0	$ 11,033.24	$ 3,966.76	74%
300	305025-5013	ON CALL	$ 8,000.00	0	$ 4,590.13	$ 3,409.87	57%
300	305025-5014	VACATION	$ -	0	$ 39,241.42	$ (39,241.42)	0%
300	305025-5015	SICK	$ -	0	$ 31,714.67	$ (31,714.67)	0%
300	305025-5016	HOLIDAY	$ -	0	$ 46,201.41	$ (46,201.41)	0%
300	305025-5019	OTHER NON-PRODUCTIVE	$ -	0	$ 3,886.25	$ (3,886.25)	0%
300	305025-5050	MEDICAL INSURANCE	$ 181,780.00	0	$ -	$ 181,780.00	0%
300	305025-5054	LIFE INSURANCE	$ 416.00	0	$ 281.50	$ 134.50	68%
300	305025-5056	DEFERRED COMP	$ 16,900.00	0	$ 3,773.91	$ 13,126.09	22%
300	305025-5057	LT DISABILITY INSURANCE	$ -	0	$ 3,811.65	$ (3,811.65)	0%
300	305025-5060	FEDERAL TAX	$ 14,181.00	0	$ 8,590.69	$ 5,590.31	61%
300	305025-5062	CALPERS	$ 108,491.00	0	$ 66,656.23	$ 41,834.77	61%
300	305025-5063	CALPERSUAL	$ 197,251.00	0	$ 197,250.92	$ 0.08	100%
300	305025-5065	FUTURE MEDICAL BENEFITS	$ -	0	$ -	$ -	0%
300	305025-5101	CONF. & MEETINGS	$ 5,300.00	0	$ 1,075.66	$ 4,224.34	0%
300	305025-5102	TRAINING	$ 640.00	0	$ -	$ 640.00	0%
300	305025-5103	MEMBERSHIP & PUBS	$ 12,250.00	0	$ 345.00	$ 11,905.00	3%
300	305025-5104	CERTIFICATIONS	$ 522.00	0	$ 553.00	$ (31.00)	0%
300	305025-5105	EMPLOYEE REIMBURSEMENT	$ 90.00	0	$ 350.00	$ (260.00)	389%
300	305025-5106	SAFETY PPE	$ 9,200.00	90.68	$ 4,870.36	$ 4,238.96	54%
300	305025-5108	UNIFORMS	$ 6,000.00	0	$ 2,458.81	$ 3,541.19	41%
300	305025-5111	OFFICE SUPPLIES	$ 1,200.00	45.66	$ 495.41	$ 704.59	41%
300	305025-5112	OFFICE EQUIPMENT	$ 3,200.00	0	$ 891.15	$ 2,308.85	0%
300	305025-5114	PRINTED MATERIALS	$ -	0	$ -	$ -	0%
300	305025-5115	BOOKS & PUBLICATIONS	$ -	0	$ -	$ -	0%

City of San Bernardino Municipal Water Department 7/1/2024 % of Budget Year Elapsed

RIX Facility Appropriations Report - Section 305025 Report Date: 03/25/25 73%

Fiscal Year 2024 - 2025 Payroll through: 02/23/25 65%

Approximate Budget Expended (not including Capital Outlay): 56%

Expense Type	Account Number	Account Long Description	Revised Budget	Amount Encumbered	YTD Actual	Balance	% Used
300	305025-5116	RENT AND LEASES	$ 630.00	0	$ 10,020.52	$ (9,390.52)	1591%
300	305025-5117	POSTAGE	$ 500.00	0	$ -	$ 500.00	0%
300	305025-5118	LIABILITY INSURANCE	$ 60,000.00	0	$ 33,725.48	$ 26,274.52	56%
300	305025-5119	PROPERTY INSURANCE	$ 58,000.00	0	$ 39,447.53	$ 18,552.47	68%
300	305025-5121	UNINSURABLE LOSSES	$ 5,200.00	6,994	$ 12,397.08	$ (7,197.08)	373%
300	305025-5124	PERMITS & FEES	$ -	0	$ -	$ -	0%
300	305025-5201	PROFESSIONAL SERVICES	$ -	0	$ -	$ -	0%
300	305025-5202	AUDIT SERVICES	$ 3,100.00	0	$ -	$ 3,100.00	0%
300	305025-5203	ENGINEERING SERVICES	$ 1,125,000.00	258,514	$ 26,291.43	$ 1,098,708.57	2%
300	305025-5204	JANITORIAL SERVICES	$ 4,680.00	0	$ 2,730.00	$ 1,950.00	58%
300	305025-5205	TRUCK HAULING	$ 5,940.00	0	$ 3,195.00	$ 2,745.00	54%
300	305025-5208	LAB SERVICES	$ -	0	$ -	$ -	0%
300	305025-5211	SECURITY SERVICES	$ 3,400.00	0	$ -	$ 3,400.00	0%
300	305025-5214	EQUIPMENT RENTAL	$ 234,000.00	176,932	$ 211,307.81	$ (154,239.72)	166%
300	305025-5216	INSPECTION SERVICES	$ 1,700.00	0	$ 2,826.12	$ (1,126.12)	166%
300	305025-5224	LANDSCAPE SERVICES	$ 1,204.00	4351.42	$ 1,289.78	$ (4,437.20)	469%
300	305025-5230	LEGAL SERVICES	$ 25,000.00	0	$ -	$ 25,000.00	0%
300	305025-5301	MATERIALS & SUPPLIES	$ 59,100.00	21,306.11	$ 33,148.60	$ 4,645.29	92%
300	305025-5302	SMALL EQUIPMENT	$ 2,500.00	5,468	$ 6,706.73	$ (9,674.47)	487%
300	305025-5303	RADIO EQUIPMENT	$ -	0	$ -	$ -	0%
300	305025-5305	FUEL & LUBRICANTS	$ 36,500.00	0	$ 23,449.84	$ 13,050.16	64%
300	305025-5306	CHEMICALS	$ 18,800.00	7,521.5	$ 10,810.00	$ 468.50	98%
300	305025-5311	UV LAMPS	$ 66,200.00	113,634	$ 94,210.40	$ (141,644.40)	314%
300	305025-5401	GENERAL REPAIRS	$ 28,000.00	362.66	$ 29,939.37	$ (2,302.03)	108%
300	305025-5402	GENERAL MAINTENANCE	$ 133,000.00	0.00	$ 6,639.95	$ 126,360.05	5%
300	305025-5404	STREET PAVING	$ 1,900.00	0	$ -	$ 1,900.00	0%
300	305025-5501	ELECTRIC	$ 748,480.00		$ 165,416.99	$ 583,063.01	22%

City of San Bernardino Municipal Water Department 7/1/2024 % of Budget Year Elapsed

RIX Facility Appropriations Report - Section 305025 Report Date: 03/25/25 73%

Fiscal Year 2024 - 2025 Payroll through: 02/23/25 65%

Approximate Budget Expended (not including Capital Outlay): 56%

Expense Type	Account Number	Account Long Description	Revised Budget	Amount Encumbered	YTD Actual	Balance	% Used
300	305025-5502	WATER	$ 2,100.00	0	$ 1,026.77	$ 1,073.23	49%
300	305025-5504	REFUSE	$ 6,160.00	0	$ 2,406.48	$ 3,753.52	39%
300	305025-5505	HAZ WASTE DISPOSAL	$ 1,000.00	0	$ 205.00	$ 795.00	21%
300	305025-5506	LANDLINE	$ 10,920.00	0	$ 17,735.62	$ (6,815.62)	162%
300	305025-5507	CELLPHONE	$ 1,440.00	0	$ 842.42	$ 597.58	0%
300	305025-5508	INTERNET	$ 29,000.00	0	$ 10,432.43	$ 18,567.57	36%
300	305025-5601	SOFTWARE	$ 3,000.00		$ 322.56	$ 2,677.44	11%
300	305025-5602	SOFTWARE MAINTENANCE	$ 3,700.00	6,400	$ 6,035.90	$ (8,736.02)	336%
300	305025-5604	COMPUTER EQUIPMENT	$ -	0	$ -	$ -	0%
300	305025-5605	COMPUTER MAINTENANCE	$ 2,000.00	0	$ -	$ 2,000.00	0%
300	305025-5930	OTHER EXPENSE	$ -	0	$ 405.62	$ (405.62)	0%
300	305025-6001	CAPITAL OUTLAY-CIP	$ 1,000,000.00	100,842.92	$ -	$ 899,157.08	10%
300	305025-6007	CAPITAL OUTLAY-BUILD	$ -	0	$ -	$ -	0%
300	305025-6008	CAPITAL OUTLAY-EQUIPMENT	$ -	0	$ -	$ -	0%
300	305025-6150	CAPITAL OUTLAY-OPS & MAINT.	$ 1,205,000.00	112,118.00	$ 48,085.13	$ 1,044,796.87	13%

	Adjusted Budget	Encumbrances	YTD Actuals	Expenditures & Encumbrances	Percent Used *(includes encumbrances)*
Subtotal Personnel:	$ 1,520,021.00	$ -	$ 1,010,047.06	$ 1,010,047.06	66.45%
Subtotal O&M:	$ 2,720,556.00	$ 601,619.05	$ 764,004.82	$ 1,365,623.87	28.08%
Subtotal Personnel and O&M:	$ 4,240,577.00	$ 601,619.05	$ 1,774,051.88	$ 2,375,670.93	41.84%
Subtotal Capital Outlay:	$ 2,205,000.00	$ 212,960.92	$ 48,085.13	$ 261,046.05	11.84%
Total Budget:	$ 6,445,577.00	$ 814,579.97	$ 1,822,137.01	$ 2,636,716.98	28.27%

CITY OF SAN BERNARDINO
MUNICIPAL WATER DEPARTMENT
INTEROFFICE MEMORANDUM

TO: **Miguel J. Guerrero, P.E., President, RIX JPA Board of Directors**

FROM: **Kevin T. Stewart, P.E., Director of Water Reclamation, City of San Bernardino Municipal Water Department (SBMWD)**

SUBJECT: **RIX Compliance Report June 26, 2024 – February 28, 2025**

DATE: **March 24, 2025**

COPIES: **File**

The following is a compliance review of the Regional Tertiary Treatment Rapid Infiltration and Extraction Facility (RIX) for the period of June 26, 2024, through February 28, 2025. This report has been provided by Jennifer L. Shepardson, Director of Environmental & Regulatory Compliance, for the City of San Bernardino Municipal Water Department and will be a regular reporting item within the RIX/Joint Powers Agreement (JPA) agenda.

For this monitoring period, all samples were collected from the established sampling point and all toxicity test results have passed and been validated. February 2025 test results will be provided in the next RIX/JPA compliance report because at the time of this report, this data had yet to go through management review and validation.

As noted in previous Compliance Reports, during quarterly effluent sampling that was completed on January 9, 2020, mercury was detected but not quantified at a level that exceeded the trigger level outlined in Attachment "I" of adopted Order R8-2013-0032 (RIX's National Pollutant Discharge Elimination System (NPDES) Permit. Although the trigger levels outlined in Attachment "I" only determine compliance of annual mercury monitoring, the RIX Facility continues to monitor mercury monthly. Additionally, the RIX facility uses an ultra-low-level mercury sampling method, which allows for mercury analysis at concentration levels below that of the trigger level outlined in Attachment "I". This sampling will continue to ensure metals are "non-detect" or below NPDES Permit thresholds until the Santa Ana Regional Water Quality Control Board provides permission to resume quarterly monitoring for this constituent.

Also noted in previous Compliance Reports, following the annual effluent sampling completed on September 8, 2021, priority pollutants 4,4'-DDD, 4,4'-DDE, and dieldrin were detected but not quantified at a level that exceeded the trigger levels outlined in Attachment "I" of the adopted Order. Per the monitoring requirements outlined in Attachment "E" of the adopted Order, the RIX facility accelerated monitoring of these constituents from an annual to a quarterly basis. There have been no detections over the trigger levels of these constituents in the last ten quarters of accelerated monitoring, therefore, monitoring frequency has reverted to an annual basis.

Additionally, during the annual sampling for priority pollutants completed on December 7, 2022, a quantifiable concentration of chloroform was detected, and monitoring of this pollutant was accelerated to quarterly monitoring. During the subsequent annual sampling for priority pollutants

that was completed on March 08, 2023, a quantifiable concentration for chloroform was again detected. Attachment "I" of the adopted Order does not specify a trigger value for chloroform, so the frequency of the monitoring continued a quarterly basis for an additional year as per the accelerated monitoring requirements outlined in Attachment "E" of the adopted Order.

During this reporting period there were no calendar weeks when the maximum calculated 7-day median for total coliform exceeded the value of 2.2 MPN, nor were there any daily samples above 23 MPN per 100 mL of sample wastewater.

The Department continues to work with San Bernardino Valley Municipal Water District, U.S. Fish and Wildlife Service (USFWS) and the Santa Ana Regional Water Quality Control Board (SARWQCB) to incorporate measures at the RIX Facility that would facilitate continuous water flow to the Santa Ana River-Reach 4, when the RIX Facility experiences scheduled and unscheduled shutdown events. Adherence to this work helps fulfill the Department's commitment as a stakeholder in the San Bernardino County Habitat Conservation Plan (HCP) for the region, as well as the Department's Santa Ana Sucker Habitat Maintenance/Restoration Project. Additionally, Department staff participated in the development of the HCP's Comprehensive Adaptive Monitoring & Management Plan (CAMMP). As mentioned in previous reports, the overall goal of this work is to minimize the potential stress on the Santa Ana sucker fish, and other threatened or endangered species, located in or along this Reach of the Santa Ana River. In years past, The Santa Ana River flow did not completely cease downstream when the RIX Facility experienced shutdown events. Due to drought conditions and lower groundwater table levels along the Santa Ana River plain, this is no longer the case. The RIX expansion site (RIXES) wells are equipped to discharge ground water to Reach 4 of the Santa Ana River during RIX shutdown events or when effluent flow drops below fifteen (15) million gallons per day (MGD). These wells remain fully functional and in stand-by automatic mode.

The RIXES wells did activate and release water to the Santa Ana River seven (7) times during this compliance period. These events are summarized below:

- On September 09, 2024, the RIX experienced a power outage from 05:55 hours to 12:52 hours. The RIXES wells (1, 2, 4) came online automatically under generator power at 05:55 hours and ran for six (6) hours and fifty-seven minutes and discharged a total of 2.068 MG of groundwater to the Santa Ana River. The total duration of the shutdown was six (6) hours and fifty-seven (57) minutes. A De Minimis sample was collected on 9/09/24 at 07:20 hours.
-
- On October 09, 2024, the RIXES wells (1,2,3,4) were tested for maintenance and repair, and ran intermittently from 08:36 hours to 15:14 hours and discharged a total of 1.91 MG of groundwater to the Santa Ana River. A De Minimis sample was collected on October 09, 2024, at 10:37 hours.
-
- On October 10, 2024, the RIXES wells (1,2,3,4) were tested for maintenance and repair and ran from 14:57 hours to 15:24 hours. A total of 0.177 MG of groundwater was discharged to the Santa Ana River, and a De Minimis sample was collected at 15:15 hours.

