AGRICULTURAL WATER QUALITY PROGRAM

2020 Monitoring Activity

Report & Executive Summary

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EXECUTIVE SUMMARY

Colorado Dept of Agriculture's (CDA) Agricultural Water Quality Program (AWQP) conducted its first surface water sampling project since being officially charged with expanded monitoring responsibility. Work was focused on the mainstem and tributaries of the South Platte River Basin (SPRB) but also limited sites from several other major watersheds through collaboration with the Water Quality Control Division (WQCD) of the Colorado Dept of Public Health & Environment. Furthermore, samples from urban stormwater projects by the Colorado School of Mines and edge-of-field (EOF) projects by Colorado State University Extension resulted in AWQP analyzing more than 150 surface water samples from 57 different sites. Sampling of alluvial groundwater was limited to 19 sites in the SPRB, of which 14 are part of a new, 60-70 well, statewide legacy monitoring network to be sampled annually.

Groundwater samples underwent routine analysis for inorganic ions and 95 pesticide compounds via LC/MS/MS methodology. Surface water samples underwent inorganic analysis and quantitative analysis for glyphosate, but also underwent LC-QTOF (quadrupole time-of-flight) analysis to qualitatively screen for ~250 pesticide compounds. LC-QTOF is one of several factors used to assist AWQP with its expansion of the LC/MS/MS screening method to include pesticides that may contaminate surface water. Split samples from collaborative efforts were also analyzed for total nitrogen (TN) and total phosphorus (TP).

Lab results for alluvial groundwater were mostly unremarkable. Nitrate-N concentrations ranged 1.1 to 71.1 mg/L with higher concentrations being seen in wells of a shallow, long-term Weld County well network. Legacy network wells in rural, agricultural areas outside of the Weld County network, show median nitrate-N of 8.5 mg/L compared to 3.5 mg/L seen of four wells in the urban land use. 75% of wells detected 1+ pesticides but only one of 41 total detects was discovered in an urban land use well. As seen over the last decade, metolachlor and its major degradants account for a majority of detections (56%).

Overall, review of either TN or nitrate-N data revealed higher values in streams of the SPRB than in other basins. At least one sample from three samples sites in the SPRB exceeded the nitrate-N water quality standard of 10.0 mg/L, but the median of all sites was 2.3 mg/L with 9% non-detect. Higher TP concentrations occurred in the ARB than in the SPRB although ARB sites were limited. Sulfate exceeded the table value of 250 mg/L at nearly all sites, but this is not necessarily indication of impairment. Salinity in the SPRB was assessed using electrical conductivity and showed a range from 750-1500 µS/cm in the mainstem up to Fort Morgan, CO and then increasing to more than 2,000 µS/cm near Julesburg, CO. Glyphosate was found at several sites but well below its 700 µg/L standard. LC-QTOF analysis showed evidence of 34 pesticides that are included in a list of 60+ being reviewed by the lab for fitment on the CDA's LC/MS/MS method.

AWQP plans to continue expanding monitoring of surface water in 2021 but will work to conduct its full groundwater sampling plan as well. Surface water work will again focus intensively on the SPRB, but collaboration with WQCD will find samples collected from sites in each of Colorado's major watersheds. Groundwater efforts will see intensive sampling of the South Platte alluvial aquifer, the Front Range Urban network, and the San Luis Valley. Work will also continue establishing the 70-80 well, statewide legacy monitoring network.

FULL REPORT

INTRODUCTION

The year 2020 was rather unique for the Agricultural Water Quality Program (AWQP) [formerly the Agricultural Chemicals and Groundwater Protection Program] and not just for the reasons it will forever be renowned for. With the changes to the AWQP by SB 19-186 – which effective August 2019 expanded the program's responsibility from just groundwater to all state waters – the first surface water sampling work began in 2020. With the operational impacts caused by the health and safety response to the SARS-CoV-2 pandemic, AWQP's inaugural monitoring year was hindered but still effectively completed. With limitations of sampling personnel and laboratory analytical capacity, the program decided to focus a majority effort on surface water which required a significant paring down of its groundwater duties.

The routine analysis for groundwater samples included inorganics (fluoride, bromide, chloride, nitrate, nitrite, orthophosphate, and sulfate) and a suite of 96 pesticide compounds analyzed using an LC/MS/MS direct-inject methodology. Surface water samples were analyzed for inorganics, LC/MS/MS analysis for glyphosate and AMPA (major degradate), and analysis for nearly 250 pesticide compounds using a LC-QTOF (liquid chromatograph-quadrupole time-of-flight) methodology that provides the qualitative results: "present" or "absent". Reporting limits for inorganics and pesticides monitored by LC/MS/MS can be found in **Appendix A** at the end of this report.

