Supplementary Information for

Potential climate and water-use effects on water-quality trends in a semiarid, western U.S. watershed: Fountain Creek, Colorado, USA

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Table S1. Information relating to the regressions between specific conductance and total dissolved solids for the 8 streamgage sites in the study [1].

	07103700 FOUNTAIN CREEK NEAR COLORADO SPRINGS, CO[1]	07103970 MONUMENT CR ABV WOODMEN RD AT COLORADO SPRINGS, CO	07104905 MONUMENT CREEK AT BIJOU ST. AT COLO. SPRINGS, CO[1]	07105500 FOUNTAIN CREEK AT COLORADO SPRINGS, CO[1]	07105530 FOUNTAIN CR BLW JANITELL RD BLW COLO. SPRINGS, CO[1]	07105800 FOUNTAIN CREEK AT SECURITY, CO[1]	07106000 FOUNTAIN CREEK NEAR FOUNTAIN, CO[2]	07106500 FOUNTAIN CREEK AT PUEBLO, CO[3]
Equation	TDS = 0.576*SC + 5.65	NA	TDS = 0.609*SC + 10.5	TDS = 0.597*SC + 17.91	TDS = 0.658*SC - 24.3	TDS = 0.643*SC - 9.12	TDS = 0.648*SC + 15	TDS = 0.808*SC - 121
Number of samples	36	NA	37	40	36	36	56	92
R^2	0.93	NA	0.89	0.95	0.87	0.85	0.85	0.92
Period used for existing equation	2011-2013	NA	2011-2014	2011-2013	2011-2013	2011-2013	2004-2022	2003-2022
Period of record for discrete TDS samples	2011-2013	NA	2011-2014	2009, 2011-2013	2011-2013	2011-2013	2004-2008, 2011-2013, 2022	1963-1965, 1988, 1990-1993, 2003-2022

[1]This study

[2] Equations published: https://doi.org/10.3133/sir20105069[2]

[3] Equations published: https://doi.org/10.3133/sir20045024[3]

Table S2. Data points retained after the z-score culling procedure versus total number of data points for unfiltered water-quality constituents data analysis. [1]

Parameter	07103700 FOUNTAIN CREEK NEAR COLORADO SPRINGS, CO.	07103970 MONUMENT CR ABV WOODMEN RD AT COLORADO SPRINGS, CO	07104905 MONUMENT CREEK AT BIJOU ST. AT COLO. SPRINGS, CO	07105500 FOUNTAIN CREEK AT COLORADO SPRINGS, CO	07105530 FOUNTAIN CR BLW JANITELL RD BLW COLO. SPRINGS, CO	07105800 FOUNTAIN CREEK AT SECURITY, CO	07106000 FOUNTAIN CREEK NEAR FOUNTAIN, CO	07106500 FOUNTAIN CREEK AT PUEBLO, CO
Phosphorus, water, unfiltered, milligrams per liter as phosphorus	140/192	187/194	170/176	190/222	213/216	197/215	172/176	167/179
Total nitrogen [nitrate + nitrite + ammonia + organic-N], water, unfiltered	106/112	111/112	130/130	128/129	135/136	122/122	119/119	121/122
Selenium, water, unfiltered, micrograms per liter	167/183	184/191	149/151	179/181	180/180	175/179	150/151	163/167
Arsenic, Total, unfiltered, ug/L	154/190	187/193	151/151	176/185	174/181	159/180	107/110	103/109
Iron, water, unfiltered, recoverable, micrograms per liter	79/87	82/87	81/85	83/84	83/85	84/86	80/83	78/82
Lead, water, unfiltered, recoverable, micrograms per liter	124/169	159/167	91/91	121/157	149/157	65/67	–	–

Table S3. Concentration trend likelihood output from the WRTDS analysis[4-6]. NA indicates that no data were available and NRD indicates that no recent data covering the last few years were available. Site names from Table 1