- On December 11, 2024, the RIXES Wells were activated from 06:52 to 09:08 for preventative maintenance testing. De-minimis samples were collected at 07:47 hours, and 0.87 MG were discharged.

- On December 30, 2024, the RIXES Wells were activated from 10:07 to 11:23 for preventative maintenance testing. De-minimis samples were collected at 10:19 hours, and 0.51 MG were discharged.

- On January 07, 2025, from 07:42 hours to 15:16 hours, the RIX facility conducted a planned shutdown to perform UV channel influent and effluent launder cleaning. The scheduled shutdown was done in conjunction with an invasive species fish removal project in the Santa Ana River. The total duration of the shutdown was seven (7) hours and thirty-three (33) minutes. The RIXES wells (1, 2, 3, 4) came online automatically at 07:42 and stayed on until 15:16 hours. Approximately 3.27 MG of groundwater was discharged to the Santa Ana River during this event. A De Minimis sample was collected at approximately 09:50 hours.

- On January 21, 2025, the RIXES Wells were activated from 08:17 to 10:21 for preventative maintenance testing. De-minimis samples were collected, and 0.85 MG were discharged.

A total of 9.655 MG of groundwater was released from the RIXES wells to the Santa Ana River during this compliance period.

Ground water discharged from the RIXES wells is authorized under the Regional Board's General De Minimis Permit (R8-2020-0006, NPDES No. CAG998001). This permit was issued to the Colton/San Bernardino Regional Tertiary Treatment and Water Reclamation Authority for the Regional Tertiary Treatment Rapid Infiltration and Extraction Facility (RIX) on May 24, 2017. Discharges from well testing and operation and directed to the Santa Ana River will be sampled as required by this Permit. Department staff anticipates that the operation and monitoring of these wells will eventually be covered under the renewed RIX NPDES Order, and expect coverage under the General De Minimis Order to cease at that time.

Meetings & Other News:

The Emerging Constituent (EC) Task Force continues to commit to monitoring ECs that were selected by the State Water Resources Control Board for monitoring ground water quality, when necessary. The Task Force decreased annual monitoring in 2014 in favor of monitoring, when necessary, since the constituents being monitored had not significantly changed from one year to the next, and all collected sample levels thus far have been well below objectives used for human health measures. This Task Force is administered by the Santa Ana Watershed Project Authority (SAWPA) and the Department's Environmental & Regulatory Compliance staff participate regularly with this group and its public education campaign. This Task Force prepares a two-year budget. RIX's portion of the budget for fiscal years 2024 and 2025 is $8,769 for a total of $17,538. The public education campaign is handled by a consultant. This consultant is tasked with public relations as they are related to EC-related blogs and videos utilized for educational events and social media. The consultant is also tasked with maintaining all EC Task Force social media accounts and content. Tracking and presentation metrics are collected for all educational events and social media visits to better understand what information the public is seeking and to create material that will be more appealing to future social media visitors.

The last major monitoring for EC's at the RIX's discharge point occurred the week of August 26, 2019, as a part of the overall EC monitoring program developed through SAWPA. The monitoring

plan at that time included Per- and polyfluoroalkyl substances (PFAS). PFAS substances have been used in multiple products such as flame retardants, fabric protectors, paper food containers, and various other industrial and consumer products since the 1940s. These chemicals are persistent and do not degrade in the environment easily. According to the United States Environmental Protection Agency (EPA) these chemicals have been linked to reproductive, developmental, liver, kidney, and immunological effects in laboratory animals. Also, per EPA studies these chemicals are connected to increased cholesterol levels among exposed populations, low infant birth weights, effects on the immune system, cancer (for PFOA), and thyroid hormone disruption (for PFOS) in humans. As mentioned in previous reports, EPA released a health advisory for these substances in drinking water and has required selective testing of water system wells to determine if PFAS substances are identified in groundwater sources. Additionally, the Office of Administrative Law approved an Amendment that added PFAS monitoring requirements to the Water Quality Control Policy for Recycled Water and the State Water Resources Control Board released Water Code Sections 13267 and 13383 Order for the Determination of the presence of PFAS substances at Publicly Owned Treatment Works (Order WQ 2020-0015-DWQ). This Order does apply to the RIX Facility and requires the Department to conduct sampling and analyses of 31 PFAS analytes in the RIX's influent and effluent. The Department complied with the Order and continues collecting routine influent and effluent samples at RIX for PFAS monitoring. Environmental & Regulatory Compliance staff continue to participate in the Clean Water SoCal (formally referred to as the Southern California Association of Publicly Owned Treatment Works or SCAP), the California Association of Sanitation Agencies (CASA) and SAWPA meetings or task forces on PFAS regulation requirements and sample testing methodologies. SAWPA is exploring whether additional EC monitoring will be performed in 2025.

In June 2022 the United States Environmental Protection Administration (USEPA) announced a proposal to designate two PFAS substances, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), as hazardous substances under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This designation would require more transparency regarding the use and release of these chemicals into the environment. This proposal's public review period ended November 7, 2022. On June 13, 2023, USEPA released notice that the publication of a final rule designating these substances as hazardous under CERCLA would be delayed from August 2023 to February 2024. On February 8, 2024, EPA proposed adding nine per- and polyfluoroalkyl compounds including their salts and isomers as hazardous substances under CERCLA. Inclusion of these nine compounds as hazardous substances under CERCLA would allow these PFAS contaminants to be subject to additional corrective and cleanup actions under CERCLA's Corrective Action Program. Many water and wastewater agency representatives have expressed concern over how the hazardous substances designation will affect passive receivers of PFAS compounds. Public water and wastewater agencies have no control over the PFAS compounds they receive from groundwater and sewage influent streams, respectively. The Senate Committee on Environment and Public Works held a hearing on March 20, 2024, to discuss the impacts from designating PFAS compounds as hazardous substances under CERCLA. Two points brought forward at this hearing were (1) EPA is bypassing its usual policy development approach by listing PFAS as a hazardous substance without first defining the specific PFAS chemicals as a hazardous waste under the Resource Conservation and Recovery Act (RCRA), and (2) EPA proposal to use its discretionary authority to not enforce against passive receivers would not protect passive receivers from third party lawsuits. EPA released a PFAS Enforcement Discretion and Settlement Policy Under CERCLA on April 19, 2024. Per this policy, EPA will not "pursue entities where equitable factors do not support seeking response actions or costs under CERCLA" for PFAS contamination., EPA will focus on holding parties that have played a significant role in releasing or increasing the spread of PFAS into the environment, such as PFAS manufacturers and those that have used PFAS in manufacturing.

The policy also states that EPA does not intend to pursue response actions or remedy costs from community water systems, publicly owned treatment works, municipal separate storm sewer systems, publicly owned/operated municipal solid waste landfills, publicly owned airports, publicly owned fire departments, and farms where biosolids are applied to land. The Department will continue to work with Water and Wastewater industry groups to advocate for stronger protection measures against third party litigation for public agencies.

On January 14, 2025, the United States Environmental Protection Agency (USEPA) released a Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) for public review and comment. This Draft Assessment evaluates the potential risks to human health and the environment when sewage sludge containing PFOA and PFOS is applied to land or incinerated. CASA released a letter regarding their concern over this Draft Risk Assessment. They believe in its current state the Assessment may create uncertainty and confusion over the use of land applied biosolids and jeopardize this proven practice of sustainable and responsible use of biosolids. CASA highlighted several key concerns. First, the Assessment did not include a risk management analysis that would provide context and provide a risk-benefit analysis. Secondly, the assessment did not stress that reality of limited biosolid management options. Thirdly, the assumptions made in the Assessment do not reflect the majority of biosolids land application practices, which typically involve non-contaminated biosolids with negligible background levels of PFAS and existing regulations that prevent runoff and ensure safe application. Finally, the Assessment does not include recent research on typical biosolids. The current research findings demonstrate limited migration of PFAS to groundwater and negligible crop uptake, which are critical elements that must be considered before finalizing the risk assessment. The Department supports CASA position on this Risk Assessment and sent a letter stating as such to the USEPA on February 27, 2025.

Department staff still routinely participate in the Basin Monitoring Task Force. As noted in previous reports, this Task Force is responsible for the creation of the Santa Ana Regional Triennial Ambient Water Quality Report and the Santa Ana River Waste Load Allocation Modeling effort. These two modeling efforts provide projections on expected water quality in surface waters (Santa Ana River and its tributaries) and ground water, with respect to Total Dissolved Solids (TDS) and Total Inorganic Nitrogen (TIN) throughout the Santa Ana River Watershed. The Ambient Water Quality Report has been completed and was released by SAWPA in April 2018. The next recomputation of ambient water quality will evaluate the 20-year period 2002-2021. As mentioned in previous compliance reports, the Waste Load Allocation Model results were finalized in April 2020.

The Department continues to participate in the development of a Salt and Nutrient Management Study specific to the San Bernardino Basin Area (SBBA) initiated by San Bernardino Valley Municipal Water District (Valley District) and continues to participate in Valley District's Habitat Conservation Plan (HCP) development and review as an active stakeholder and partner. Additionally, as noted in previous reports, the Department completed a nitrogen loss study at the RIX Facility in June 2019. The goal of the study is to show the Regional Board that the RIX's processes can support a higher nitrogen loss coefficient. The Regional Board reached out to Department staff in April 2023 to ask for additional field data to support the Report's findings. A field test work plan was created by WSC and quarterly sampling to support the study are still underway.

As noted in previous reports, The State Water Board did approve one new narrative and four new numeric mercury objectives to apply to inland surface waters, enclosed bays, and estuaries within the State of California. These new objectives will apply to RIX's discharge to Reach 4 of the Santa Ana River.

For the RIX Facility, mercury objectives, as well as monitoring data for selenium, arsenic and cadmium are monitored and discussed in an annual Biomonitoring Report developed through the Santa Ana River Dischargers Association (SARDA), of which the Department is a member. As shown in past years' studies, this study focuses on mercury, selenium, cadmium and arsenic content in the tissues of edible fish and fish that are less than 55 millimeters in length. This study meets the annual regional monitoring requirement for fish flesh testing highlighted in the RIX Facility's National Pollutant Discharge Elimination System (NPDES) permit. This report also includes sampling of benthic invertebrates, extended habitat evaluations and algal sampling. This data is uploaded to the California Environmental Data Exchange Network (CEDEN) for it to be used for Clean Water Act 303(d) (impaired water bodies) evaluation by the State and Regional Water Quality Control Boards. The scope of work for the2024 Study was released in April 2024 and work is underway. A copy of this Study's final report is included with this report.

On December 1, 2020, the State Water Resources Control Board adopted statewide numeric water quality objectives for both acute and chronic toxicity and a program of implementation to control toxicity. These toxicity provisions include a statistical analysis known as the Test for Significant Toxicity (TST). On February 23, 2022, the Stakeholder Advisory Committee for the State Water Board held a meeting to discuss the variability in test results when using test species, (past analyses performed by the Southern California Coastal Water Research Project (SCCWRP)) and expert science panel's interpretation of past analyses. SCCWRP released Ceriodaphnia dubia Quality Assurance Guidance Recommendation to assist the regulated community on evaluating sources of variability in control samples and reference toxicants to improve consistency and comparability of Ceriodaphnia dubia toxicity testing results. At this time, RIX's TST samples have shown no indications of toxicity that would negatively affect the reproduction and growth of Ceriodaphnia dubia specimens.

As noted in previous reports, the State Water Board has incorporated their Biological Integrity Assessment Plan into their Biostimulatory Substances Amendment to the Inland Surface Water, Enclosed Bays and Estuaries of California (ISWEBE Plan). According to the State Water Resources Control Board (SWRCB) website, The SWRCB is considering statewide water quality objectives for nutrients, cyanotoxins and other biostimulatory substances. These objectives could be numeric or narrative and could include biological condition assessment tools. The SWRCB plans on starting discussions on implementing objectives in the second half of 2024 for wastewater effluent, wadable streams and rivers through public workshops. In 2025 the SWRCB will focus on biostimulatory water quality for lakes and reservoirs, as well as cyanotoxins water quality objectives for inland surface waters. The Department's Environmental and Regulatory Compliance staff will continue to track these developments and provide public comments on the proposals when necessary.

As mentioned in June 2024, SCCWRP 's study of individual salt ions in the Santa Ana River and the effect these ions could have on habitat and biota has been completed and a draft report was released through SAWPA for review and comments. Several stakeholders, including the Department's Environmental and Regulatory Compliance staff, raised concerns that this report will be utilized by the State Water Board for regulatory purposes. Stakeholders stressed that additional information on the sampling protocol and laboratory reporting will be necessary before the study is to be considered to aid in regulatory setting for individual ions. SCCWRP's authors of the study understood the concerns raised and reiterated that the study was not planned to be utilized for regulatory purposes at this time.

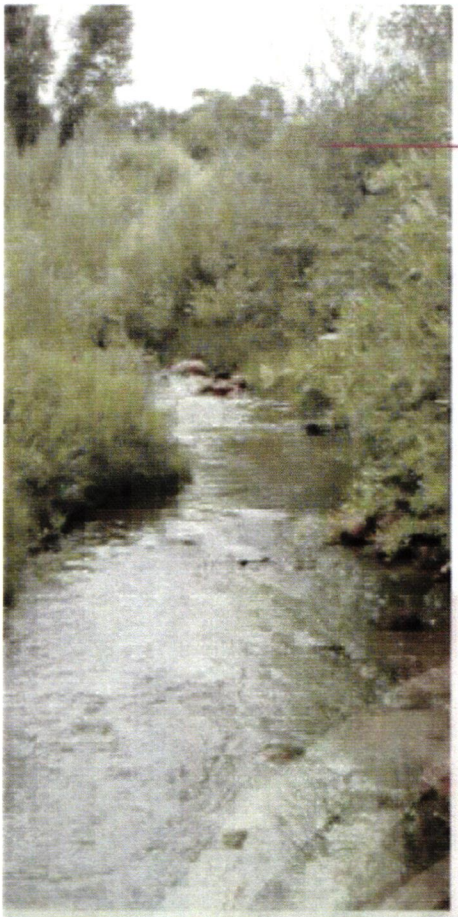
San Bernardino County Code Enforcement has not provided any information at the time of this report on whether Santa Ana River sweeps to remove trespassers and off-road vehicle riders have already occurred this year or are planned i. The last sweep occurred on September 4, 2022. As noted in past

reports, homelessness continues to be a problem along the Santa Ana River and its tributaries. Concerns from SAWPA Task Forces on bacteria loading from these encampments continue and studies are still underway for possible source control options. The Department staff continue to work with the City Attorney and Colton Police Department to try and relocate homeless encampments off RIX property when they are identified.

