

Figure 1

Figure 1. Southern Nevada sewershed boundaries and characteristics.

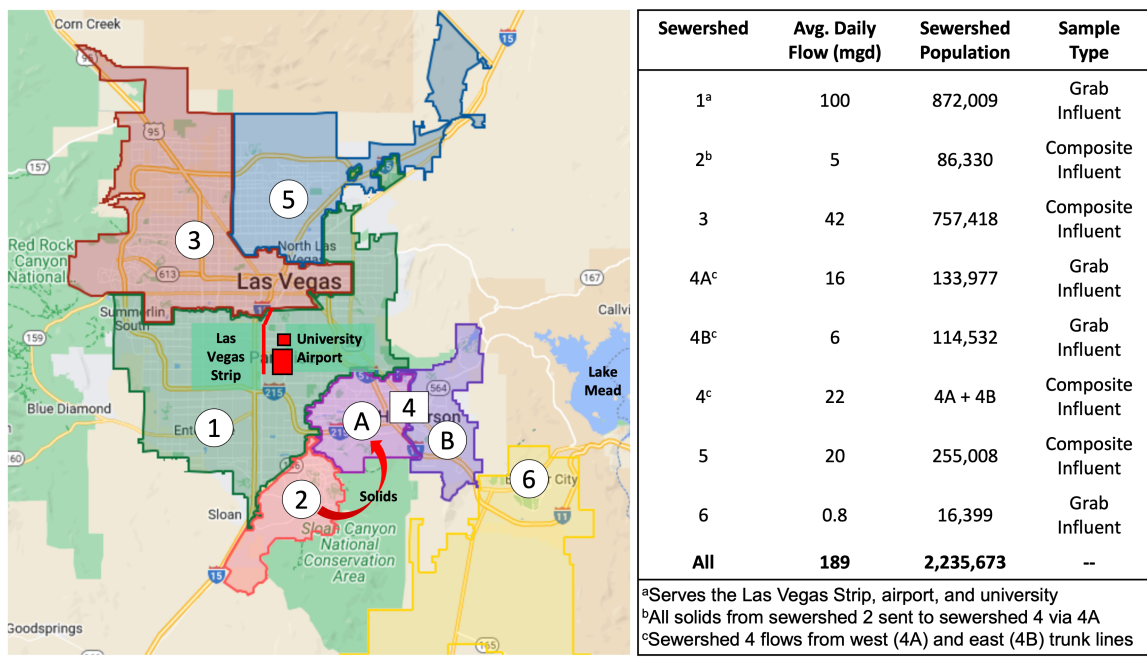


Figure 2. (Left) Per capita influent wastewater loadings for (top) sucralose and (bottom) caffeine in mg/day per 1,000 residents. Caffeine was adjusted for metabolism (CF = 33.3). (Right) Results of Pairwise Wilcoxon Rank Sum Tests, with significant sewershed differences denoted by orange ($0.01 < p < 0.05$) or red ($p < 0.01$) shading. Loadings from representative sewersheds (i.e., 2, 3, 4, 4B, 5, and 6) were used to adjust the populations of sewersheds 1 and 4A to account for their confounding contributions (e.g., from tourists/air travelers).