Water Type	# Sites	# Events	Total # Samples	Dates Sampled
Ground	20	1	20	07/14/2020 - 07/22/2020; 08/24/2020*
Surface				
Stream	46	1 to 3†	108	07/28/2020 - 10/21/2020
Stormwater	6	4	24	08/16/2020 - 10/04/2020
Edge-Of-Field	5‡	2	36	08/12/2020 - 08/27/2020

Table 1. T*he number of sites, events, and total samples for groundwater and surface water samples collected by or on behalf of the Agricultural Water Quality Program in 2020.*
* A single groundwater site was sampled on 08/24/2020.
† 23 sites had 3 events; 17 sites had 2 events; and 5 sites had a single event.
‡ Each Edge of Field site consisted of several sampling locations.

The program decided to utilize LC-QTOF analysis as an initial step in working to expand its current LC/MS/MS method. Due to differing fate and transport mechanisms of pesticides impacting surface water compared to groundwater, it is likely multiple new compounds will be added to the method. In addition to the pertinent physiochemical properties that may suggest the need to add a specific compound, the use of LC-QTOF aims to provide some level of understanding to what compounds may be present in surface water. In attempt to optimize the effectiveness of this approach, the program focused surface water sampling to the South Platte River Basin (SPRB) due to the perceived high likelihood of encountering

pesticide compounds within the urban and rural land uses in the basin. Shallow groundwater studies conducted by the program in the SPRB have shown it is the most quality impacted basin in the state with respect to nutrients and pesticides. It is believed surface water studies may reveal a similar trend. **Table 1** delineates the number of samples for groundwater and surface water as well as the dates of collection. Specifics on groundwater and surface water monitoring efforts follow in their respective sub-sections.

GROUNDWATER

METHODS

Groundwater sampling focused on monitoring wells (MW) in the SPRB alluvial aquifer. There were 14 MW's selected from the Legacy Monitoring Network which is a new objective discussed in the program's 2019-2029 Long-Term Groundwater Monitoring Plan. Wells in this network are to be sampled annually.

An additional four MWs were sampled along the mainstem of the South Platte River because of their proximity to surface water sampling locations in 2020, and two domestic-stock use wells were sampled in the southern portion of the Lost Creek Designated Basin that lies in Adams County as follow-up to elevated nitrate discovered in 2019. The map in **Figure 1** shows the groundwater sites sampled in 2020. As detailed in the long-term monitoring plan mentioned earlier, the AWQP utilizes a priority index ("Sampling Priority" in Map Legend) to facilitate the location and sampling frequency of groundwater sites throughout Colorado. With limited sampling personnel and analytical capacity at the CDA laboratory, sampling efforts are focused within high to moderate priority areas.

The legacy sites in the Figure 1 map are located mostly within areas of high monitoring priority; however, those sites in the urban land use area of Denver-metro also include areas of moderate priority. While the number of previous events varies, each legacy site has prior sampling data. Monitoring in the SPRB since 1992 has revealed persistent, elevated nitrate-N above 2-3 mg/L or parts-per-million (ppm), which is the level considered to be naturally occurring. Wells with nitrate-N below the reporting limit of 0.01 ppm is uncommon in the areas of SPRB alluvial aquifer where the program samples. Typical median nitrate-N for the aquifer, underlying a mostly rural-agricultural land use, hovers around 10 ppm which is the U.S. EPA Drinking Water Maximum Contaminant Level (MCL). An exception to this, are MWs that are part of the program's Weld County Long-Term (WLT) network – a network of about 20 MWs installed near the top of the alluvial aquifer – which typically shows a median nitrate-N of 20 ppm. In contrast, the last sampling of about 35 MWs in the Denver-metro portion of the Front Range Urban network in 2016, revealed a median nitrate-N of 4.56 ppm. Sampling in 2020 included four legacy MWs from that portion of the Front Range Urban network. More information on these historical results can be found by reviewing AWQP's Monitoring Activity Reports from prior years.

RESULTS

Nitrate-N results for 2020 reveal concentrations similar to prior results. The three WLT MW's ranged from 16.6 to 46.8 ppm nitrate-N and these data align with each well's historical results. The seven legacy MWs outside of the WLT network in the rural-agricultural land use area show a median nitrate-N of 8.5 ppm

Figure 1. *Map showing legacy and non-legacy groundwater sites sampled in the year 2020 for the monitoring of nutrients and pesticide compounds. Sites are in defined areas of moderate to high sampling priority in the South Platte alluvial aquifer.*