The current NPDES Order and Waste Discharge Requirements (WDR) (Order No. R8-2013-0032; NPDES No. CA8000304) expired on July 1, 2018. Department staff submitted the permit renewal application for waste discharge and water reclamation requirements on December 27, 2017, and Regional Board staff acknowledged receipt of this application the same day via e-mail. A draft permit has not yet been released for review, but the Regional Board staff did indicate that the current RIX Order would be administratively extended until a new Permit is issued. Regional Board staff did not provide information on when a new RIX Order would be released.

Laboratory Budget

The FY 2023-2024 RIX Laboratory Budget was $272,600. Expenses and encumbrances up to June 30, 2024, are $161,044 or approximately 59% of the adopted budget. These costs appear low when compared to expectations, however, staff anticipated that the RIX's new NPDES Permit would be released by the Santa Ana Regional Water Quality Control Board in fiscal year 2023/2024 and therefore budgeted for additional Whole Effluent Toxicity (WET) analyses under the expected permit's new toxicity testing methodology (Test of Significant Toxicity). For fiscal year 2024/2025 the laboratory budget is $283,000 and expenses and encumbrances through February 2025 are $103,828, or approximately 36.7% of the budget. The contract laboratory invoicing is approximately one month behind, but costs are in line with expectations.

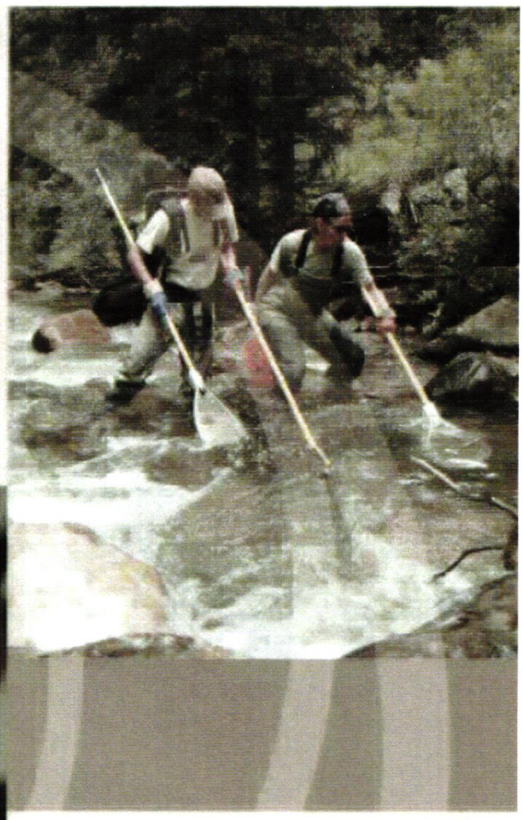


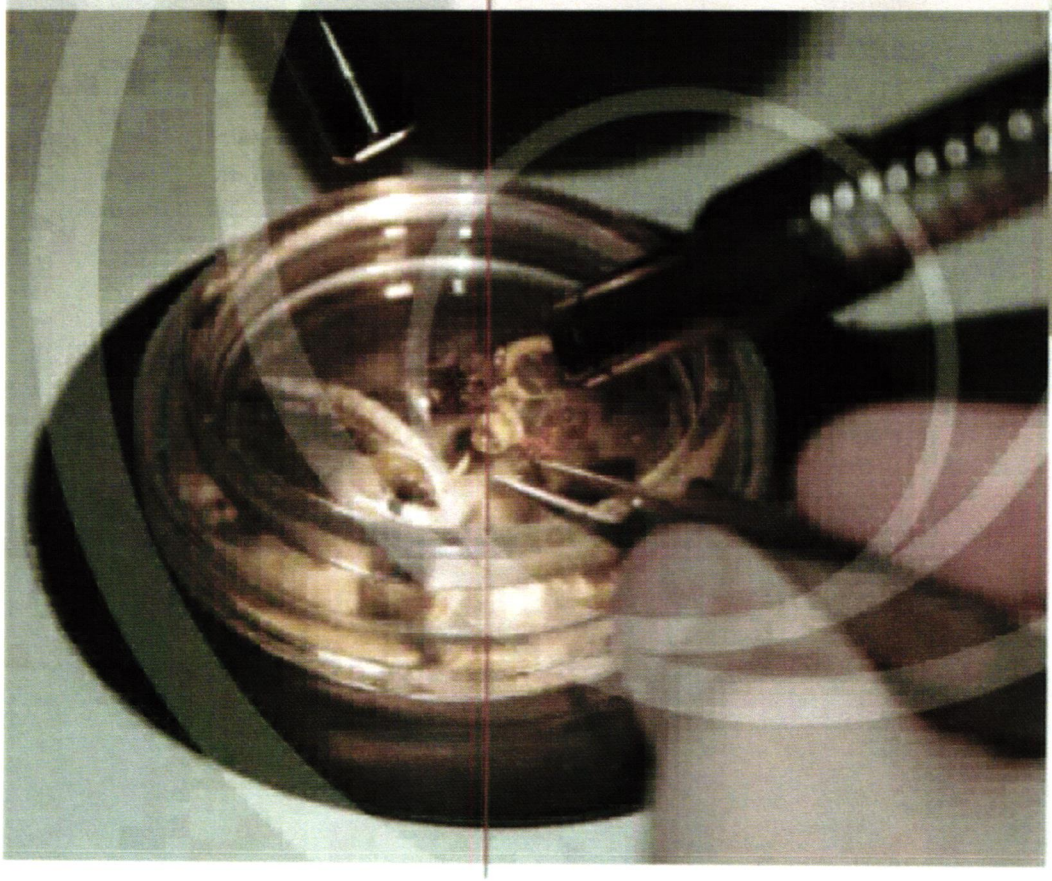
GEI Consultants

Consulting Engineers and Scientists

2024 Mercury, Selenium, Arsenic and Cadmium Monitoring Data for the Santa Ana River, California

December 2024





2024 Mercury, Selenium, Arsenic and Cadmium Monitoring Data for the Santa Ana River, California

Submitted to:

SARDA Agencies

Submitted by:

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December 2024

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1. Introduction

This report presents the 2024 data collected from the Santa Ana River by GEI Consultants for the annual Mercury Monitoring Program in the Middle Santa Ana River. This monitoring program began in 1995 and is conducted in accordance with the California Statewide Mercury Policy, which was finalized in 2017. In 2004, the U.S. Environmental Protection Agency (EPA) published an updated selenium criteria document proposing a revised chronic value based on fish tissue concentrations (EPA 2004), and selenium monitoring was added to the program. The EPA draft document was updated again in 2014 (EPA 2014), revised in 2015 (EPA 2015), and finalized in 2016 (EPA 2016). In December of 2024, numeric selenium criteria were updated for California waters (EPA 2024). However, the updated criteria were for water column concentrations; the criteria for fish tissue have not been updated. Likewise, the EPA is reassessing the criteria for arsenic (EPA 2006) and considers arsenic in fish tissue a potential human health risk. Therefore, arsenic monitoring was added to the sampling effort in 2007. Cadmium was also added to the list of target analytes in 2015, as cadmium is commonly used in screening level assessments for fish consumption advisories, and proposals have been advanced in the California legislature to consider upstream reaches of the Santa Ana River for the 303(d) list for cadmium.

Fish population sampling was initiated in the Santa Ana River in 1991, as part of a Use Attainability Analysis (UAA, Chadwick and Associates 1992). Electrofishing was used for semi-quantitative fish population sampling at all monitoring sites, three of which are still surveyed annually (Table 1). Electrofishing surveys did not occur from 1999 through 2006, due to the listing of the Santa Ana Sucker (*Catostomus santaanae*) as Threatened under the Endangered Species Act. Electrofishing was resumed after discussions with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife. These electrofishing surveys are used for tissue sample collection and to determine species composition and relative abundance at each site (see Methods for details). Electrofishing is the most efficient method for collecting larger fish and crayfish that are analyzed for constituents of concern as part of the Mercury Monitoring Program.

Monitoring activities were expanded in the Santa Ana River from 2018 through 2020 to provide data in support of California's 303(d) hearings (Table 1). In July and August of 2018 and 2019, and in July 2020, annual sampling was conducted at six sites (Figure 1) to collect a larger, more comprehensive data set and to better track any longitudinal changes along the study reach. Detailed habitat data, macroinvertebrate samples, and algal samples were collected at all six sites, and fish population and fish tissue data were collected at sites SAR 6, SAR 8, and SAR 12 from 2018 through 2020. In 2021, the expanded sampling was discontinued, and data collection efforts again focused on the annual monitoring sites, SAR 6, SAR 8, and SAR 12. These sites were sampled again in 2024.

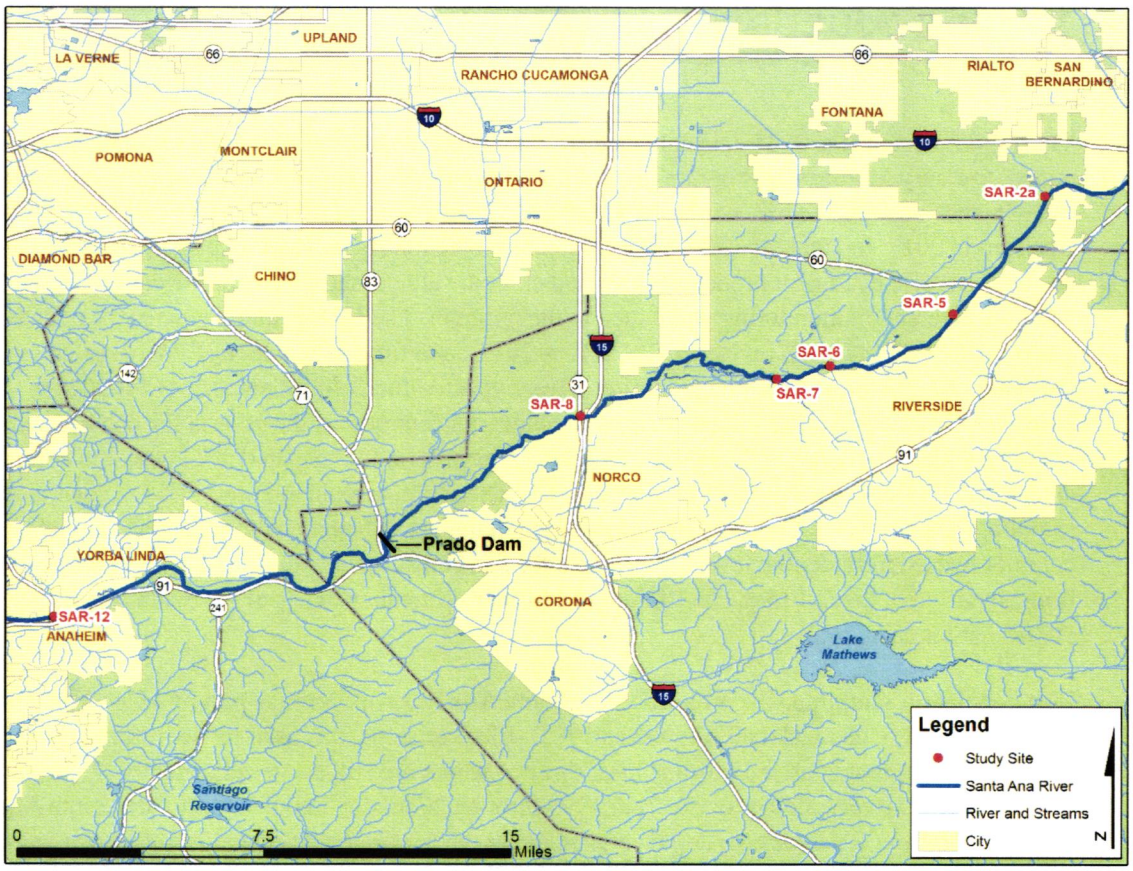

Figure 1: Six monitoring sites on the Santa Ana River. Sites SAR 6, SAR 8, and SAR 12 have been sampled annually since 1995. Supplementary data collection occurred at Site SAR 5 from 2017 through 2020 and at sites SAR 2a and SAR 7 from 2018 through 2020.

Table 1: Summary of sampling sites and years sampled on the Santa Ana River.

Site Name	Location	Years Sampled
SAR-2A	Downstream of RIX Outfall	2018-2020
SAR-5	Upstream of Mission Boulevard	1991, 2018-2020
SAR-6	At MWD Crossing	1991-present
SAR-7	Downstream of Van Buren Ave.	1991, 2018-2020
SAR-8	Downstream of I-15	1991-present
SAR-12	Downstream of Prado Dam	1991-present

2. Methods

2.1 Tissue Samples

As in the past, fish and crayfish that were representative of the aquatic community were collected for tissue analysis in accordance with California's Statewide Mercury Provisions (California State Water Board 2017). California mercury policy assigns fishes to different trophic (feeding) levels; Trophic Level 3 fish consume zooplankton, insects/invertebrates, and/or small forage fish, and Trophic Level 4 fish are piscivores. The policy requires that the captured fish with the highest trophic level be used when determining whether mercury levels meet consumption standards. One edible sized game fish from Trophic Level 3 or 4 (> 150 millimeters [mm] or > 200 mm long, respectively) and one prey fish (between 50 and 150 mm in length) were collected whenever possible, as the goal of the Mercury Monitoring Plan is to identify potential risks to human health at each site. If game fish greater than 150 mm in length were not present at the site, the largest individual captured was retained for tissue analysis. No native fish were kept for tissue analysis. In addition, one crayfish and one composite sample of small-bodied fish were also collected at each site, when present. Attempts were made to collect the same fish species across sites and to collect the same number of fish for each of the composite samples to minimize controllable sources of variation in the results. If a sufficient number of fish were not collected during fish population surveys, additional individuals were collected during supplemental electrofishing near the site. All fish tissue samples were placed in ice-filled coolers and shipped overnight to Brooks Applied Laboratories in Bothell, Washington, for analysis of total mercury, methylmercury, total selenium, total arsenic, total cadmium, and percent solids. Concentrations of metals in the collected fish and crayfish were examined to determine whether values met the applicable criteria and the goals of the Mercury Monitoring Plan.