Constituent	Fountain Creek, upstream	Monument Creek, upstream	Monument Creek at Bijou Street	Fountain Creek at Colorado Springs	Janitell Road	Security	Fountain	Pueblo
Unfiltered phosphorus	Downward trend is highly likely	Upward trend is likely	Either trend is likely as not	Upward trend is likely	Either trend is likely as not	Downward trend is highly likely	Downward trend is very likely	Downward trend is likely
Orthophosphate	Downward trend is highly likely	Downward trend is likely	Upward trend is highly likely	Upward trend is highly likely	Downward trend is likely	NRD	NRD	Downward trend is highly likely
Unfiltered nitrogen	Downward trend is highly likely	Upward trend is highly likely	Either trend is likely as not	Either trend is likely as not	Upward trend is very likely	Upward trend is likely	Upward trend is highly likely	Upward trend is highly likely
Nitrate plus nitrite	Downward trend is highly likely	Downward trend is highly likely	Upward trend is highly likely	Upward trend is highly likely	Upward trend is highly likely	NRD	NRD	Upward trend is likely
Ammonia and ammonium	Downward trend is likely	Downward trend is likely	Upward trend is likely	Upward trend is likely	Downward trend is likely	NRD	Downward trend is very likely	Downward trend is highly likely
Total dissolved solids	Downward trend is highly likely	NA	Upward trend is highly likely	Upward trend is likely	Downward trend is likely	Downward trend is likely	Downward trend is highly likely	Downward trend is highly likely
Chloride	NA	NA	Upward trend is highly likely	Upward trend is likely	Upward trend is highly likely	NA	NA	NA
Unfiltered selenium	Downward trend is highly likely	Downward trend is likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely
Filtered selenium	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	NA	Downward trend is highly likely

Unfiltered arsenic	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely
Filtered arsenic	NA	NA	Downward trend is likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely
Unfiltered iron	Downward trend is likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is likely	Downward trend is highly likely	Downward trend is very likely	Downward trend is likely
Unfiltered lead	Either trend is likely as not	Downward trend is likely	Downward trend is likely	Downward trend is likely	Downward trend is highly likely	NRD	NA	NA
Filtered manganese	Downward trend is highly likely	Upward trend is highly likely	Upward trend is highly likely	Upward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Downward trend is highly likely	Either trend is likely as not

Fig. S1 Potable water production for customers of Colorado Springs Utilities from 2000 through 2022 depicted as daily production and water year (WY) mean production [7]. The significant (p = 0.013) trend for WY mean is depicted for reference and has a slope of −2.15 ML/yr [7].

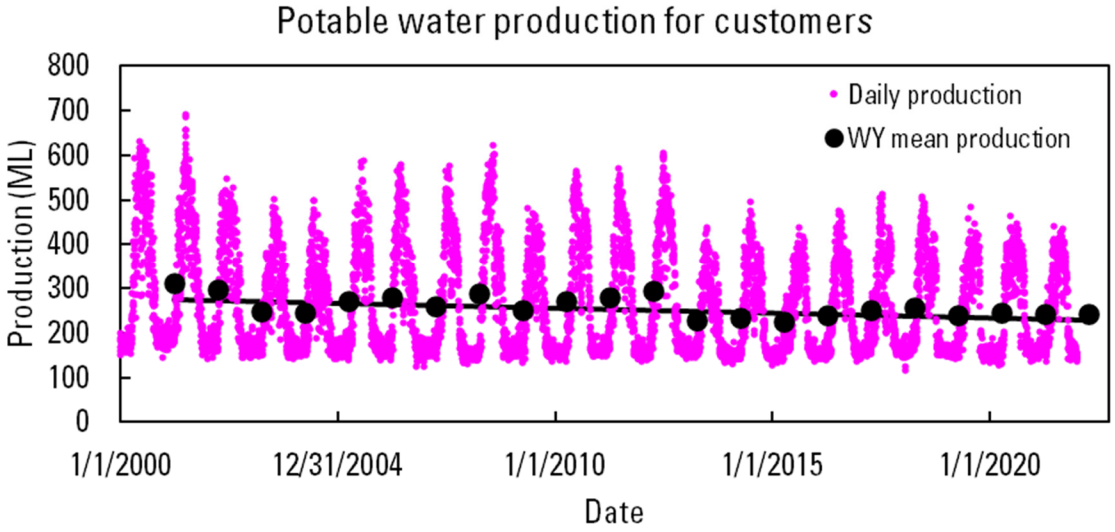


Fig. S2 Ratios of filtered, orthophosphate as P to unfiltered phosphorus as P plotted through time for individual samples at the sites: (a) Fountain Creek, upstream, (b) Monument Creek, upstream, (c) Monument Creek at Bijou Street, (d) Fountain Creek at Colorado Springs, (e) Janitell Road, (f) Security, (g) Fountain, (h) Pueblo [1]. For reference, vertical lines indicate when the JD Phillips facility began taking some of the wastewater treatment load from the Las Vegas Street facility.