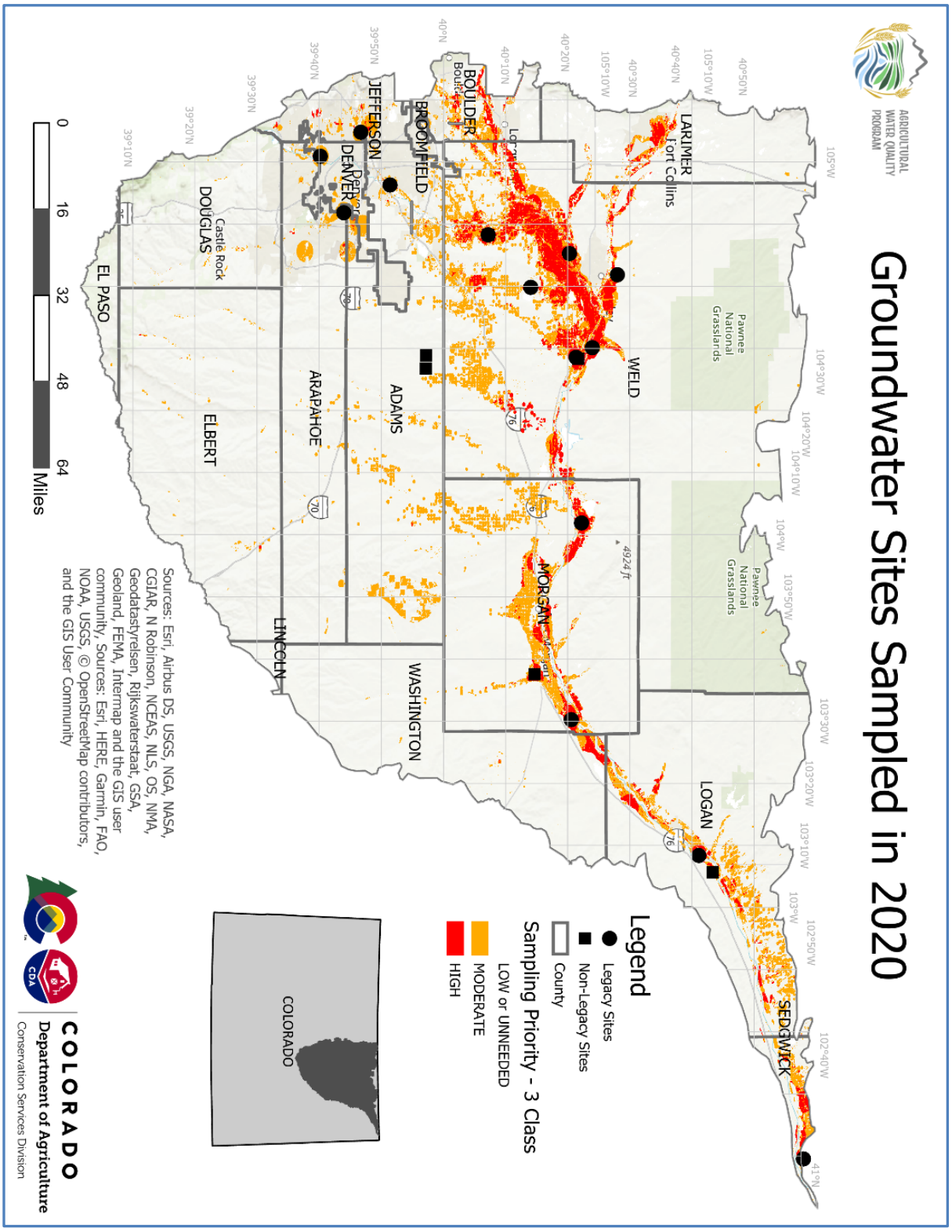


Figure 2. *Map showing distribution of nitrate-N discovered in groundwater collected from legacy and non-legacy sites in defined areas of moderate to high sampling priority of the South Platte alluvium. Symbols for nitrate-N are classified as less than 2.5 ppm, 2.5-9.9 ppm, 10.0-19.9 ppm, or 20+ ppm.*