2.2 Fish Populations

Fish populations were sampled semi-quantitatively with a backpack electrofishing unit at three monitoring sites on July 16 and 17, 2024. Electrofishing activities were conducted in accordance with conditions in Threatened and Endangered Recovery Species Permit TE-032198-4, issued by the U.S. Fish and Wildlife Service. At these sites, 100 meters (328 feet [ft]) of bank habitat were sampled for one pass. All fish sampled were identified, counted, measured for total length, weighed, and released, except for individuals retained for tissue analysis. This sampling provided species lists and semi-quantitative estimates of density (#/kilometer [km]) and biomass (kilogram [kg]/km) that could be compared among sites and years. All three sites were sampled in the same locations as in previous years.

2.3 Habitat Surveys

Habitat quality was evaluated using the Rapid Bioassessment Protocol (RBP) (Barbour et al. 1999). This protocol assesses parameters such as the variety and quality of the substrate, channel morphology, bank stability, and riparian vegetation. Each habitat parameter is visually assessed and assigned a value from 0 to 20, with higher values representing better habitat conditions. The values for each site are summed, and the total score is used to categorize the habitat quality. The scores for

each category are "optimal" (total score 160 – 200), "suboptimal" (total score 110 – 159), "marginal" (total score 60 – 109), or "poor" (total score ≤ 59). The RBP protocol (e.g., Plafkin et al. 1989, Barbour and Stribling 1991, Barbour et al. 1999) has been used in all years except for 2018-2020, when intensive Surface Water Ambient Monitoring Protocol (SWAMP) habitat surveys were performed. The RBP protocols have changed over time, but the scores are compatible between the different versions. Habitat quality was compared between sites and between years.

The California Surface Water Ambient Monitoring Program (SWAMP) habitat survey methodology has an abbreviated version that involves assessing a subset of the RBP habitat parameters. Therefore, there are two advantages to using the RBP protocol in years when expanded monitoring and use of the full SWAMP habitat protocol are not needed. First, RBP allows the calculation of habitat quality scores, which can be compared between sites and over time, as described above. Second, it ensures data continuity and compliance with SWAMP protocols.

2.4 Macroinvertebrates

Macroinvertebrate data were first collected in 1991 for the UAA and have been collected annually from 1995 through 2024. Previously, three replicate quantitative samples were collected with a Surber sampler at each of the three original sampling sites (SAR 6, SAR 8, SAR 12). From 1995 through 2016, an additional sweep sample was also collected at each site to collect benthic macroinvertebrates in areas other than riffle habitat. Surber sample collection was discontinued in 2023, because these qualitative data are not considered by the State of California when evaluating macroinvertebrate community condition.

Since 2017, sweep samples have been collected in accordance with SWAMP protocols at all surveyed sites. From 2018 through 2020, six sites were sampled, as described in Section 1, and data collection efforts have focused on the original three sampling sites since 2021. For each SWAMP sample, eleven equidistant transects were established to cover a total distance of 150 m or 250 m, depending on stream width. At each transect, a 1-ft^2 kick sample was collected over a period of 30 seconds by agitating the substrate directly upstream of the kick net and allowing dislodged invertebrates to drift into the net. Because the Santa Ana River is a wide, shallow, sand bed river throughout the study area, the reach-wide margin-channel-margin collection method was used. This method requires that the samples be collected from the right channel margin, the center of the stream, and the left channel margin in equal proportions. This method is used for sand bed streams because most macroinvertebrates avoid sand substrate, and the channel margins are often more productive due to their proximity to features such as emergent and overhanging vegetation.

Macroinvertebrate samples were placed into containers, preserved with denatured alcohol, and shipped to the GEI Ecological Laboratory for processing, identification, and analysis. In the laboratory, organisms were sorted from the debris. If the number of organisms in a given sample was excessive (i.e., > 600 organisms/sample), the sample was subsampled in accordance with SWAMP protocols. A minimum of $3/20^{th}$ of each sample was sorted in 2024. For quality assurance, an experienced technician or taxonomist checked all sorted samples, and the results were documented for one of the three samples; these procedures indicated over 99% thoroughness for sorting.

The sorted specimens were then identified to the lowest practical taxonomic level using available keys (dependent upon the age and condition of each specimen) and counted by taxon (Carter and

Resh 2001). Quality assurances for identifications and counts (Whittaker 1975; Stribling et al. 2003) were randomly conducted and documented on one of the three samples; this procedure indicated at least 95% agreement for taxonomic and count accuracy.

The analysis of the macroinvertebrate data allowed estimates of density, the number of taxa, the number of Ephemeroptera, Plecoptera, and Trichoptera Taxa (EPT taxa, which are deemed sensitive), and the Shannon-Weaver Diversity (H') for each site. Shannon-Weaver Diversity is a measure of the number of taxa sampled within a site and how evenly individuals are distributed among those taxa. For example, a sample containing many taxa but high numbers of individuals belonging to one or two of these taxa would still receive a low H' score. Dominance of only one or two taxa in a sample is considered a potential indicator of a stressed macroinvertebrate community. Shannon-Weaver Diversity values range from 0 to over 4.0, with values greater than 2.5 typically associated with well-balanced communities and values less than 1.0 associated with communities under significant stress (Wilhm 1970). Density, taxonomic composition, and Shannon-Weaver Diversity were compared between sites and between years.

The SWAMP samples were analyzed using the California Stream Condition Index framework (CSCI, Boyle et al. 2020), which was developed through a multi-agency[1] effort in support of the SWAMP program. This analysis uses R Statistical Software (v4.2.3; R Core Team 2023) and the tidyverse package (Wickham et al. 2019). This analysis compares macroinvertebrate communities collected from individual sites to an "expected community" from an analogous, unmodified stream.

The analysis produces scores, the first being a multimetric macroinvertebrate index (MMI) score and the second being a score of the overall community (i.e., with no focus on individual metrics). The metrics used to determine the MMI score include:

- Number of taxa,
- Number of shredder taxa (i.e., taxa that consume or "shred" organic matter such as leaves,
- Percent of clinger taxa (i.e., taxa that cling to hard substrate),
- Percent of Coleoptera taxa (i.e., beetles),
- Percent of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) taxa, or EPT taxa. These three insect families are more sensitive to environmental disturbance and stress than many other families.

The first MMI is calculated from the collected macroinvertebrate sample. If there are sufficient organisms in the collected sample (i.e., over 500), the analysis software takes 20 random subsamples from the total taxa list, averages conditions across the subsamples, and generates the observed community. The use of multiple subsamples reduces the chance of a random sample not being representative of the macroinvertebrate community.

[1] California State University Geographical Information Center (Chico, CA), Southern California Coastal Water Research Project (SCCWRP), California Department of Fish and Wildlife, Moss Landing Marine Laboratories, and the State Water Resources Control Board.

The second MMI is calculated from an "expected community". A regionally appropriate expected community (i.e. a taxa list and numbers of individuals) is based on many reference sites and is generated using ArcGIS and stream/watershed conditions such as elevation, position of the site in the watershed (i.e., near the headwaters or lower in the stream network), precipitation, temperature, and soil characteristics as predictors. Once the expected community is generated, a MMI is produced for this community using the same metrics listed above.

The individual metrics calculated from the collected sample are then compared to those of the expected community (Mazor et al. 2016), so that each metric is assigned a ratio of the observed number to the expected number. An average observed to expected ratio is calculated by averaging the individual ratios from each of the five metrics.

The second score involves the entire macroinvertebrate community, as opposed to the MMI metrics. This score is an observed to expected ratio calculated by comparing all of the taxa in the collected sample to those of the expected community. The final CSCI score is an average of the MMI score and the score generated by comparing the entire community in the collected sample against the expected community.

Because multiple sites were used to generate the expected community for this analysis, the score from the collected sample can be assigned a percentile, based on how the sample scores compare to the distribution of the reference site scores. While values associated with impairment have not yet been established for MMI or CSCI percentiles, lower percentiles are more indicative of a modified or altered community.

3. Results

3.1 Fish Tissues

A total of seven tissue samples and one crayfish were collected at sites SAR 6, SAR 8, and SAR 12 during July 2024 sampling (Table 2). Yellow Bullhead (*Ameiuras natalis*) was collected at sites SAR 6 and SAR 8. A single Largemouth Bass (*Micropterus salmoides*) sample and a single crayfish sample were collected at Site SAR 12 (Table 2). Common Carp (*Cyprinus carpio*) were collected at sites SAR 8 and SAR 12. Two composited Western Mosquitofish (*Gambusia affinis*) samples was collected at sites SAR 8 and SAR 12. Composite samples were necessary to attain adequate mass for laboratory analyses for these small-bodied species. Supplemental shocking immediately outside of the reach was required to collect fish samples at sites SAR 6, SAR 8 and SAR 12.

Table 2: Tissue analysis (whole body) for total mercury, methylmercury, selenium, arsenic, and cadmium for organisms collected in the Santa Ana River, July 2024.

Site/Organism (# in sample)	Weight (g)	Total Mercury (µg/g ww)	Methylmercury (µg/g ww)	Selenium (µg/g dw)	Arsenic (µg/g ww)	Cadmium (µg/g dw)
SAR 6						
YBH	> 5	0.0508	0.0480	1.26	0.011[b]	0.060
SAR 8						
CCP	> 5	0.0465	0.0432	1.84	0.023	0.050
MSQ*	> 5	0.0072	0.0094	1.39	0.048	0.018[b]
YBH	> 5	0.0336	0.0284	1.51	0.023	0.038[b]
SAR 12						
CPP	> 5	0.0346	0.0354	1.65	0.040	0.028[b]
MSQ*	> 5	0.0304	0.0364	1.72	0.066	0.026[b]
CRAY	>5	0.0191	0.0185	0.85	0.182	0.110
LMB	> 5	0.0870	0.0909	1.65	0.042	< 0.012 [a]

YBH = Yellow Bullhead, CCP = Common Carp, MSQ = Western Mosquitofish, CRAY = crayfish, LMB = Largemouth Bass.
ww = wet weight, dw = dry weight, * = composite sample to achieve 5 g minimum sample weight
[a] concentrations below the method detection limit - results are reported as the minimum detection limit
[b] detectable concentrations insufficient for accurate measurement - results reported as an estimate

3.1.1 Mercury Results

In 2024, total mercury concentrations in the collected tissue samples ranged from 0.0072 micrograms/gram (µg/g) wet weight (ww) in the mosquitofish composite sample at Site SAR-8 to 0.0870 µg/g ww in the Largemouth Bass sample from Site SAR 12 (Table 2). Methylmercury concentrations ranged from 0.0094 µg/g in the Western Mosquitofish composite sample from Site SAR 8 to 0.0909 µg/g ww in the Largemouth Bass sample from Site SAR 12. All measured tissue methylmercury values are well below both the EPA human health criterion of 0.3 µg/g ww in fish tissue (EPA 2001), and the California criterion of 0.2 µg/g ww for subsistence and sport fishing. All tissue concentrations of total mercury were also below the target concentration of 0.30 µg/g in the

Mercury Monitoring Plan. The percentage of mercury as methylmercury was variable and ranged from 85% to 100% in these tissue samples.

3.1.2 Selenium Results

Fish and crayfish selenium concentrations ranged from 0.850 µg/g dry weight (dw) in the Crayfish sample from SAR 12 to 1.84 µg/g dw in the Common Carp sample from Site SAR 8 (Table 2). All selenium tissue concentrations were less than the EPA's whole-body fish tissue chronic selenium value of 8.5 ug/g dw for the protection of aquatic life (EPA 2016). Average tissue selenium concentrations were comparable among all three sites in the 2024 tissue samples.

3.1.3 Arsenic Results

Fish tissues had concentrations of arsenic ranging from 0.011 µg/g ww in the Yellow Bullhead sample from SAR 6 to 0.182 µg/g ww in the Crayfish sample from Site SAR 12 in 2024 (Table 2). EPA (2000b) recommends a risk-based consumption limit of no more than 0.13 µg/g ww for inorganic arsenic, even when consuming a very low level of fish per month.

Exceedances of the 0.13 µg/g ww criterion for arsenic were observed at Site SAR 12 for total arsenic. However, the EPA criterion is based on the more biologically available inorganic arsenic. Most laboratory analyses do not discriminate between organic (low toxicity) and inorganic (high toxicity) forms of arsenic in fish tissues. Inorganic arsenic levels in freshwater fish can be assumed to be 30% or less of the total arsenic present in the tissue (EPA 2000a). This revised percentage is higher than previous estimates of the proportion of inorganic arsenic (e.g., U.S. Food and Drug Administration 1993). Arsenic concentrations in crayfish and fish tissues from the Santa Ana River sites in 2024 remain well below the risk-based human health consumption limit, based on the assumption that 30% of total arsenic is inorganic.

3.1.4 Cadmium Results

Cadmium tissue levels ranged from below the method detection limit in the Largemouth Bass from Site SAR 12 to 0.110 µg/g dw in the Crayfish from Site SAR 12. All values were well below the EPA screening level consumption values of 4.0 µg/g dw for adults and 2.6 µg/g dw for children in 2024 tissue samples (EPA 2000a).

3.2 Fish Populations

Seven fish species were collected at sites SAR 6, SAR 8, and SAR 12 during July 2024 sampling (Table 3, Appendix B)

. Supplemental shocking was required to collect adequate numbers of Western Mosquitofish for tissue sample analysis at sites SAR 8 and SAR 12. Fish collected during supplemental shocking were not included in abundance or biomass estimates.

No species was collected at all three sites (Table 3, Appendix B). Common Carp, Western Mosquitofish, and Yellow Bullhead were all found at two sites, and Santa Ana Sucker, Largemouth Bass, Channel Catfish, and White Crappie were captured at a single site.

Table 3: Fish density and biomass in the Santa Ana River fish sampling reaches, July 2024.

Species	SAR 6		SAR 8		SAR 12	
	#/km	kg/km	#/km	kg/km	#/km	kg/km
Common Carp (*Cyprinus carpio*)	--	--	10	2.48	20	0.78
Channel Catfish (*Ictalurus punctatus*)	10	0.01	--	--	--	--
Santa Ana Sucker (*Catostomus santaanae*)	10	0.01	--	--	--	--
Largemouth Bass (*Micropterus salmoides*)	--	--	--	--	10	0.38
Western Mosquitofish (*Gambusia affinis*)*	--	--	10	< 0.01	40	0.01
White Crappie (*Pomoxis annularis*)	--	--	--	--	20	0.06
Yellow Bullhead (*Ameiurus natalis*)	210	0.41	80	1.32	--	--
Total	**230**	**0.43**	**100**	**3.80**	**90**	**1.23**

* Western Mosquitofish were only collected during supplemental shocking efforts.