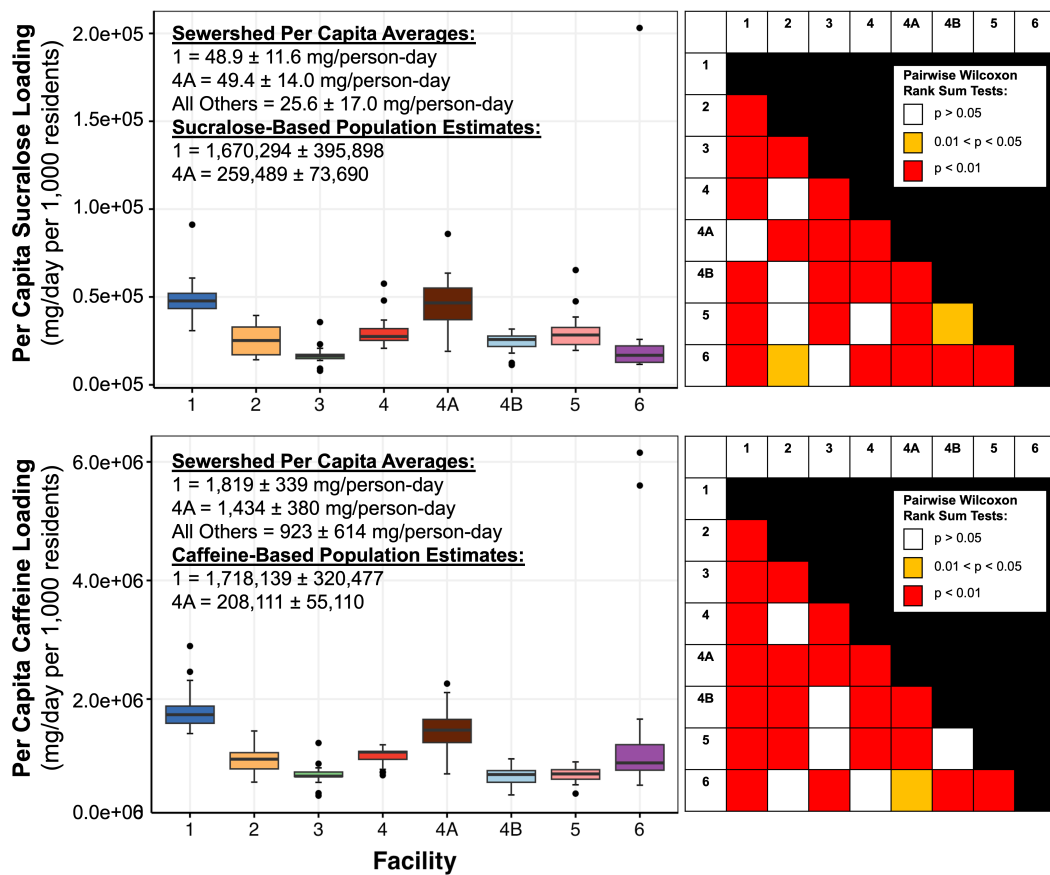


Figure 3. Comparison of absolute versus sucralose-normalized methamphetamine concentrations for outlier determinations.