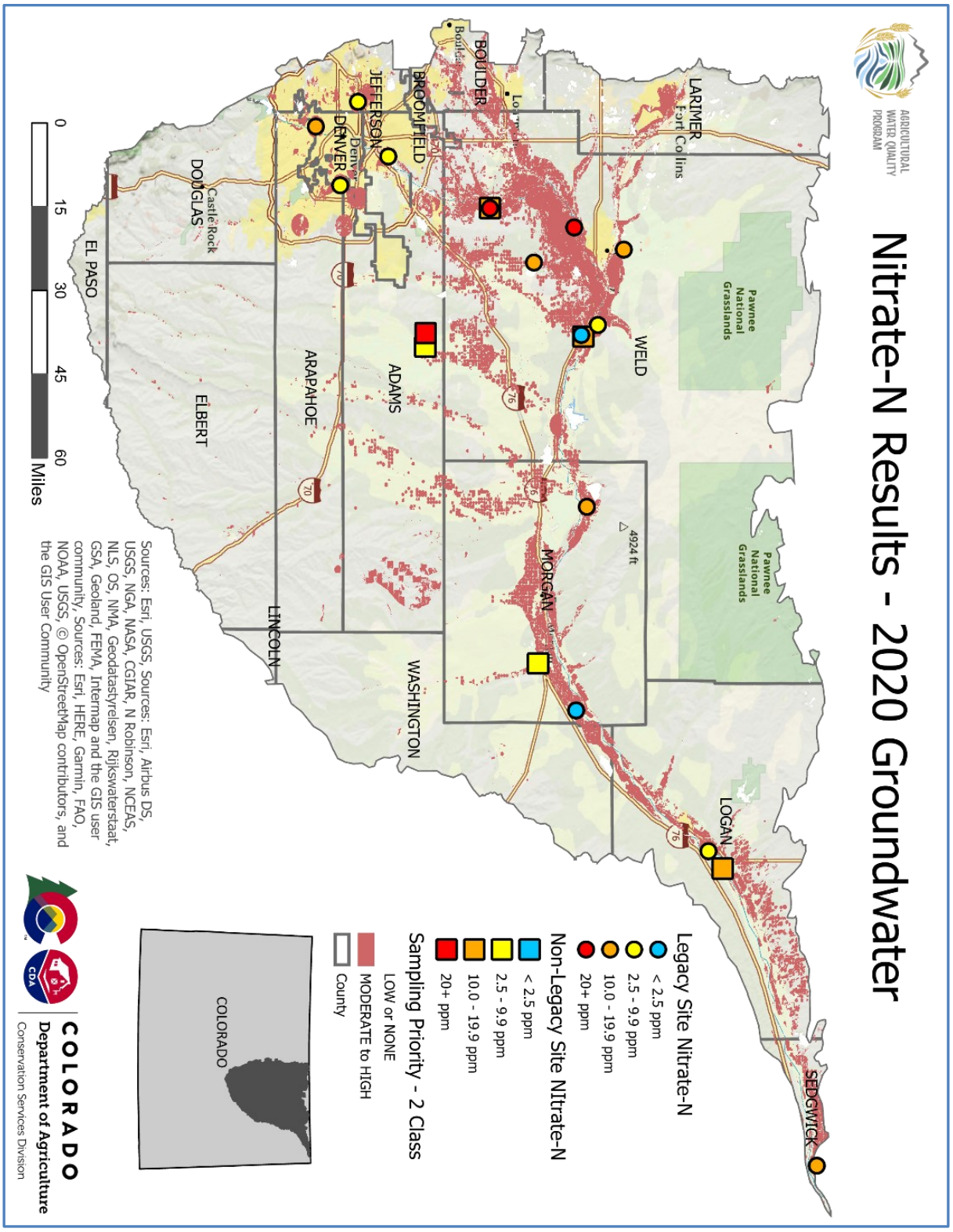
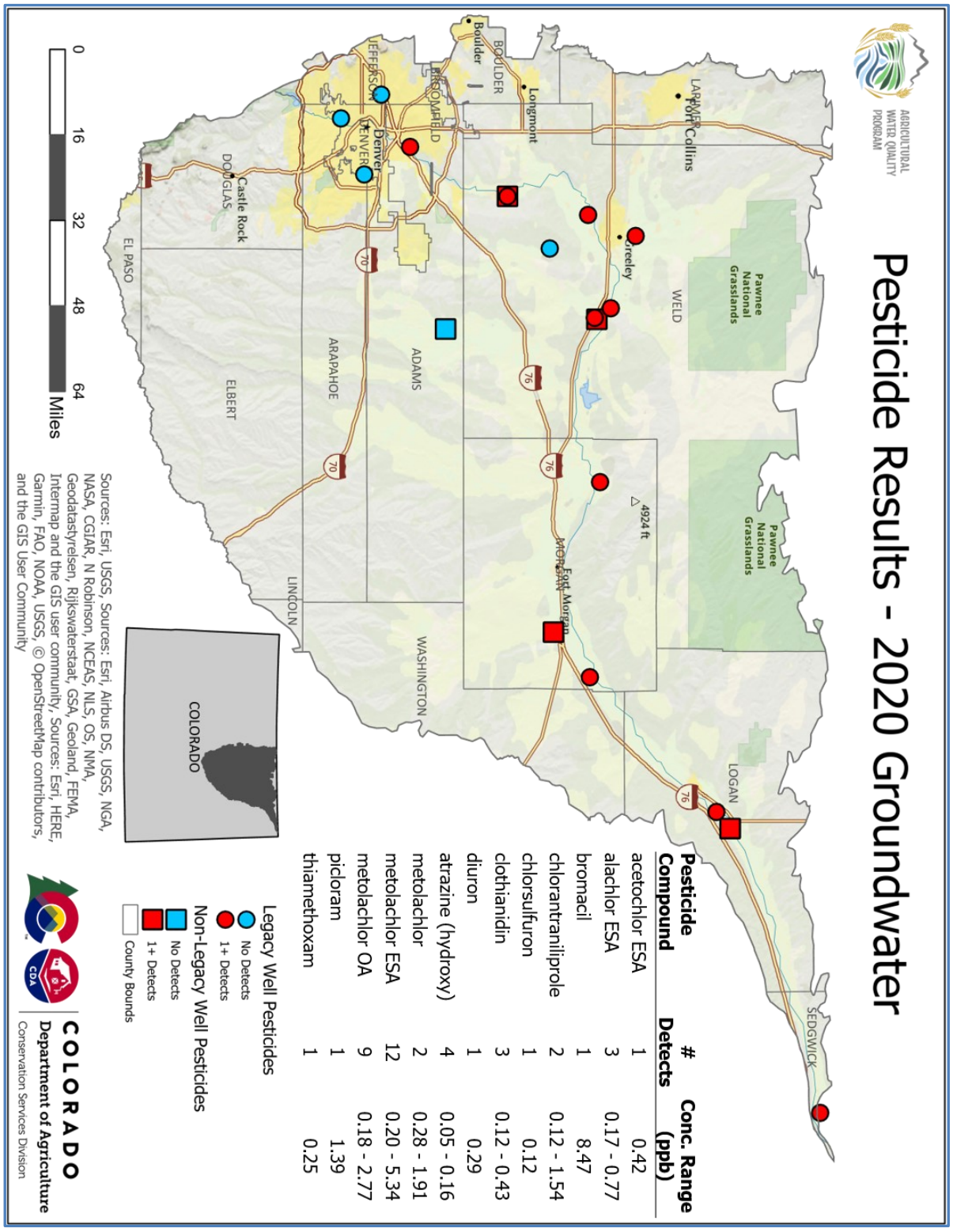