Density and biomass values were relatively low at all three sites in 2024, but low density and biomass and substantial interannual fluctuation in both are not unusual in the study area. Density at all three sites varied by an order of magnitude in the 1990s and from 2005 through 2010, but densities over 1,000 individuals per km have not been observed in the study area since 2010. Lower densities since 2011 have occurred throughout the study area and likely result from regional factors such as periodic drought. Densities at all three sites in 2024 were within the range of values observed since 2011. Densities at sites SAR 8 and SAR 12 were near the low end of the observed range, but density at Site SAR 6 was closer to the middle of the observed range (Table 4). Like density, biomass in the study area has been highly variable. Although biomass has been near the low end of the observed range in recent years (2024 included), variability in biomass has decreased less over time than density. Most of the fishes captured in the Santa Ana River are small, and biomass estimates can therefore be heavily influenced by the presence of a small number of larger-bodied adult fishes. Since the 1990s, long-term variability in biomass has often been caused by the presence or absence of large individual fishes such as bullheads (*Ameiurus* sp), Common Carp, Largemouth Bass, White Crappie (*Pomoxis annularis*), Green Sunfish (*Lepomis cyanellus*), and Bluegill (*L. macrochirus*).

Table 4: Total fish density (#/km) and biomass (kg/km) for three Santa Ana River sites, 1991 through 2024.

Year Range (# years)	SAR 6		SAR 8		SAR 12	
	Total Density (#/km)	Total Biomass (kg/km)	Total Density (#/km)	Total Biomass (kg/km)	Total Density (#/km)	Total Biomass (kg/km)
1991-1999 (n=6)	731-1,853	0.43-14.84	73-736	0.02-33.29	150-1,145	1.89-56.71
2006-2010 (n=5)	60-932	0.02-6.00	88-696	3.50-19.30	330-1,305	0.4-1.40
2011-2015 (n=5)	100-490	0.1-0.75	80-220	0.32-33.50	150-630	0.66-11.91
2016-2020 (n=5)	130-310	0.21-1.71	10-390	0.10-2.33	0*-520	0*-1.38
2021	300	0.48	260	0.13	500	0.05
2022	630	2.22	150	4.58	20	< 0.01
2023	110	1.66	10	0.41	234	0.36
2024	230	0.43	100	3.80	90	1.23

* Larval Western Mosquitofish observed within reach but not captured due to small size.

Western Mosquitofish and Yellow Bullheads have been collected from one or more of the sites during most or all years in which sampling was conducted (CEC 1998, 1999; GEI 2007, 2008, 2009a, 2009b, 2011a, 2011b, 2012 – 2020a, 2020b, 2021, 2022, 2024). While Santa Ana Suckers have been collected frequently over the course of the study, densities were generally low from 1999 through 2021, and no Santa Ana Suckers were sampled at any site in 2016, 2018, or 2021. Santa Ana Suckers have typically only been collected at Site SAR 6, and the number collected in 2022 was the highest since 1997. The high density of Santa Ana Suckers at Site SAR 6 may have been attributable to high flows in early 2022, but only one specimen was collected from Site SAR 6 in 2024.

Arroyo Chub (*Gila orcutti*) have only been collected within or near Site SAR 6 during the study period. Arroyo Chub were most abundant in 1991 and from 2010 through 2012. Arroyo Chub were not found in Site SAR 6 from 2013 to 2016 but were observed during supplemental shocking in 2015 and 2016 and collected within the site in 2017 through 2022. As in 2023, Arroyo Chub were absent from Site SAR 6 in 2024.

Pool habitat is rare at all three sampling sites, and this reduces the available habitat for larger fish that would be targeted by anglers for consumption. Due to the rarity of these larger bodied individuals, the abundance of fish that would be more suitable for tissue analysis has been limited in many years. The human health risks associated with consumption of game fish has also been relatively low due to low tissue concentrations of analytes, as well as limited availability of game fish at sites within the Santa Ana River.

3.3 Habitat Surveys

Using the RBP habitat monitoring protocol, sites SAR 6, SAR 8, and SAR 12 were all categorized as "marginal" or "poor" during 2024 habitat surveys (Table 5, Appendix C). Relatively low scores were given at all sites for ratings of pool variability, sediment deposition, and channel sinuosity. Site SAR-12 also received low scores for the channel alteration, vegetative protection, and riparian vegetation zone width categories. Low scores for the pool substrate, sediment deposition, and pool variability parameters would be expected in shallow, sand bed streams like the Santa Ana River, where the stream bed is comprised of shifting fine sediments, and pool habitat is rare. Low scores given at Site SAR 12 for many metrics are heavily influenced by the extensive channelization at this site and the surrounding urban environment. The stream is contained on both sides by grouted rip rap walls to facilitate water conveyance, and adjacent to these walls are bike paths, sidewalks, and other urban infrastructure. The riparian zone is almost nonexistent at this location, and the lower RBP score is influenced by these modifications.

Habitat ratings at all sites improved between the 1990s and 2010 and have largely been stable through 2024 (Table 6). Over time, the scores and ratings have displayed a longitudinal pattern, with the lowest scores and ratings typically occurring at Site SAR 12, below Prado Dam.

The lowest ratings for Site SAR 6 have consistently been related to low pool variability and sediment deposition. Higher scores were received for channel alteration, bank stability, and riparian vegetative zone width categories. Variability in habitat ratings at Site SAR 6 has been attributable to changes in channel flow status and vegetative protection scores. This site typically scores higher when vegetated mid-channel islands concentrate flow and facilitate local scour, and when small amounts of coarse substrate are present.

Table 5: RBP habitat features and scores for study sites on the Santa Ana River, July 2024.

Habitat Parameter	SAR 6	SAR 8	SAR 12
Epifaunal substrate/Available cover*	9	10	6
Pool substrate characterization	5	5	3
Pool variability	1	4	5
Sediment deposition*	6	6	4
Channel flow status	16	17	8
Channel alteration	15	11	1
Channel sinuosity	8	8	1
Bank stability (score both banks)	14	18	20
Vegetative Protection (score both banks)	12	12	2
Riparian vegetative zone width (score each bank riparian zone)	18	11	0
Total Score	**104**	**102**	**50**
Rating	**Marginal**	**Marginal**	**Poor**

* parameter used in abbreviated SWAMP habitat survey protocol.

At Site SAR 8, habitat ratings have largely been affected by construction and by unauthorized use of recreational vehicles in the riparian zone. The lowest scores at this site are consistently related to epifaunal substrate, pool variability, and sediment deposition. Habitat quality at site SAR 8 has consistently been limited by structural simplicity (i.e., few pools and lack of cover), and a high proportion of fine sediment, both of which would be expected in a sand bed stream (Table 5, Appendix C). In recent years (2022 through 2024), bridge construction at the Hamner Ave crossing has resulted in significant riparian impacts that have affected riparian vegetation scores.

Table 6: RBP habitat data for sample periods 1991, 1995-2017, and 2021-2024 at three sampling locations on the Santa Ana River, California. Data from surveys using different methodology in 2018-2020 is not comparable and is not included here. RBP habitat rating abbreviations are as follows: P = Poor, M = Marginal, S = Suboptimal

Year Range	SAR 6		SAR 8		SAR 12	
	Scores	Ratings	Scores	Ratings	Scores	Ratings
1991-1999	55-56	P	55-58	P	9-19	P
2000-2005	56-80	P, M	56-75	P, M	18-57	P
2006-2010	80-89	M	79-90	M	47-65	P, M
2011-2015	80-136	M, S	76-120	M, S	65-105	P, M
2016-2020	104-142	M, S	81-124	M, S	73-90	M
2021	121	S	80	M	92	M
2022	108	M	105	M	81	M
2023	111	M	107	M	78	M
2024	104	M	102	M	50	P

Habitat quality at Site SAR 12 has long been affected by its channelization by the Army Corps of Engineers. However, in some years, limited habitat complexity has developed in the vicinity of large, mid-channel sediment deposits. This site has consistently been rated as marginal for the last decade, with few exceptions (Table 6). Habitat quality at this site is most limited by channelization, and the conversion of the natural stream cross section into a trapezoidal channel. The RBP score decreased

from 2021 through 2024 due to slight decreases in scores for pool variability, sediment deposition, and vegetative protection metrics. Some of these minor changes occurred because the site was moved upstream in 2022 (the original site is no longer accessible). However, the new site was selected for its similarity to the original site with respect to bank stabilization, vegetative characteristics, and streambed morphology. Two years of habitat data indicate that scoring in individual categories is not markedly different between the original and new locations.

3.4 Macroinvertebrates

3.4.1 SWAMP-Compliant Sweep Samples

Macroinvertebrates were sampled at the three study sites using SWAMP methods. Ephemeroptera (mayflies), Trichoptera (caddisflies), Diptera (true flies), Annelida (segmented worms), and Gastropoda (snails) were present at all three sites (Table 7, Appendix D).

. Taxa collected at one or two sites included Coleoptera (beetles), Lepidoptera (moths), Amphipoda (crustaceans), Pelecypoda (clams), Odonata (dragonflies and damselflies), Hydracarina (mites), Turbellaria (flatworms) and Nemertea (ribbonworms). Invertebrate density, number of taxa, and the number of EPT taxa increased in a downstream direction. Diversity values were above the 2.50 threshold, indicating a diverse macroinvertebrate community at all three sites. Site SAR 8 received the lowest diversity score because three taxa, a dipteran and two ephemeropterans comprised almost 80 percent of the total abundance, resulting in a less balanced community.

The SWAMP samples from sites SAR 6 and SAR 8 contained a low number of total organisms. SWAMP samples are comprised of a composite of multiple 1 ft square samples at 11 points throughout the site, evenly split between mid-channel habitat and stream margin habitat. The intervals at which these samples are taken is based upon average stream width at the given site (as described in Section 2.4). Low densities could be attributable to the fact that there was little coarse substrate present at sites SAR 6 and SAR 8.

Analysis of SWAMP samples produced MMI scores ranging from 56.0 at Site SAR 12 to 80.0 at Site SAR 8. The CSCI scores ranged from 65.5 at Site SAR 12 to 79.3 at Site SAR 8 (Table 6). These scores are associated with relatively low percentiles (i.e., all below the 25th percentile), even though both scores were above 75 at Site SAR 8. Both scores were between 50 and 75 at sites SAR 6 and SAR 12. While the low percentiles indicate a high probability that the macroinvertebrate communities at the three sites are altered, no impairment thresholds have been established for CSCI or MMI scores derived from SWAMP samples.

Table 7: Macroinvertebrate population summaries and metrics calculated from SWAMP protocol samples for Sites SAR 6, SAR 8, and SAR 12, July 2024.

Taxa	SAR 6	SAR 8	SAR 12
Insecta			
Ephemeroptera	16	141	493
Hemiptera	3	--	20
Odonata	37	--	--
Coleoptera	--	2	--
Lepidoptera	--	--	3
Trichoptera	41	19	180
Diptera	38	193	1,013
Hydracarina	--	1	--
Annelida			
Oligochaeta	2	4	37
Hirudinida	--	3	10
Crustacea			
Amphipoda	4	--	104
Mollusca			
Gastropoda	13	3	13
Pelecypoda	--	5	33
Turbellaria	--	--	177
Nemertea	--	--	13
TOTAL DENSITY (#/m^2)	154	371	2,096
NUMBER OF TAXA	21	23	29
NUMBER OF EPT TAXA	4	5	5
SHANNON-WEAVER DIVERSITY (H')	3.62	2.71	3.05
MMI score (CSCI score in parentheses)	57.0 (73.3)	80.0 (79.3)	56.0 (65.5)

3.4.2 Discussion

3.4.2.1 Long-term Data

Ratings calculated from SWAMP sample metrics indicated that all three sampling sites likely support altered macroinvertebrate communities (Table 7). All sites scored low for the percentage of intolerant individuals in 2024; this has occurred since 2019 (GEI 2020a, 2020b, 2021). Sites SAR 8 and SAR 12 also received low scores for the percentage of Coleoptera taxa, similar to previous years. Scores for the percent EPT taxa were relatively high at each site, particularly Sites SAR 6 and SAR 8. Remaining scores for individual metrics were moderate at each site. The low scores for some metrics are probably due in part to the prevalence of sand substrate in the Santa Ana River; sand substrate typically supports a limited number of macroinvertebrate taxa. Habitat that would be expected to support higher numbers of macroinvertebrates (i.e., vegetated islands, rooted macrophytes, riffles with gravel and cobble substrate) is not abundant at any of the three sites. Riffle habitat, which can support a higher diversity of macroinvertebrates, was present but uncommon at Site SAR 12 and nearly absent at sites SAR 6 and SAR 8. Furthermore, the benthic macroinvertebrate community at Site SAR 12, which had the lowest MMI and CSCI scores in 2024, is likely limited by the effects of

direct urban runoff, because the riparian zone at this site is almost nonexistent, to the point that the site receives surface runoff directly from the surrounding urban environment. The MMI and CSCI scores in 2024 were similar to 2023 scores at Site SAR 12 but were slightly higher at Site SAR 8, and slightly lower at Site SAR 6 than in previous years.

Shannon-Weaver Diversity values from the SWAMP samples in 2024 were above the 2.50 threshold indicating a diverse benthic macroinvertebrate community at all three sites (Table 7). The 2024 Shannon-Weaver Diversity values and the number of taxa at all three sites were within the previously observed range of values, even though the diversity index was calculated from SWAMP samples in 2023 and 2024 (due to the discontinuation of Surber samples in 2023). However, community composition scores indicate that the communities at these sites are likely altered. The MMI and CSCI scores were calculated for the first time in 2022, so it is not possible to determine whether they indicate a change in macroinvertebrate communities over time. However, interim analyses of SWAMP macroinvertebrate samples from 2018 through 2021 resulted in ratings of "Good" and "Fair" for Site SAR 6, "Fair" for Site SAR 8, and "Fair", "Poor", and "Very Poor" at Site SAR 12 (Table 8). Examination of Shannon-Weaver values and community metric scores/ratings over time suggests community diversity is somewhat stable but that that substantial annual fluctuations can occur in community composition at sites SAR 6 and SAR 12, and to a lesser extent at Site SAR 8. Interim scores and CSCI/MMI scores also suggest an altered macroinvertebrate community.

Periodic flow disturbances, habitat limitations, and impacts from a heavily developed urban environment limit the diversity of macroinvertebrate communities at all three sites. All three of the sampling sites are dominated by a shifting sand bed, suitable riffle habitat is often absent at sites SAR 6 and SAR 8, and grouted rip rap lines the banks of Site SAR 12. This reduces the habitat suitability for many macroinvertebrate taxa, as reflected in the macroinvertebrate community scores such as Shannon-Weaver Diversity and MMI/CSCI scores calculated from SWAMP samples (Table 7, Table 8).