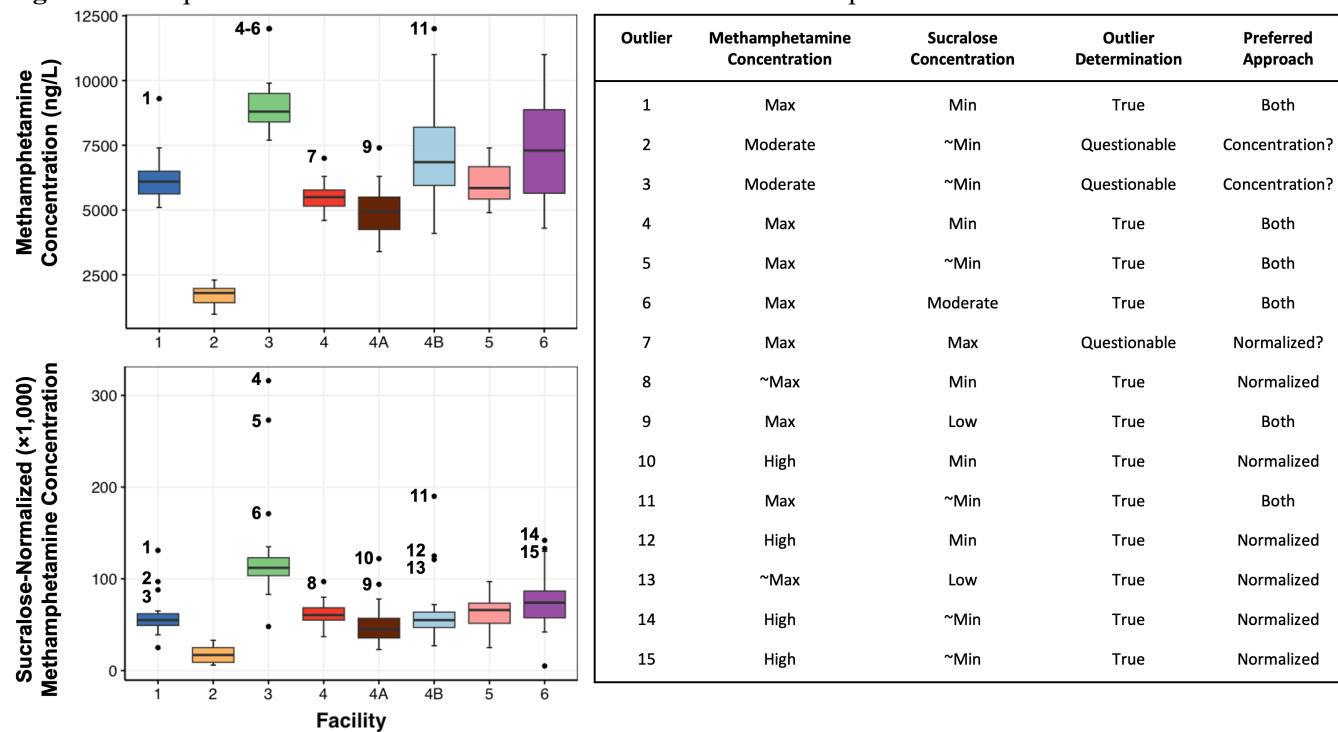


Figure 4. (Left) Unitless sucralose-normalized opioid concentrations: (top) acetylmorphine as a surrogate for heroin, (middle) oxycodone, and (bottom) norfentanyl as a surrogate for fentanyl. For acetylmorphine, percentages indicate the proportion of samples with concentrations >MRL. (Right) Results of Pairwise Wilcoxon Rank Sum Tests, with significant sewershed differences denoted by orange ($0.01 < p < 0.05$) or red ($p < 0.01$) shading. Similar figures for morphine (direct consumption estimate), codeine, EDDP (methadone metabolite), hydrocodone, and tramadol are provided in Figure S11-S13, and outlier dates are provided in Tables S5 and S6.

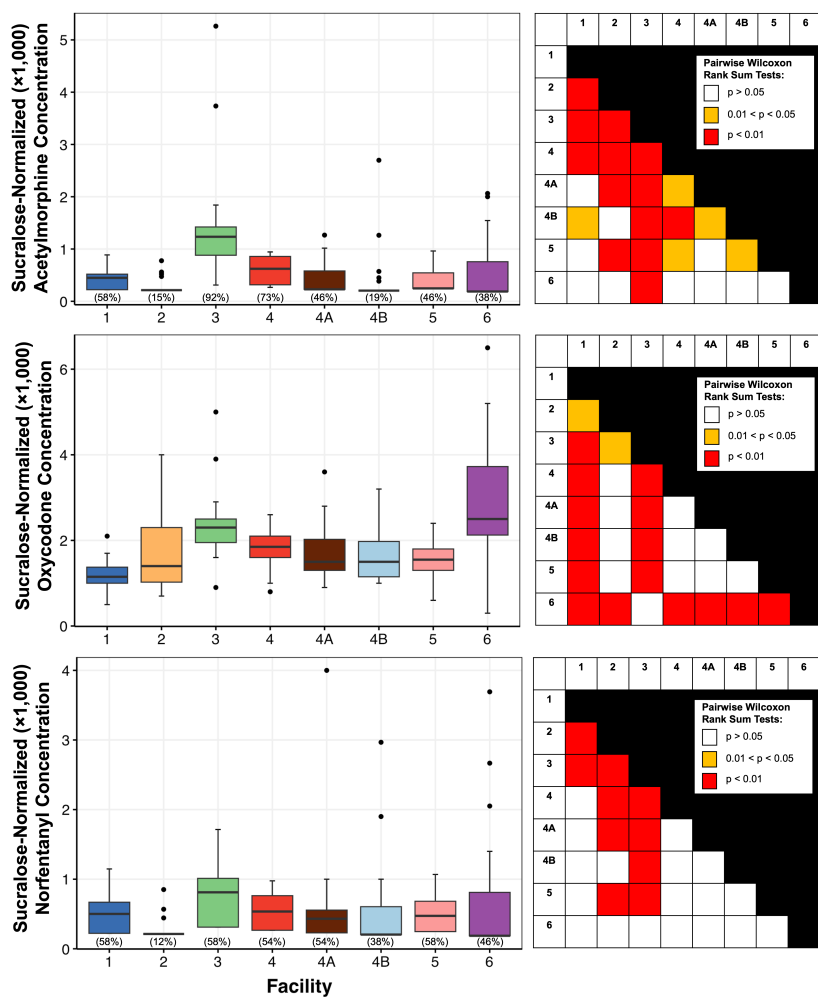


Figure 6. (Left) Unitless sucralose-normalized non-opioid concentrations: (top) methamphetamine, (middle) cocaine, and (bottom) MDMA. Cocaine concentrations were based on the sum of cocaine, BZE, EME, ECG, and NOR, all converted to cocaine-equivalent concentrations. For MDMA, the dashed red circles denote samples that were collected following a music festival, and percentages indicate the proportion of samples with concentrations >MRL. (Right) Results of Pairwise Wilcoxon Rank Sum Tests, with significant sewershed differences denoted by orange (0.01<p<0.05) or red (p<0.01) shading. Similar figures for THC-COOH (THC metabolite) are provided in Figure S13, and outlier dates are provided in Tables S5 and S6.