Figure 3. *Map showing distribution of groundwater sites where at least one pesticide was detected. Pesticide symbols show either No Detects or 1+ Detects. Inset graph image shows summary of detections and concentration of the 13 pesticide compounds detected in at least one well.*



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and range 2.1-13.0 ppm. The four legacy MWs in Denver-metro, as seen in **Figure 2**, show a median nitrate-N of 3.5 ppm. One domestic-stock well in the Lost Creek Designated Basin, sampled on 8/24/2020, was analyzed only for inorganics as follow-up to a level of 90 ppm nitrate-N discovered in 2019. That well resulted in 71 ppm nitrate-N in the 2020 sample which confirms a persistent, elevated concentration.

A total of 41 detects of 13 different pesticide compounds were found in 14 of the 19 wells screened in 2020 as shown in **Figure 3**. A common degradate of the herbicide metolachlor (Tradename Dual), metolachlor ethane sulfonic acid (ESA), was detected in 12 wells, all of which were located within a rural-irrigated agriculture land use. Similarly, another common metolachlor degradate, metolachlor oxanilic acid (OA), was found in nine wells. These two compounds account for 51.2% of all detects. The next most frequently detected pesticides were four detects of hydroxy atrazine (a degradate of the herbicide atrazine [Tradename AATrex]); and three detects each of the herbicide clothianidin (Tradename Arena) and alachlor ESA (a degradate of the herbicide alachlor [Tradename Bullet]). A single detect of the herbicide chlorsulfuron (Tradename Telar) was the only pesticide discovered in the four legacy MWs sampled as part of the Front Range Urban network.

No pesticide concentrations were detected above established U.S. EPA Drinking Water Standards. A monitoring well sampled near Brush, CO – a well not specifically used for human consumption – saw the soil sterilant bromacil (Tradename Hyvar) detected at 8.47 µg/L which is more than 10% of the U.S. EPA Lifetime Health Advisory Level of 70 µg/L. This detect nearly doubles the previous high of 4.26 µg/L seen in the well in 2011. It also is the fourth highest concentration of the 50 total detects of bromacil discovered by the AWQP in the SPRB alluvial aquifer since 1996. For reference, the all-time maximum of 31.3 µg/L was discovered in a WLT MW in 2017.