Table 8: Macroinvertebrate number of taxa and Shannon-Weaver diversity values (H') from replicate Surber samples (1991, 1995-2022) and SWAMP samples (2023), and MMI/CSCI scores or ratings from SWAMP data, on the Santa Ana River, 2018-2024. Ratings of "Good", "Fair", "Poor", and "Very Poor" were assigned to scores calculated with interim methods from 2018 through 2021.

	SAR 6			SAR 8			SAR 12		
	Number of Taxa	H'	MMI/CSCI	Number of Taxa	H'	MMI/CSCI	Number of Taxa	H'	MMI/CSCI
1991-1999	17-34	0.92-3.01	--	6-20	0.62-3.04	--	13-30	0.53-2.93	--
2000-2009	9-50	0.73-3.34	--	15-32	0.04-2.90	--	14-42	1.09-2.96	--
2010-2019	21-48	0.50-3.26	Good/Fair	13-35	1.30-2.62	Fair	24-41	2.02-2.89	Poor/Fair
2020	41	3.33	Fair	36	3.38	Fair	48	2.89	Poor
2021	64	4.01	Fair	29	2.37	Fair	33	3.03	Very Poor
2022	43	3.98	80.8/83.8	13	1.85	51.3/48.1	35	4.33	57.7/72.6
2023	23	3.14	82.1/80.2	21	3.40	65.1/77.4	21	2.92	60.2/68.5
2024	21	3.62	57.0/73.3	23	2.71	80.0/79.3	29	3.05	56.0/65.5

3.5 Conclusions

Biological sampling and habitat survey activities during 2024 continued to demonstrate that the Santa Ana River is an urban stream with variable conditions and limited habitat quality. As in previous years, concentrations of mercury, selenium, and cadmium in fish tissues from all sites are present in concentrations below relevant human health standards. Estimated inorganic arsenic concentrations, calculated from total tissue arsenic concentrations, also fall below the human health thresholds. Fish density and biomass estimates at sites SAR 6 and SAR 8 were near the lower end of the previously observed ranges of values, though slightly higher than in 2023. Density at Site SAR 12 was lower in 2024 than in previous years, however biomass was higher due to the presence of a Largemouth Bass and a Common Carp. Habitat conditions varied somewhat from site to site, but quality was limited by a general lack of pool habitat, high levels of sedimentation, poor availability of cover, and extensive channelization at Site SAR 12. RBP habitat scores indicated "Marginal" or "Poor" conditions at all three sites. Although ratings have varied between 2011 and 2024, they do not indicate directional change; ratings continue to fluctuate between poor, marginal, and suboptimal. Habitat RBP scores have improved since the early years of monitoring at all three study sites. The MMI/CSCI ratings derived from the SWAMP samples suggested the presence of an altered macroinvertebrate community at all three sites. Interim calculations performed on SWAMP samples from 2018 through 2021 also indicated that the macroinvertebrate communities were periodically subject to stress. Sites SAR 6 and SAR 8 are impacted by extensive sediment deposition, and Site SAR 8 is somewhat impacted by limited channelization, as well as bridge construction at the downstream end of the site. Site SAR 12 is likely impacted by flow regulation by Prado Dam upstream of the site, channelization within the stream channel, and urban development immediately adjacent to the stream channel. Varying benthic macroinvertebrate metrics, both between sites and over time are likely a result of differences in habitat types and the degree of natural and anthropogenic disturbance at each site. Year-to-year fluctuations continue to occur at all three sites in the fish and benthic invertebrate communities, and macroinvertebrate scores indicate that communities are subject to environmental stress. Much of this may be attributable to the Santa Ana River's physical habitat, which is limited by its sand bed and its presence in a highly urbanized landscape.

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Appendix A 2024 Fish Tissue Data

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August 28, 2024

GEI Consultants, Inc.
ATTN: Ashley Ficke
4601 DTC Boulevard, Suite 900
Denver CO 80237
aficke@geiconsultants.com

RE: Project GEI-DN1801 Client Project: Santa Ana River

Dear Ashley Ficke,

On July 18, 2024, Brooks Applied Labs (BAL) received eight (8) biota samples. The samples were logged-in for the analyses of total mercury (Hg), methyl mercury (MeHg), arsenic (As), selenium (Se), cadmium (Cd) and percent total solids (%TS) according to the chain-of-custody form. All samples were received and stored according to BAL SOPs and EPA methodology. All results have been reported on both an as received basis (wet-weight basis) and a dry-weight basis.

Once thawed, the samples were homogenized using pre-cleaned commercial grade homogenization equipment. When homogenizing the samples, BAL neglected to remove the shell from the crayfish sample (2407311-04, SAR 12 - SRAY1) prior to homogenization. The client was notified of this and requested that we proceed with the analysis of the sample.

Total Metals Quantitation by ICP-QQQ-MS
All samples were digested via modified EPA Method 3050B with a mixture of concentrated nitric acid, hydrochloric acid, and hydrogen peroxide. Trace metals were analyzed using inductively coupled plasma triple quadrupole mass spectrometry (ICP-QQQ-MS). The ICP-QQQ-MS uses advanced interference removal techniques to ensure accuracy of the sample results. For more information, please visit the *Interference Reduction Technology* section on our website,www.brooksapplied.com.

Total Mercury using MERX
All samples for Hg analysis were digested via modified EPA Method 1631, Appendix using a mixture of concentrated nitric acid and concentrated sulfuric acid. The digested samples were preserved with bromine monochloride prior to analysis. The preserved digests were then analyzed via cold vapor atomic fluorescence spectroscopy (CVAFS).

Methyl Mercury using MERX
All samples for MeHg analysis were extracted with a mixture of potassium hydroxide and methanol in accordance with BAL SOPs. Extracts were then analyzed via cold vapor gas chromatography atomic fluorescence spectroscopy (CV-GC-AFS).

In instances where the MeHg results for samples were slightly larger than their associated total Hg results. The results were considered statistically equivalent [relative percent difference (RPD) less than 30%] and all Hg in these samples should be presumed to be in the methylated form.

Total Solids
Solid samples were homogenized, and an aliquot of each sample was measured into a pre-weighed vessel and dried in an oven for at least 12 hours. The vessels were removed from the oven, weighed again, and the percent of dried solid material was calculated.

Sample results reported for Hg and MeHg were method blank corrected, while all other results were not method blank corrected, as described in the calculations section of the relevant BAL SOP(s). All results were evaluated using reporting limits adjusted to account for sample aliquot size. Please refer to the *Sample Results* page for sample-specific MDLs, MRLs, and other details.

All data was reported without further qualification and all other associated quality control sample results met the acceptance criteria.

BAL verifies that the reported results of all analyses for which the laboratory is accredited meet the requirements of the accrediting body, unless otherwise noted in the report narrative. For more information regarding accreditations please see the *Report Information* and *Batch Summary* pages. This report must be used in its entirety for interpretation of results.

Please feel free to contact us if you have any questions regarding this report.

Sincerely,

Amy Goodall

Amy Goodall
Project Manager
Brooks Applied Labs
amy@brooksapplied.com

Report Information

General Disclaimers

Test results are based solely upon the sample submitted to Brooks Applied Labs in the condition it was received . This report shall not be reproduced or copied, except in full, without written approval of the laboratory. Brooks Applied Labs is not responsible for the consequences arising from the use of a partial report.

Laboratory Accreditation

BAL maintains accreditation with various state and national agencies for select test methods. For a current list of BAL accreditations, please visit our website at <http://www.brooksapplied.com/resources/certificates-permits/>. The reported analyte/matrix/method combination shall be considered outside BAL's scopes of accreditation unless otherwise identified as ISO, TNI, or ISO,TNI in the tables. It is the responsibility of the client to verify whether a specific accreditation is required for the intended data use.

ISO: ISO/IEC 17025:2017 accredited test method. Issued by ANSI National Accreditation Board (ANAB), #ADE-1447.02

TNI: NELAP accredited test method. Issued by the State of Florida Department of Health, #E87982.

ISO,TNI: Test method is accredited under both the ISO/IEC 17025:2017 and NELAP accreditations referenced above.

Field Quality Control Samples

Please be notified that certain EPA methods require the collection of field quality control samples of an appropriate type and frequency; failure to do so is considered a deviation from some methods and for compliance purposes should only be done with the approval of regulatory authorities. Please see the specific EPA methods for details regarding required field quality control samples.

Common Abbreviations

AR	as received	**MS**	matrix spike
BAL	Brooks Applied Labs	**MSD**	matrix spike duplicate
BLK	method blank	**ND**	non-detect
BS	blank spike	**NR**	non-reportable
CAL	calibration standard	**N/C**	not calculated
CCB	continuing calibration blank	**PS**	post preparation spike
CCV	continuing calibration verification	**REC**	percent recovery
COC	chain of custody record	**RPD**	relative percent difference
D	dissolved fraction	**SCV**	secondary calibration verification
DUP	duplicate	**SOP**	standard operating procedure
IBL	instrument blank	**SRM**	reference material
ICV	initial calibration verification	**T**	total fraction
MDL	method detection limit	**TR**	total recoverable fraction
MRL	method reporting limit		

Definition of Data Qualifiers

E	An estimated value due to the presence of interferences. A full explanation is presented in the narrative.
H	Holding time and/or preservation requirements not met. Please see narrative for explanation.
J	Detected by the instrument, the result is > the MDL but ≤ the MRL. Result is reported and considered an estimate.
J-1	Estimated value. A full explanation is presented in the narrative.
M	Duplicate precision (RPD) was not within acceptance criteria. Please see narrative for explanation.
N	Spike recovery was not within acceptance criteria. Please see narrative for explanation.
R	Rejected, unusable value. A full explanation is presented in the narrative.
U	Result is ≤ the MDL or client requested reporting limit (CRRL). Result reported as the MDL or CRRL.
X	Result is not BLK-corrected and is within 10x the absolute value of the highest detectable BLK in the batch. Result is estimated.
Z	Holding time and/or preservation requirements not established for this method; however, BAL recommendations for holding time were not followed. Please see narrative for explanation.

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Sample Information

Sample	Lab ID	Report Matrix	Type	Sampled	Received
SAR 12 - CCP1	2407311-01	Biota	Sample	06/17/2024	07/18/2024
SAR 12 - LMB1	2407311-02	Biota	Sample	06/17/2024	07/18/2024
SAR 12 - MQF1	2407311-03	Biota	Sample	06/17/2024	07/18/2024
SAR 12 - SRAY1	2407311-04	Biota	Sample	06/17/2024	07/18/2024
SAR 8 - CCP1	2407311-05	Biota	Sample	06/16/2024	07/18/2024
SAR 8 - MQF1	2407311-06	Biota	Sample	06/16/2024	07/18/2024
SAR 8 - YBH1	2407311-07	Biota	Sample	06/16/2024	07/18/2024
SAR 6 - YBH1	2407311-08	Biota	Sample	06/16/2024	07/18/2024

Batch Summary

Analyte	Lab Matrix	Method	Accred.	Prepared	Analyzed	Batch	Sequence
%TS	Biota	SOP BAL-0501	ISO	08/13/24	08/15/24	B241999	N/A
As	Biota	EPA 6020B Mod	ISO,TNI	07/29/24	07/31/24	B241811	S240729
Cd	Biota	EPA 6020B Mod	ISO,TNI	07/29/24	07/31/24	B241811	S240729
Hg	Biota	EPA 1631 Appendix	ISO,TNI	08/02/24	08/06/24	B241781	S240758
MeHg	Biota	EPA 1630 Mod	ISO,TNI	07/31/24	08/01/24	B241760	S240744
MeHg	Biota	EPA 1630 Mod	ISO,TNI	08/12/24	08/16/24	B242032	S240795
Se	Biota	EPA 6020B Mod	ISO,TNI	07/29/24	07/31/24	B241811	S240729

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
SAR 12 - CCP1										
2407311-01	%TS	Biota	NA	20.99		0.05	0.18	%	B241999	N/A
2407311-01	As	Biota	dry	0.189		0.041	0.097	mg/kg	B241811	S240729
2407311-01	As	Biota	AR	0.040		0.009	0.020	mg/kg	B241811	S240729
2407311-01	Cd	Biota	dry	0.028	J	0.018	0.041	mg/kg	B241811	S240729
2407311-01	Cd	Biota	AR	0.006	J	0.004	0.009	mg/kg	B241811	S240729
2407311-01	Hg	Biota	dry	165		1.63	4.07	ng/g	B241781	S240758
2407311-01	Hg	Biota	AR	34.6		0.342	0.855	ng/g	B241781	S240758
2407311-01	MeHg	Biota	dry	169		4.2	12.6	ng/g	B241760	S240744
2407311-01	MeHg	Biota	AR	35.4		0.9	2.7	ng/g	B241760	S240744
2407311-01	Se	Biota	dry	1.65		0.088	0.175	mg/kg	B241811	S240729
2407311-01	Se	Biota	AR	0.347		0.018	0.037	mg/kg	B241811	S240729
SAR 12 - LMB1										
2407311-02	%TS	Biota	NA	24.30		0.04	0.13	%	B241999	N/A
2407311-02	As	Biota	dry	0.173		0.028	0.064	mg/kg	B241811	S240729
2407311-02	As	Biota	AR	0.042		0.007	0.016	mg/kg	B241811	S240729
2407311-02	Cd	Biota	dry	≤ 0.012	U	0.012	0.028	mg/kg	B241811	S240729
2407311-02	Cd	Biota	AR	≤ 0.003	U	0.003	0.007	mg/kg	B241811	S240729
2407311-02	Hg	Biota	dry	358		1.37	3.43	ng/g	B241781	S240758
2407311-02	Hg	Biota	AR	87.0		0.333	0.833	ng/g	B241781	S240758
2407311-02	MeHg	Biota	dry	374		4.4	13.2	ng/g	B241760	S240744
2407311-02	MeHg	Biota	AR	90.9		1.1	3.2	ng/g	B241760	S240744
2407311-02	Se	Biota	dry	1.65		0.058	0.116	mg/kg	B241811	S240729
2407311-02	Se	Biota	AR	0.402		0.014	0.028	mg/kg	B241811	S240729
SAR 12 - MQF1										
2407311-03	%TS	Biota	NA	22.76		0.10	0.34	%	B241999	N/A
2407311-03	As	Biota	dry	0.292		0.036	0.085	mg/kg	B241811	S240729
2407311-03	As	Biota	AR	0.066		0.008	0.019	mg/kg	B241811	S240729
2407311-03	Cd	Biota	dry	0.026	J	0.016	0.036	mg/kg	B241811	S240729
2407311-03	Cd	Biota	AR	0.006	J	0.004	0.008	mg/kg	B241811	S240729
2407311-03	Hg	Biota	dry	134		1.35	3.38	ng/g	B241781	S240758
2407311-03	Hg	Biota	AR	30.4		0.308	0.769	ng/g	B241781	S240758
2407311-03	MeHg	Biota	dry	160		3.7	11.0	ng/g	B241760	S240744
2407311-03	MeHg	Biota	AR	36.4		0.8	2.5	ng/g	B241760	S240744
2407311-03	Se	Biota	dry	1.72		0.077	0.153	mg/kg	B241811	S240729
2407311-03	Se	Biota	AR	0.391		0.017	0.035	mg/kg	B241811	S240729