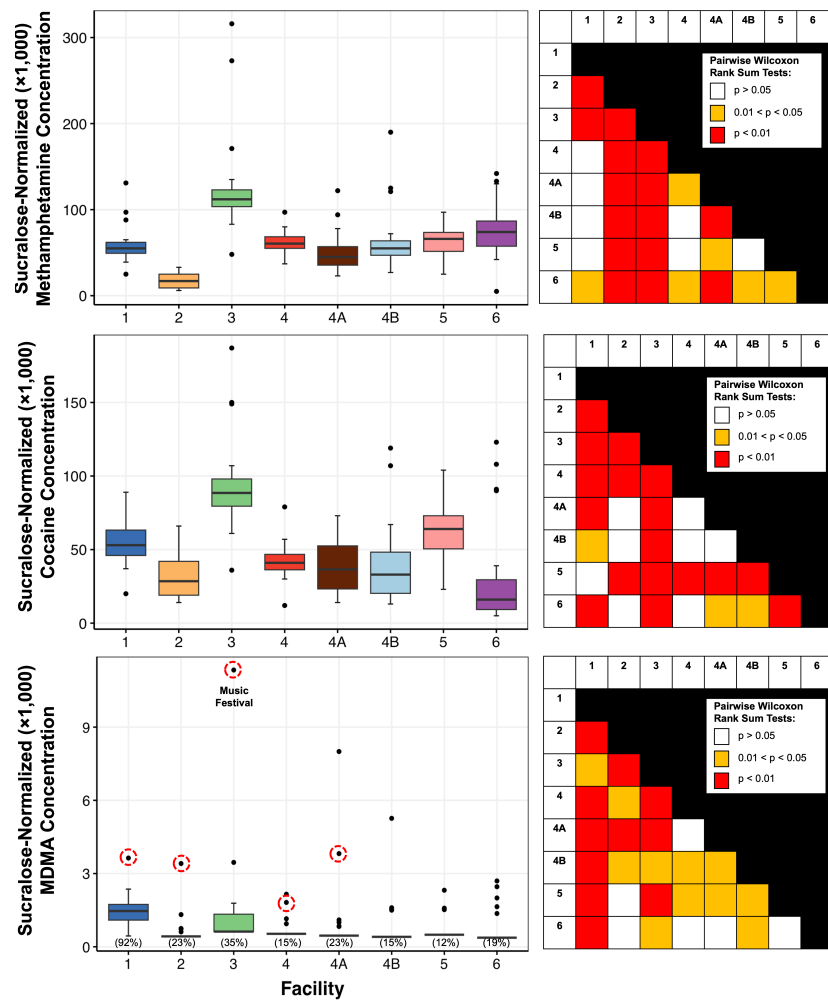


Figure 7

Figure 7. Population-normalized consumption estimates for parent compounds (\log_{10} mg/day per 1,000 people). Observed concentrations of parent compounds or surrogate metabolites were adjusted for metabolism and/or mass equivalence when estimating consumption. To allow for direct comparisons with other studies, the caffeine data do not consider ingestion vs. disposal. For sewersheds 1 and 4A, consumption estimates were normalized based on sucralose-adjusted sewershed populations. For any concentrations that were $<$ MRL (i.e., acetylmorphine for heroin, norfentanyl for fentanyl, and MDMA), $1/2 \times$ MRL was substituted for the left-censored data. A detailed summary of sewershed-specific, population-normalized consumption rates is provided in Table S7.