SURFACE WATER

METHODS

Surface water sampling work in 2020 saw AWQP personnel conduct three rounds of sampling on 23 stream sites within the SPRB, and one or two rounds of sampling at nine other sites, for a total of 80 samples. AWQP also collaborated with Colorado Dept of Public Health & Environment's Water Quality Control Division (WQCD) to get two rounds of split samples from 14 of the 29 stream sites that are part of their long-term, legacy monitoring network. Of the 28 samples collected from the WQCD sites (listed in **Table 2)**, 14 came from seven sites in the SPRB resulting in a total of 94 samples collected from streams in that basin. **Figure 4** shows the stream locations where samples were collected.

The AWQP also collaborated with its program colleagues at Colorado State University (CSU) to obtain split samples from their Edge-Of-Field (EOF) trials. A total of 36 samples were submitted from two rounds of sampling at five such sites. EOF sites have multiple monitoring locations to track water quality entering, crossing, and emerging from agricultural crop fields in attempt to directly measure the effectiveness of Best Management Practice (BMP) on mitigation of water quality issues. The program's interest for collecting EOF samples in 2020 was primarily focused on LC-QTOF analysis for pesticide compounds that may be entering agricultural lands through diverted irrigation water or emerging from agricultural land in

Station ID	Station Latitude	Station Longitude	WBID	Waterbody Names	Sampling Dates
WQCD11	37.28730	-104.31877	COARLA07_A	Purgatoire River	8/5/2020; 10/19/2020
WQCD22	40.41222	-104.56278	COSPMS01b_A	South Platte River	8/5/2020; 10/1/2020
WQCD23	39.92286	-104.86809	COSPUS15_D	South Platte River	8/24/2020; 10/7/2020
WQCD26	40.66444	-105.22389	COSPCP10a_A	Cache la Poudre River	8/5/2020; 10/2/2020
WQCD27	40.41778	-104.63944	COSPCP12_A	Cache la Poudre River	8/5/2020; 10/1/2020
WQCD28	40.35133	-104.77437	COSPBT05_A	Big Thompson River	8/5/2020; 10/1/2020
WQCD29	40.25806	-104.87917	COSPSV03_D	St Vrain Creek	8/5/2020; 10/1/2020
WQCD82	37.79020	-107.66757	COSJAF04a_A	Animas River	8/12/2020; 10/13/2020
WQCD128	40.74737	-103.05598	COSPLS01_A	South Platte River	8/5/2020; 10/1/2020
WQCD137	37.32917	-106.95556	COSJSJ06a_D	San Juan River	8/11/2020; 10/13/2020
WQCD7360	38.27033	-104.59966	COARFO02b_A	Fountain Creek	8/5/2020; 10/6/2020
WQCD7520	38.17948	-104.13950	COARLA01b_A	Arkansas River	8/6/2020; 10/21/2020
WQCD7808	38.10603	-102.61908	COARLA01c_A	Arkansas River	8/5/2020; 10/19/2020
WQCD8305	37.48139	-105.87944	CORGRG12_A	Rio Grande River	8/10/2020; 10/12/2020

Table 2. *Site information and sampling dates of 14 stream sites from which split samples were collected for Colorado Dept of Public Health & Environment and Colorado Dept. of Agriculture in the year 2020.*

tailwater which may also return to a stream. In addition to LC-QTOF analysis, the CDA lab also tested for nutrient concentrations, but this report will only focus on LC-QTOF results. Given the research-oriented purpose, reporting on outcomes from EOF studies will be left to CSU personnel since such reporting more thoroughly discusses nutrient results and how they compare to their projects' various treatments of crop and irrigation management.

Lastly, the program collaborated with the Colorado School of Mines (CSM) and the City & County of Denver and their effort to evaluate BMP techniques implemented to mitigate water quality issues associated with stormwater drainage in urban areas. Their plan for sampling such sites is to get samples

from wet-weather and dry-weather events and the AWQP was interested in obtaining split samples from several sites for both event types. The first split samples were collected on 08/16/2020. Throughout the remainder of August and September, only a single significant precipitation event occurred in the Denver area as can be seen in data from the Community Collaborative Rain, Hail & Snow Network (www.cocorahs.org), and unfortunately, no events contributed sufficient precipitation to induce stormwater flows at the sites sampled. Consequently, this resulted in 24 samples from only dry-weather events. The program's purpose in collecting split samples for LC-QTOF analysis from the CSM effort was primarily focused on evaluating for pesticides potentially emerging in urban area surface water.

All surface water samples underwent pesticide analysis by LC-QTOF for reasons described earlier, but also underwent LC/MS/MS analysis for glyphosate and AMPA. Nutrient determination was variable between CDA's lab and other labs used by collaborative partners. While AWQP purchased a new analytical instrument capable of measuring total nitrogen (TN) and total phosphorus (TP) starting in 2021, only nitrate-N, nitrite-N, and orthophosphate as PO_4 was available in 2020. TN and TP values are preferred for evaluation of water quality as standards are being developed for these two parameters through the Water Quality Roadmap for eventual statewide adoption in Regulation Nos. 31-38. WQCD legacy sites undergo routine analysis for TN, TP, and dissolved metals as did samples collected by CSM for their stormwater studies. EOF samples were submitted to a third-party lab for TKN and TP analysis.