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
SAR 12 - SRAY1										
2407311-04	%TS	Biota	NA	25.32		0.10	0.32	%	B241999	N/A
2407311-04	As	Biota	dry	0.719		0.033	0.076	mg/kg	B241811	S240729
2407311-04	As	Biota	AR	0.182		0.008	0.019	mg/kg	B241811	S240729
2407311-04	Cd	Biota	dry	0.110		0.015	0.033	mg/kg	B241811	S240729
2407311-04	Cd	Biota	AR	0.028		0.004	0.008	mg/kg	B241811	S240729
2407311-04	Hg	Biota	dry	75.4		1.53	3.82	ng/g	B241781	S240758
2407311-04	Hg	Biota	AR	19.1		0.387	0.968	ng/g	B241781	S240758
2407311-04	MeHg	Biota	dry	73.0		3.7	11.2	ng/g	B241760	S240744
2407311-04	MeHg	Biota	AR	18.5		0.9	2.8	ng/g	B241760	S240744
2407311-04	Se	Biota	dry	0.850		0.069	0.138	mg/kg	B241811	S240729
2407311-04	Se	Biota	AR	0.215		0.018	0.035	mg/kg	B241811	S240729
SAR 8 - CCP1										
2407311-05	%TS	Biota	NA	19.09		0.08	0.27	%	B241999	N/A
2407311-05	As	Biota	dry	0.119		0.042	0.098	mg/kg	B241811	S240729
2407311-05	As	Biota	AR	0.023		0.008	0.019	mg/kg	B241811	S240729
2407311-05	Cd	Biota	dry	0.050		0.019	0.042	mg/kg	B241811	S240729
2407311-05	Cd	Biota	AR	0.009		0.004	0.008	mg/kg	B241811	S240729
2407311-05	Hg	Biota	dry	244		1.76	4.40	ng/g	B241781	S240758
2407311-05	Hg	Biota	AR	46.5		0.336	0.840	ng/g	B241781	S240758
2407311-05	MeHg	Biota	dry	226		4.5	13.5	ng/g	B241760	S240744
2407311-05	MeHg	Biota	AR	43.2		0.9	2.6	ng/g	B241760	S240744
2407311-05	Se	Biota	dry	1.84		0.089	0.178	mg/kg	B241811	S240729
2407311-05	Se	Biota	AR	0.351		0.017	0.034	mg/kg	B241811	S240729
SAR 8 - MQF1										
2407311-06	%TS	Biota	NA	26.10		0.10	0.33	%	B241999	N/A
2407311-06	As	Biota	dry	0.183		0.032	0.076	mg/kg	B241811	S240729
2407311-06	As	Biota	AR	0.048		0.008	0.020	mg/kg	B241811	S240729
2407311-06	Cd	Biota	dry	0.018	J	0.014	0.032	mg/kg	B241811	S240729
2407311-06	Cd	Biota	AR	0.005	J	0.004	0.008	mg/kg	B241811	S240729
2407311-06	Hg	Biota	dry	27.6		1.32	3.29	ng/g	B241781	S240758
2407311-06	Hg	Biota	AR	7.21		0.344	0.859	ng/g	B241781	S240758
2407311-06	MeHg	Biota	dry	36.1		3.8	11.4	ng/g	B242032	S240795
2407311-06	MeHg	Biota	AR	9.4		1.0	3.0	ng/g	B242032	S240795
2407311-06	Se	Biota	dry	1.39		0.069	0.137	mg/kg	B241811	S240729
2407311-06	Se	Biota	AR	0.362		0.018	0.036	mg/kg	B241811	S240729

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Sample Results

Sample	Analyte	Report Matrix	Basis	Result	Qualifier	MDL	MRL	Unit	Batch	Sequence
SAR 8 - YBH1										
2407311-07	%TS	Biota	NA	21.12		0.04	0.13	%	B241999	N/A
2407311-07	As	Biota	dry	0.107		0.041	0.095	mg/kg	B241811	S240729
2407311-07	As	Biota	AR	0.023		0.009	0.020	mg/kg	B241811	S240729
2407311-07	Cd	Biota	dry	0.038	J	0.018	0.041	mg/kg	B241811	S240729
2407311-07	Cd	Biota	AR	0.008	J	0.004	0.009	mg/kg	B241811	S240729
2407311-07	Hg	Biota	dry	159		1.54	3.86	ng/g	B241781	S240758
2407311-07	Hg	Biota	AR	33.6		0.326	0.814	ng/g	B241781	S240758
2407311-07	MeHg	Biota	dry	134		4.0	11.9	ng/g	B241760	S240744
2407311-07	MeHg	Biota	AR	28.4		0.8	2.5	ng/g	B241760	S240744
2407311-07	Se	Biota	dry	1.51		0.086	0.171	mg/kg	B241811	S240729
2407311-07	Se	Biota	AR	0.318		0.018	0.036	mg/kg	B241811	S240729
SAR 6 - YBH1										
2407311-08	%TS	Biota	NA	21.92		0.05	0.17	%	B241999	N/A
2407311-08	As	Biota	dry	0.050	J	0.031	0.072	mg/kg	B241811	S240729
2407311-08	As	Biota	AR	0.011	J	0.007	0.016	mg/kg	B241811	S240729
2407311-08	Cd	Biota	dry	0.060		0.014	0.031	mg/kg	B241811	S240729
2407311-08	Cd	Biota	AR	0.013		0.003	0.007	mg/kg	B241811	S240729
2407311-08	Hg	Biota	dry	232		1.41	3.53	ng/g	B241781	S240758
2407311-08	Hg	Biota	AR	50.8		0.309	0.773	ng/g	B241781	S240758
2407311-08	MeHg	Biota	dry	219		4.3	13.0	ng/g	B241760	S240744
2407311-08	MeHg	Biota	AR	48.0		0.9	2.8	ng/g	B241760	S240744
2407311-08	Se	Biota	dry	1.26		0.065	0.130	mg/kg	B241811	S240729
2407311-08	Se	Biota	AR	0.276		0.014	0.029	mg/kg	B241811	S240729

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Accuracy & Precision Summary

Batch: B241760
Lab Matrix: Biota
Method: EPA 1630 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B241760-SRM1	**Reference Material (2220020, TORT-3)**						
	MeHg		137.0	104.6	ng/g	76% 65-135	
B241760-DUP1	**Duplicate (2407311-05)**						
	MeHg	226.4		252.7	ng/g		11% 35
B241760-MS1	**Matrix Spike (2407311-05)**						
	MeHg	226.4	1566	1777	ng/g	99% 65-135	
B241760-MSD1	**Matrix Spike Duplicate (2407311-05)**						
	MeHg	226.4	1377	1544	ng/g	96% 65-135	3% 35

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Accuracy & Precision Summary

Batch: B241781
Lab Matrix: Biota
Method: EPA 1631 Appendix

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B241781-SRM1	**Reference Material (2220020, TORT-3)**						
	Hg		292.0	227.5	ng/g	78% 75-125	
B241781-DUP1	**Duplicate (2407311-05)**						
	Hg	243.7		218.9	ng/g		11% 30
B241781-MS1	**Matrix Spike (2407311-05)**						
	Hg	243.7	621.6	824.2	ng/g	93% 70-130	
B241781-MSD1	**Matrix Spike Duplicate (2407311-05)**						
	Hg	243.7	583.1	812.0	ng/g	97% 70-130	4% 30

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Accuracy & Precision Summary

Batch: B241811
Lab Matrix: Biota
Method: EPA 6020B Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B241811-BS1	**Blank Spike, (2336006)**						
	As		5.000	4.926	mg/kg	99% 75-125	
	Cd		0.5000	0.503	mg/kg	101% 75-125	
	Se		5.000	5.037	mg/kg	101% 75-125	
B241811-SRM1	**Reference Material (2302014, DORM-5)**						
	As		13.30	13.06	mg/kg	98% 75-125	
	Cd		0.1480	0.146	mg/kg	98% 75-125	
	Se		2.400	2.465	mg/kg	103% 75-125	
B241811-DUP1	**Duplicate, (2407311-05)**						
	As	0.119		0.115	mg/kg		3% 30
	Cd	0.050		0.063	mg/kg		23% 30
	Se	1.840		1.812	mg/kg		2% 30
B241811-MS1	**Matrix Spike, (2407311-05)**						
	As	0.119	25.18	24.40	mg/kg	96% 70-130	
	Cd	0.050	2.518	2.550	mg/kg	99% 70-130	
	Se	1.840	25.18	27.17	mg/kg	101% 70-130	
B241811-MSD1	**Matrix Spike Duplicate, (2407311-05)**						
	As	0.119	23.14	22.47	mg/kg	97% 70-130	0.1% 30
	Cd	0.050	2.314	2.371	mg/kg	100% 70-130	1% 30
	Se	1.840	23.14	24.98	mg/kg	100% 70-130	0.6% 30

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Accuracy & Precision Summary

Batch: B241999
Lab Matrix: Biota
Method: SOP BAL-0501

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B241999-DUP1	**Duplicate, (2407311-05)**						
	%TS	19.09		20.08	%		5% 15

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Accuracy & Precision Summary

Batch: B242032
Lab Matrix: Biota
Method: EPA 1630 Mod

Sample	Analyte	Native	Spike	Result	Units	REC & Limits	RPD & Limits
B242032-SRM1	**Reference Material (2220020, TORT-3)**						
	MeHg		137.0	103.2	ng/g	75% 65-135	
B242032-SRM2	**Reference Material (2220020, TORT-3)**						
	MeHg		137.0	124.8	ng/g	91% 65-135	
B242032-SRM3	**Reference Material (2220020, TORT-3)**						
	MeHg		137.0	106.7	ng/g	78% 65-135	
B242032-DUP1	**Duplicate (2407379-23)**						
	MeHg	233.5		235.6	ng/g		0.9% 35
B242032-MS1	**Matrix Spike (2407379-23)**						
	MeHg	233.5	743.7	1047	ng/g	109% 65-135	
B242032-MSD1	**Matrix Spike Duplicate (2407379-23)**						
	MeHg	233.5	752.5	1080	ng/g	113% 65-135	3% 35

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Method Blanks & Reporting Limits

Batch: B241760
Matrix: Biota
Method: EPA 1630 Mod
Analyte: MeHg

Sample	Result	Units
B241760-BLK1	0.05	ng/g
B241760-BLK2	0.05	ng/g
B241760-BLK3	0.06	ng/g
B241760-BLK4	0.06	ng/g

Average: 0.1
Limit: 3.0

Standard Deviation: 0.0
Limit: 1.0

MDL: 1.0
MRL: 3.0

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Method Blanks & Reporting Limits

Batch: B241781
Matrix: Biota
Method: EPA 1631 Appendix
Analyte: Hg

Sample	Result	Units
B241781-BLK1	0.087	ng/g
B241781-BLK2	0.065	ng/g
B241781-BLK3	0.043	ng/g
B241781-BLK4	0.054	ng/g

Average: 0.062
Limit: 0.400

Standard Deviation: 0.019
Limit: 0.160

MDL: 0.160
MRL: 0.400

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Method Blanks & Reporting Limits

Batch: B241811
Matrix: Biota
Method: EPA 6020B Mod
Analyte: As

Sample	Result	Units
B241811-BLK1	0.0008	mg/kg
B241811-BLK2	0.0004	mg/kg
B241811-BLK3	0.002	mg/kg
B241811-BLK4	-0.00006	mg/kg

Average: 0.001
Limit: 0.021

MDL: 0.009
MRL: 0.021

Analyte: Cd

Sample	Result	Units
B241811-BLK1	-0.0002	mg/kg
B241811-BLK2	-0.0002	mg/kg
B241811-BLK3	-0.0001	mg/kg
B241811-BLK4	-0.0002	mg/kg

Average: 0.000
Limit: 0.009

MDL: 0.004
MRL: 0.009

Analyte: Se

Sample	Result	Units
B241811-BLK1	0.002	mg/kg
B241811-BLK2	-0.0008	mg/kg
B241811-BLK3	0.002	mg/kg
B241811-BLK4	0.0001	mg/kg

Average: 0.001
Limit: 0.038

MDL: 0.019
MRL: 0.038

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Method Blanks & Reporting Limits

Batch: B241999
Matrix: Biota
Method: SOP BAL-0501
Analyte: %TS

Sample	Result	Units
B241999-BLK1	0.02	%
B241999-BLK2	0.009	%
B241999-BLK3	0.01	%
B241999-BLK4	0.02	%

Average: 0.01
Limit: 0.05

MDL: 0.01
MRL: 0.05

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Method Blanks & Reporting Limits

Batch: B242032
Matrix: Biota
Method: EPA 1630 Mod
Analyte: MeHg

Sample	Result	Units
B242032-BLK1	0.02	ng/g
B242032-BLK2	0.01	ng/g
B242032-BLK3	-0.002	ng/g
B242032-BLK4	-0.01	ng/g

Average: 0.0 **Standard Deviation:** 0.0 **MDL:** 1.0
Limit: 3.0 **Limit:** 1.0 **MRL:** 3.0

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Sample Containers

Lab ID: 2407311-01 **Report Matrix:** Biota **Collected:** 06/17/2024
Sample: SAR 12 - CCP1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-02 **Report Matrix:** Biota **Collected:** 06/17/2024
Sample: SAR 12 - LMB1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-03 **Report Matrix:** Biota **Collected:** 06/17/2024
Sample: SAR 12 - MQF1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-04 **Report Matrix:** Biota **Collected:** 06/17/2024
Sample: SAR 12 - SRAY1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

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Sample Containers

Lab ID: 2407311-05 **Report Matrix:** Biota **Collected:** 06/16/2024
Sample: SAR 8 - CCP1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-06 **Report Matrix:** Biota **Collected:** 06/16/2024
Sample: SAR 8 - MQF1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-07 **Report Matrix:** Biota **Collected:** 06/16/2024
Sample: SAR 8 - YBH1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