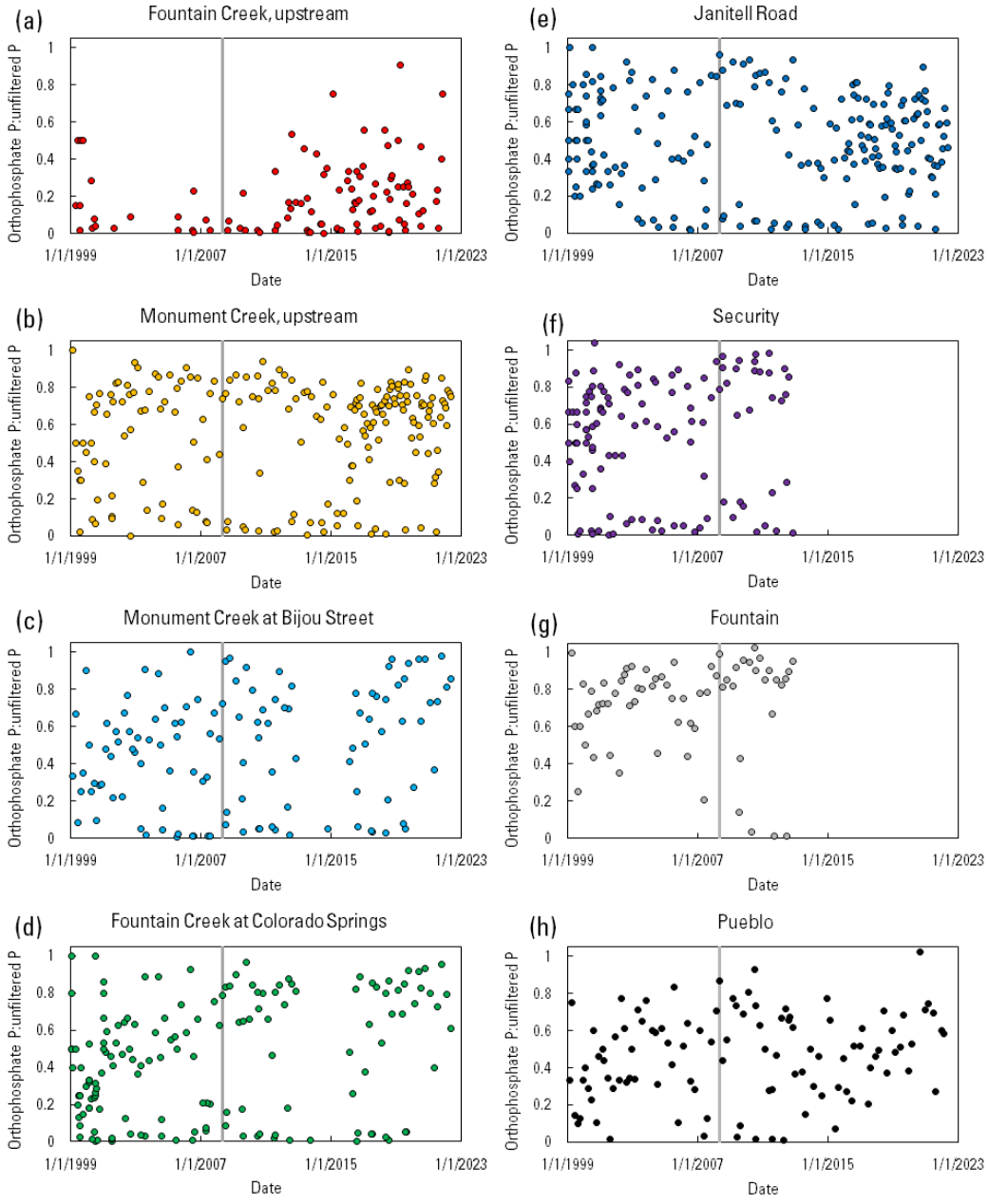


Fig. S3 Ratios of filtered nitrate plus nitrite as N to unfiltered nitrogen as P plotted through time for individual samples at the sites: (a) Fountain Creek, upstream, (b) Monument Creek, upstream, (c) Monument Creek at Bijou Street, (d) Fountain Creek at Colorado Springs, (e) Janitell Road, (f) Security, (g) Fountain, (h) Pueblo [1]. For reference, vertical lines indicate when the JD Phillips facility began taking some of the wastewater treatment load from the Las Vegas Street facility.