Discussion of phosphorus for 2020, will be limited to only those samples with TP analysis. Orthophosphate and other dissolved metals were not assessed by WQCD at this time. Discussion of nitrogen in samples will focus on TN when available but otherwise, will focus on the 85th percentile of nitrate (NO_3-N). WQCD calculated medians for TN and TP (required statistic by Regulation No. 31, Section 31.17). TN was categorized as such: low (<0.3 mg/L), medium (0.3 mg/L – 1.3 mg/L), and high (>1.3 mg/L). TP was categorized as such: low (<0.03 mg/L), medium (0.03 mg/L – 0.10 mg/L), and high (>0.10 mg/L). These categories do not represent a comparison to water quality standards but rather provide a simple means of reviewing the data. NO_3-N was compared against the water quality standard of 10.0 mg/L.

As for evaluation of pesticide compounds, assessment against established standards is limited to glyphosate for this report. Glyphosate concentration is compared against the water quality standard of 700 µg/L, while AMPA (the only other pesticide with quantitative results) is not assessed. LC-QTOF results and their implications will be briefly discussed since no concentration data is available.

WQCD also assessed electrical conductivity (EC) and sulfate concentration data which are available for all samples. EC categorization was based on the CSU Extension Fact Sheet #0.506. Sulfate was compared against the table standard of 250 mg/L in Regulation No. 31. Data for these parameters were classified into below or above water quality standard.

Typically, data generated by AWQP will be uploaded to an online database, but at the time of writing this review, a surface water branch to our existing database was yet to be completed. Therefore, all lab data quantitatively analyzed by CDA is listed at the end of this report in **Appendix B,** except for data related to CSU's EOF sites. Outside data from labs used by CSU or CSM is not listed in the appendix.

Station	TN	NO2+NO3	TP	Sulfate	EC
	mg/L	mg/L	mg/L	mg/L	µS/cm
	median	median	median	85th Percentile	
WQCD11	0.33	0.06	0.96	1073	2219
WQCD22	4.75	4.53	0.68	348	1232
WQCD23	6.57	5.12	0.45	518	1845
WQCD26	0.16	0.16	0.02	844	2126
WQCD27	4.12	3.78	0.71	277	1151
WQCD28	3.62	3.32	0.27	565	1359
WQCD29	2.61	2.23	0.66	347	1080
WQCD82	0.10	0.06	0.02	340	511
WQCD128	1.96	1.70	0.11	787	1995
WQCD137	0.13	0.13	0.02	10.7	122
WQCD7360	2.30	2.20	0.23	373	1261
WQCD7520*	1.37	1.23	0.06	451	857
WQCD7808	1.40	1.11	0.02	1500	3035
WQCD8305	0.23	0.23	0.09	17.2	284
*One of the TP data points was excluded since it was considered too high (35 mg/L)					

Table 3. *Annual summary statistics for select parameters measured in 14 stream sites sampled by Colorado Dept of Public Health & Environment's Water Quality Control Division in 2020. Sites are sampled every other month beginning in February and included statistics are based on six sampling events.*

RESULTS

There were 14 WQCD sampling locations with measured TN and TP values. TN and TP at each sampling location were assessed using the annual median (which includes results from the two sampling events collected on behalf of AWQP). The annual median values of TN and TP are presented in the **Table 3** and spatially in **Figures 5 and 6**, respectively.

As seen in **Figure 5**, the medium and high TN values are located most often in the SPRB and Arkansas River Basin (ARB). The SPRB carried the most high-level TN medians. These results agree with historical information evaluated by the WQCD. A similar pattern can be seen for TP values in **Figure 6**, with relatively more sites of medium-level TP in the ARB.

The spatial distribution of nitrate shown in **Figure 7** shows that NO_3-N concentration discovered in most of the samples is below the water quality standard of 10 mg/L. Two stream sites (Dutch Creek and Lone Tree Creek) and a single stormwater site, saw at least one sample exceed the water quality standard.

Figure 8 shows the spatial distribution of EC (µS/cm). The spatial distribution of EC showed that several tributaries joined to the mainstem with varying levels of EC before the mainstem reached Fort Morgan, CO. But the mainstem in general saw EC range from 600 to 1500 µS/cm until Fort Morgan, CO and then gradually increase from 1608 to 2126 µS/cm near Julesburg, CO with moderate hazard level to the crops according to guidance in CSU Extension Fact Sheet #0.506. Even though there is a limited number of sampling locations on the Arkansas River, data indicates a similar pattern of increasing EC as you progress downstream.