Lab ID: 2407311-08 **Report Matrix:** Biota **Collected:** 06/16/2024
Sample: SAR 6 - YBH1 **Sample Type:** Sample **Received:** 07/18/2024

Des	Container	Size	Lot	Preservation	P-Lot	pH	Ship. Cont.
A	Jar HDPE	na	na	none	na	na	Cooler - 2407311
B	XTRA_VOL	na	na	none	na	na	Cooler - 2407311

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Shipping Containers

Cooler - 2407311

Received: July 18, 2024 9:56
Tracking No: 2771 9733 9802 via FedEx
Coolant Type: Ice
Temperature: 2.0 °C

Description: Cooler
Damaged in transit? No
Returned to client? No
Comments: R-IR-3

Custody seals present? No
Custody seals intact? No
COC present? Yes

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BROOKS APPLIED LABS

Chain-of-Custody Form

Ship samples to:
13751 Lake City Way NE, Suite 108
Seattle, WA 98125

For BAL use only — BAL Report 2407311
Received by: _____ *Date:* 6/18/24
Work Order ID: _____ *Time:* 956
Project ID: _____

Client: GEI Consultants Inc
Contact: Ashley Ficke
Client Project ID: Santa Ana River
Samples Collected By: AF/JS

PO Number: _____
Phone: (970) 290-4374
Email: AFicke@geiconsultants.com

Mailing Address: _____
Email Receipt Confirmation? (Yes/No)
BAL PM: _____

Requested TAT (business days)
☐ 20 (standard)
☐ 15*
☐ 10*
☐ 5*
☐ Other ____
*Surcharges may apply to expedited TATs

	Sample ID	Collection: Date	Collection: Time	Client Sample Info: Matrix Type	Client Sample Info: Number of Containers	Client Sample Info: Field Filtered? (Yes/No)	Client Sample Info: Preservation Type HCl / HNO_3 / Other	BAL Analyses Required: Total Hg, EPA 1631	Methyl Hg, EPA 1630	ICP-MS Metals (specify)	As Species (specify) InOrg, III, V, MMA, DMA	Se Species (specify) Se(IV), Se(VI), SeCN, Uknown	Filtration	Other (specify)	Other (specify)	Comments: Specify Here
1	SAR12-CCP2	6/17/24														
2	SAR12-LMB1	↓														
3	SAR12-MRF1															
4	SAR12-SRAY1															
5	SAR8-CCP1	6/16/24														
6	SAR8-MRF1	↓														
7	SAR8-YBH1															Spikes present
8	SAR6-YBH1															Spikes present
9																
10	Trip Blank															

Relinquished By:	Date:	Time:	Relinquished By:	Date:	Time:
Received By:	Date:	Time:	Total Number of Packages:		

Page ____ of ____ List Hazardous Contaminants: _____

Appendix B 2024 Fish Population Data

DATA: FISH DENSITY
CLIENT: SARDA
SAMPLED: 7/16/24
SITE: **SANTA ANA RIVER, SAR-6**
Notes: Supplemental shocking for SAR6-YBH1

PASS	SPECIES	LENGTH (mm)	WEIGHT (g)	K	Ws	Wr
	CCF	47	1.0	0.96		
	SAS	40	1.0	1.56		
	YBH	67	4.0	1.33		
	YBH	67	3.0	1.00		
	YBH	66	3.0	1.04		
	YBH	63	3.5	1.40		
	YBH	62	3.0	1.26		
	YBH	60	3.0	1.39		
	YBH	57	2.0	1.08		
	YBH	55	3.0	1.80		
	YBH	54	2.0	1.27		
	YBH	52	2.0	1.42		
	YBH	50	2.0	1.60		
	YBH	50	1.0	0.80		
	YBH	49	1.0	0.85		
	YBH	49	1.0	0.85		
	YBH	47	2.0	1.93		
	YBH	47	1.0	0.96		
	YBH	45	1.0	1.10		
	YBH	44	1.0	1.17		
	YBH	43	0.5	0.63		
	YBH	35	0.5	1.17		
	YBH	32	1.0	3.05		

SUMMARY:

CCF		LENGTH (mm)	WEIGHT (g)	K
	N:	1	1	1
	MIN:	47	1	0.96
	MAX:	47	1	0.96
	MEAN:	47.0	1.0	0.96

SAS		LENGTH (mm)	WEIGHT (g)	K
	N:	1	1	1
	MIN:	1	1.0	1.56
	MAX:	1	1.0	1.56
	MEAN:	1.0	1.0	1.56

YBH		LENGTH (mm)	WEIGHT (g)	K
	N:	21	21	21
	MIN:	32	0.5	0.63
	MAX:	67	4.0	3.05
	MEAN:	52.1	1.9	1.29

Species	1st Pass	Site Length (km)	Density (#/km)	Biomass (kg/km)

CC	1	0.100	10	0.01
SAS	1	0.100	10	0.01
YBH	21	0.100	210	0.41

DATA: FISH DENSITY
CLIENT: SARDA
SAMPLED: 7/16/2024
SITE: **SANTA ANA RIVER SAR-8**
Notes: Supplemental shocking for mosquitofish composite

PASS	SPECIES	LENGTH (mm)	WEIGHT (g)	K	Ws	Wr	**Comment**
	CCP	271	248	1.25			SAR 8 CCP 1
	MQF	38	1.0	1.82			SAR 8 MQF 1 (+11 others)
	YBH	161	50.0	1.20			
	YBH	146	50.0	1.61			SAR 8 YBH 1
	YBH	86	12.0	1.89			
	YBH	77	6.0	1.31			
	YBH	71	4.0	1.12			
	YBH	70	4.0	1.17			
	YBH	67	4.0	1.33			
	YBH	51	2.0	1.51			

SUMMARY:

CCP		LENGTH (mm)	WEIGHT (g)	K
	N:	1	1	1
	MIN:	271	248.0	1.25
	MAX:	271	248.0	1.25
	MEAN:	271	248.0	1.25

MQF		LENGTH (mm)	WEIGHT (g)	K
	N:	1	1	1
	MIN:	38	1.0	1.82
	MAX:	38	1.0	1.82
	MEAN:	38	1.0	1.82

YBH		LENGTH (mm)	WEIGHT (g)	K
	N:	8	8	1
	MIN:	51	2	1.51
	MAX:	161	50	1.20
	MEAN:	91.1	16.5	2.18

Species	1st Pass	Site Length (km)	Density (#/km)	Biomass (kg/km)
CCP	1	0.100	10	2.48
MQF	1	0.100	10	0.00
YBH	8	0.100	80	1.32

DATA: FISH DENSITY
CLIENT: SARDA
SAMPLED: 7/17/2024
SITE: **SANTA ANA RIVER, SAR-12**
Notes: Supplemental shocking for mosquitofish composite

PASS	SPECIES	LENGTH (mm)	WEIGHT (g)	K	Ws	Wr	**Comment**
	CCP	143	43	1.47			SAR12CCP1
	CCP	132	35	1.52			
	LMB	143	38	1.30			SAR12LMB1
	LMB	75	5.0	1.19			
	MQF	30	0.2	0.74			
	MQF	30	0.2	0.74			SAR12MQF1
	MQF	30	0.2	0.74			
	MQF	29	0.2	0.82			
	WCR	60	3.0	1.39			
	WCR	60	3.0	1.39			

SUMMARY:

CCP		LENGTH (mm)	WEIGHT (g)	K
	N:	2	2	2
	MIN:	132	35	1.47
	MAX:	143	43	1.52
	MEAN:	137.5	39.0	1.50

LMB		LENGTH (mm)	WEIGHT (g)	K
	N:	1	1	1
	MIN:	143	38	1.30
	MAX:	143	38	1.30
	MEAN:	143.0	38.0	1.30

MQF		LENGTH (mm)	WEIGHT (g)	K
	N:	4	4	4
	MIN:	29	0.2	0.74
	MAX:	30	0.2	0.82
	MEAN:	29.8	0.2	0.76

WCR		LENGTH (mm)	WEIGHT (g)	K
	N:	2	2	2
	MIN:	60	3.0	1.39
	MAX:	60	3	1.39
	MEAN:	60.0	3.0	1.39

Species	1st Pass	Site Length (km)	Density (#/km)	Biomass (kg/km)
CCP	2	0.100	20	0.78
LMB	1	0.100	10	0.38
MQF	4	0.100	40	0.01
WCR	2	0.100	20	0.06

Appendix C 2024 Habitat Data

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Santa Ana River	LOCATION SAR6
STATION # _____ RIVERMILE _____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS AT JMS	
FORM COMPLETED BY AT	DATE 7/16/24 TIME 1:30 (AM) PM
	REASON FOR SURVEY Bioassessment

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

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HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0

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Total Score 103

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Santa Ana River	LOCATION SAR8
STATION # _____ RIVERMILE _____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS AT, JS	
FORM COMPLETED BY AT	DATE 7/16/14 TIME ~~1500~~ AM (PM)
REASON FOR SURVEY Bioassessment	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

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HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 (9)	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 (9)	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 (6)	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 (6)	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 (LB)	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0

60

Total Score 102

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Santa Ana River	LOCATION SAR 12
STATION # _____ RIVERMILE _____	STREAM CLASS
LAT _____ LONG _____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS AZ JMS	
FORM COMPLETED BY AZ	DATE 7/17/24 TIME 1400 (AM) PM
REASON FOR SURVEY Biomonitoring	

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 (6)	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 (3) 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 (4) 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 (8) 7 6	5 4 3 2 1 0

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HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 (1) 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 0 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	(2) 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE 0 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
SCORE 0 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)

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Total Score 50

Appendix D 2024 Benthic Invertebrate Data

DATA: MACROINVERTEBRATE DENSITY
Client: SANTA ANA
Sampled: 7/16/2024
Site: SANTA ANA RIVER, SAR-6

TAXA	SWAMP (#/SAMPLE)
INSECTA	
EPHEMEROPTERA	**16**
Fallceon sp.	7
Tricorythodes sp.	9
ODONATA	**37**
Argia sp.	22
Gomphidae	1
Hetaerina americana	14
HEMIPTERA	**3**
Gerridae	3
TRICHOPTERA	**41**
Hydropsyche sp.	38
Hydroptila sp.	3
DIPTERA	**38**
Chironomus sp.	1
Dicrotendipes sp.	1
Euparyphus sp.	4
Limnophyes sp.	3
Pentaneura sp.	5
Polypedilum sp.	3
Pseudochironomus sp.	4
Rheotanytarsus sp.	1
Saetheria sp.	15
Simulium sp.	1
CRUSTACEA	
AMPHIPODA	**4**
Hyalella azteca cx.	4
ANNELIDA	
OLIGOCHAETA	**2**
Lumbriculidae	2
MOLLUSCA	
GASTROPODA	**13**
Physa sp.	13
TOTAL (#/sample)	154

NUMBER OF TAXA	21
SHANNON-WEAVER (H')	3.62
TOTAL EPT TAXA	4
EPT INDEX (% of Total Taxa)	19
EPHEMEROPTERA ABUNDANCE (% of Total Number)	10

DATA: MACROINVERTEBRATE DENSITY
Client: SANTA ANA
Sampled: 7/16/2024
Site: **SANTA ANA RIVER, SAR-8**

TAXA	SWAMP (#/SAMPLE)
INSECTA	
EPHEMEROPTERA	**141**
Camelobaetidius maidu	80
Fallceon sp.	56
Tricorythodes sp.	5
COLEOPTERA	**2**
Postelichus sp.	1
Tropisternus sp.	1
TRICHOPTERA	**19**
Hydropsyche sp.	7
Hydroptila sp.	12
DIPTERA	**193**
Ceratopogoninae	2
Dicrotendipes sp.	1
Dolichopodidae	4
Ephydridae	1
Erioptera sp.	1
Euparyphus sp.	10
Pseudochironomus sp.	10
Rheotanytarsus sp.	1
Saetheria sp.	156
Simulium sp.	7
HYDRACARINA	**1**
Sperchon sp.	1
ANNELIDA	
OLIGOCHAETA	**4**
Lumbriculidae	2
Nais sp.	2
HIRUDINIDA	**3**
Erpobdella sp.	3
MOLLUSCA	
GASTROPODA	**3**
Physa sp.	3
PELECYPODA	**5**
Corbicula sp.	5

TOTAL (#/sample)	371
NUMBER OF TAXA	23
SHANNON-WEAVER (H')	2.71
TOTAL EPT TAXA	5
EPT INDEX (% of Total Taxa)	22
EPHEMEROPTERA ABUNDANCE (% of Total Number)	38

DATA: MACROINVERTEBRATE DENSITY
Client: SANTA ANA
Sampled: 7/17/2024
Site: SANTA ANA RIVER, SAR-12

TAXA	SWAMP (#/SAMPLE)
INSECTA	
EPHEMEROPTERA	**493**
Baetis tricaudatus cx.	10
Fallceon sp.	100
Tricorythodes sp.	383
HEMIPTERA	**20**
Trichocorixa sp.	20
LEPIDOPTERA	**3**
Petrophila sp.	3
TRICHOPTERA	**180**
Hydropsyche sp.	167
Hydroptila sp.	13
DIPTERA	**1,013**
Ceratopogoninae	7
Chironomus sp.	757
Cladopelma sp.	17
Cricotopus sp.	3
Dicrotendipes sp.	207
Orthocladius/Cricotopus gr.	10
Pentaneura sp.	3
Polypedilum sp.	3
Procladius sp.	3
Tanytarsus sp.	3
CRUSTACEA	
AMPHIPODA	**104**
Gammarus sp.	97
Hyalella azteca cx.	7
TURBELLARIA	**177**
Girardia sp.	177
NEMERTEA	**13**
Prostoma sp.	13
ANNELIDA	
OLIGOCHAETA	**37**
Aulodrilus sp.	7
Limnodrilus sp.	10

OLIGOCHAETA (cont.)	
Unid. Immature Tubificidae w/ Capilliform Chaetae	7
Unid. Immature Tubificidae w/o Capilliform Chaetae	13
HIRUDINIDA	**10**
Erpobdella microstoma	3
Erpobdella punctata punctata	7
MOLLUSCA	
GASTROPODA	**13**
Physa sp.	13
PELECYPODA	**33**
Corbicula sp.	33
TOTAL (#/sample)	2,096
NUMBER OF TAXA	29
SHANNON-WEAVER (H')	3.05
TOTAL EPT TAXA	5
EPT INDEX (% of Total Taxa)	17
EPHEMEROPTERA ABUNDANCE (% of Total Number)	24