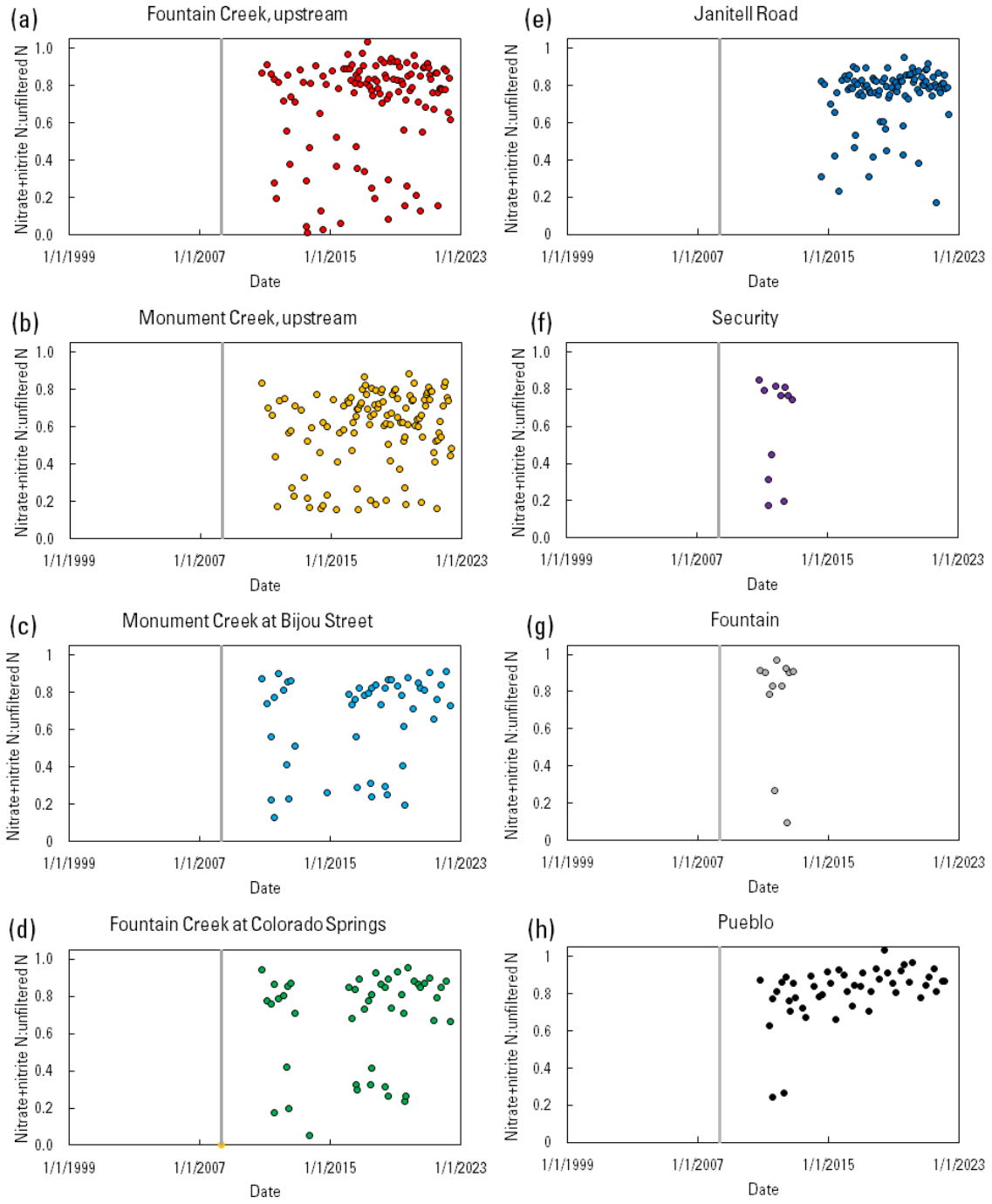
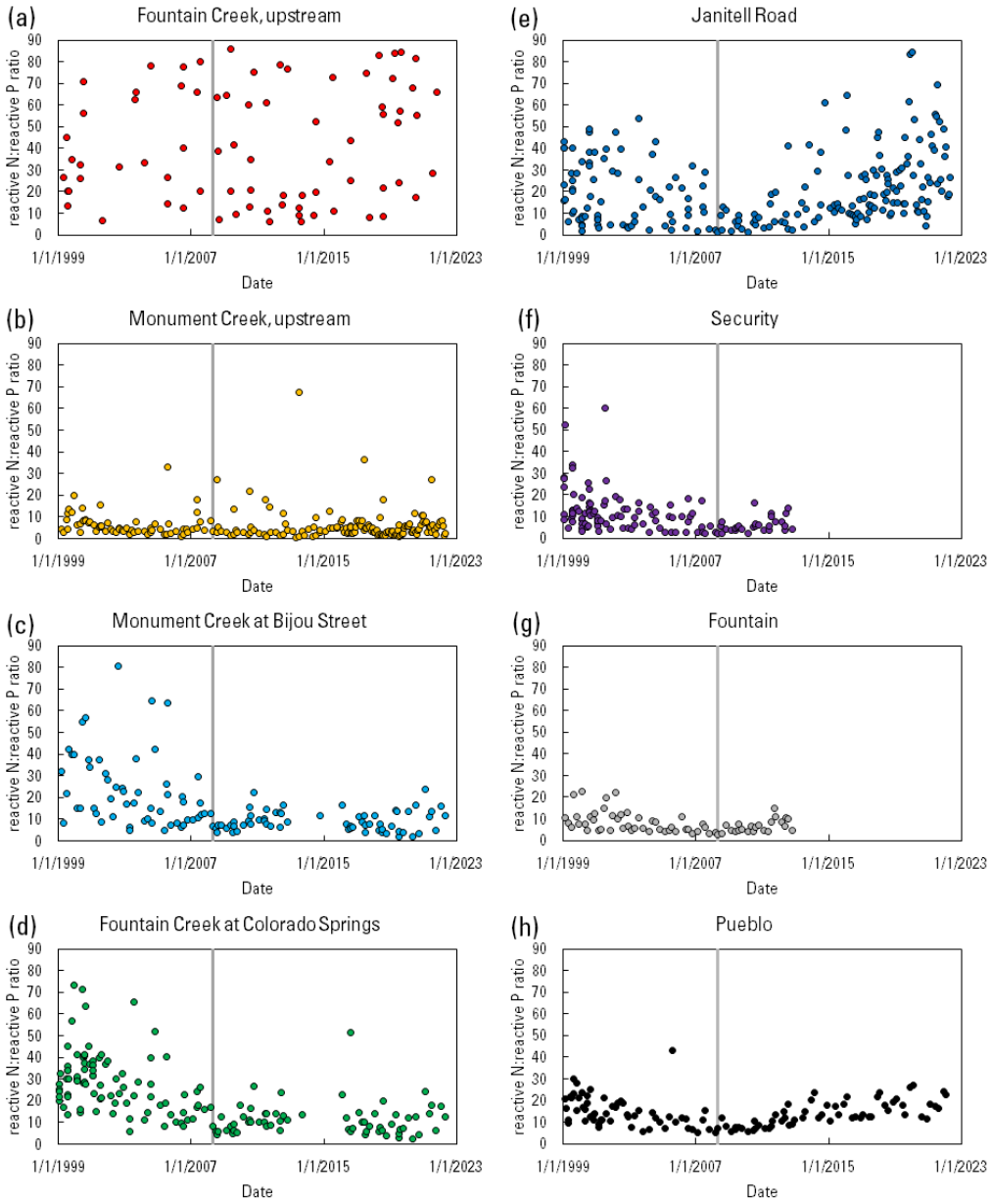


Fig. S4. Ratios of reactive nitrogen (nitrate plus nitrite) to reactive phosphorus (orthophosphate) plotted through time for individual samples at the sites: (a) Fountain Creek, upstream, (b) Monument Creek, upstream, (c) Monument Creek at Bijou Street, (d) Fountain Creek at Colorado Springs, (e) Janitell Road, (f) Security, (g) Fountain, (h) Pueblo [1]. For reference, vertical lines indicate when the JD Phillips facility began taking some of the wastewater treatment load from the Las Vegas Street facility.



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