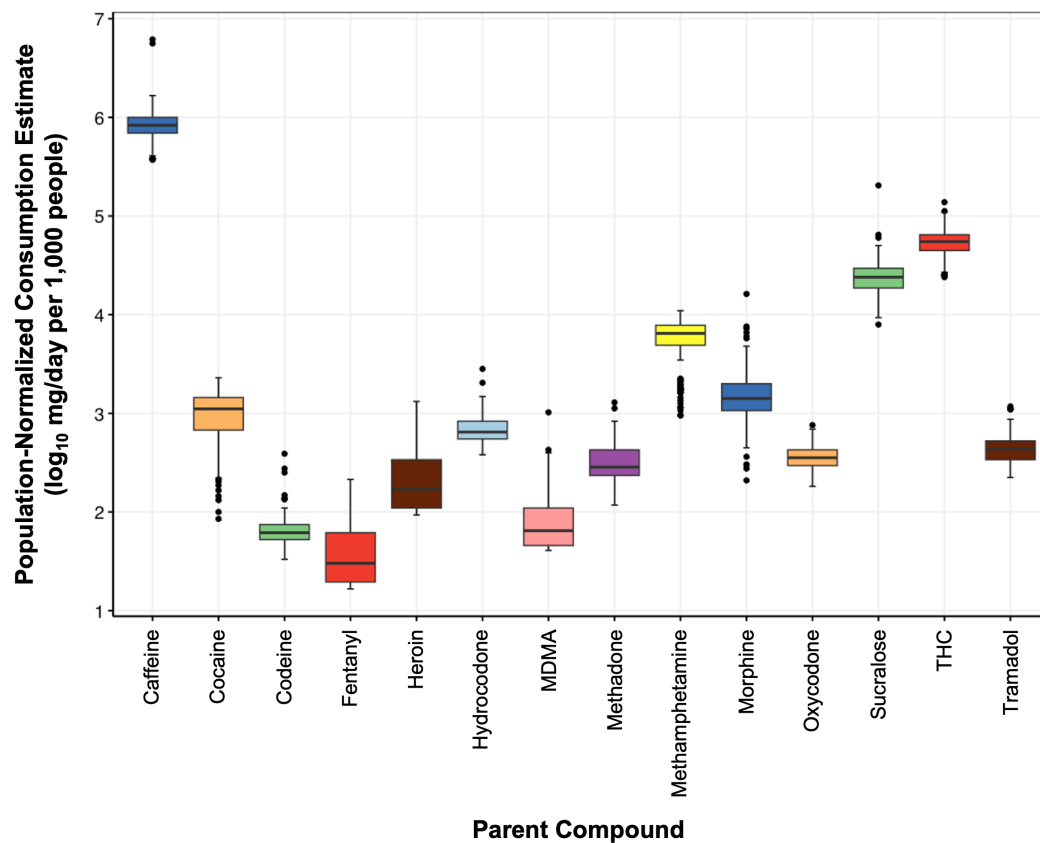


Table 1. Sewershed and overall consumption estimates for Southern Nevada (kg/year). Observed concentrations of parent compounds or surrogate metabolites were adjusted for metabolism and/or mass equivalence when estimating consumption (see main text for caffeine discussion). The total excludes the 4A and 4B grab samples because the composite from 4 was assumed to be more representative. The column on the far right represents the ratio of estimated consumption for sewershed 4 (blended composite) relative to the sum of sewersheds 4A and 4B (individual grabs). This ratio should theoretically be 1.0 if the blended composite was a perfect representation of the sum of the trunk line grab samples.

Compound/Sewershed	1	2	3	4	4A	4B	5	6	Total ^a	4/(4A+4B)
Caffeine	578,474	30,834	201,060	94,897	70,141	29,582	67,280	8,111	980,656	0.95
Caffeine (Adj.) ^b	62,297	3,248	26,412	9,534	9,086	3,969	8,880	685	111,054	0.73
Cocaine	811	22	407	115	86	36	160	2.8	1,518	0.94
Codeine	36	1.8	17	7.7	5.2	3.4	6.4	0.5	69	0.89
Fentanyl ^c	27	0.7	12	5.4	4.0	1.8	4.8	0.3	50	0.93
Heroin ^c	123	4.3	118	33	20	6.2	22	1.2	302	1.25
Hydrocodone	316	18	156	85	63	34	67	5.7	649	0.87
MDMA ^c	101	2.2	30	8.7	8.3	2.7	7.7	0.4	150	0.78
Methadone	174	5.4	65	48	32	17	27	2.7	322	0.98
Methamphetamine	3,788	52	2,328	738	483	259	734	35	7,676	0.99
Morphine ^d	819	31	312	167	161	105	139	20	1,488	0.63
Oxycodone	159	10	92	45	34	14	36	2.7	345	0.93
Sucralose	15,542	811	4,658	2,855	2,418	1,016	2,793	148	26,807	0.83
THC	38,606	1,126	10,447	5,075	5,755	2,762	4,839	392	60,485	0.60
Tramadol	200	14	90	55	38	17	44	4.1	407	1.00

^aTotal excludes the 4A and 4B grab samples; composite from 4 was assumed to be a more representative contribution.

^bMetabolism correction factor applied only to portion assumed to be ingested (based on 76 mg/person-day).

^c1/2×MRL substituted for any value <MRL.

^dEstimated direct morphine consumption (i.e., adjusted to omit morphine from heroin consumption)