The spatial distribution of the 85th percentile **(Figure 9)** for sulfate showed that the sulfate concentrations were above the water quality standard of 250 mg/L for the most sampling locations along the South Platte River and Arkansas River. In the SPRB, sulfate followed a similar pattern to EC with a gradual increase downstream from Fort Morgan, CO to near Julesburg, CO.

Figure 4. Map showing distribution of stream sampling locations for the 2020 sampling season.

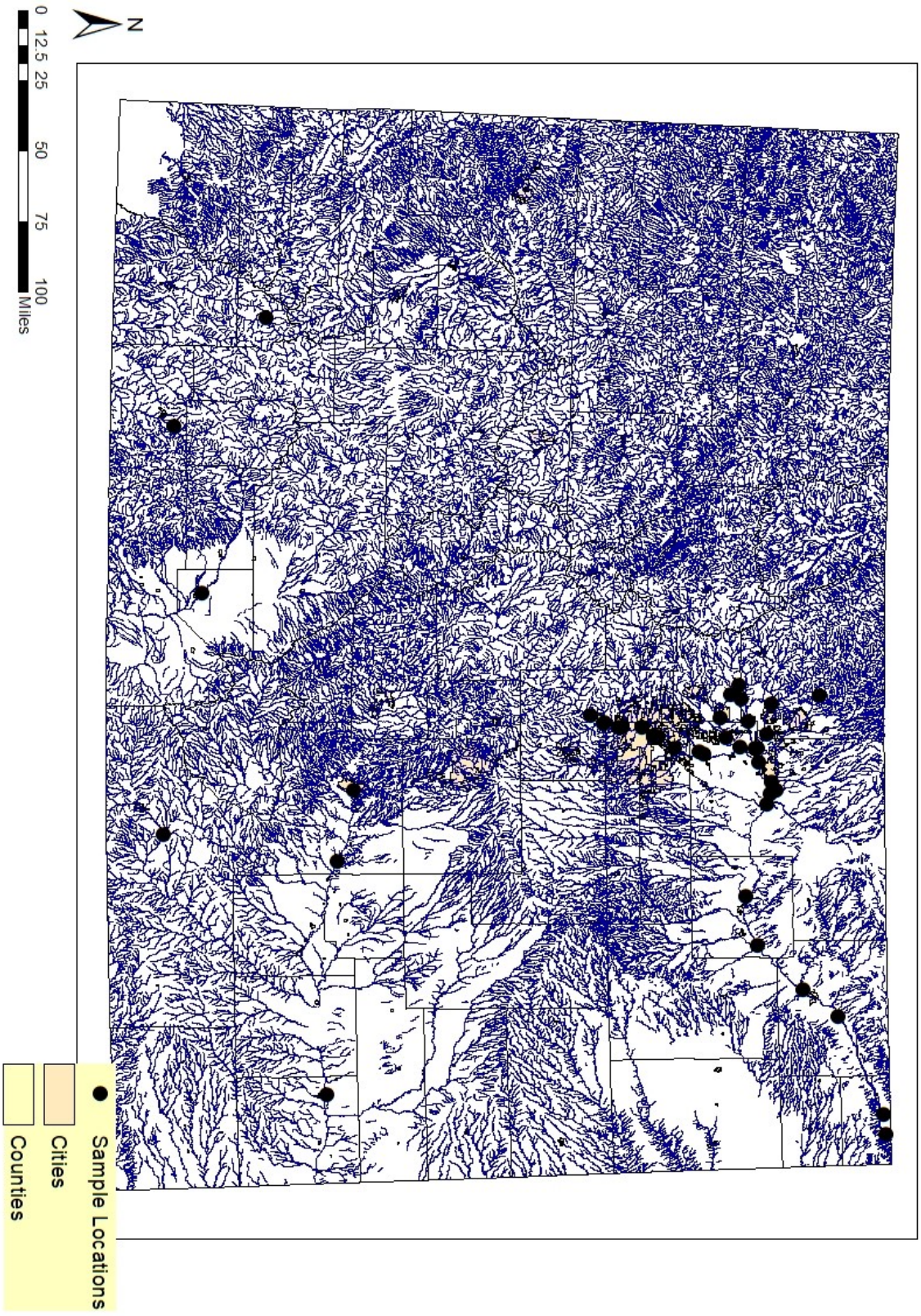

Figure 5. Map showing distribution of three classes of TN (total nitrogen) in stream samples: low (<0.3 mg/L), medium (0.3 mg/L – 1.3 mg/L), and high (>1.3 mg/L). Classes are not standard based.

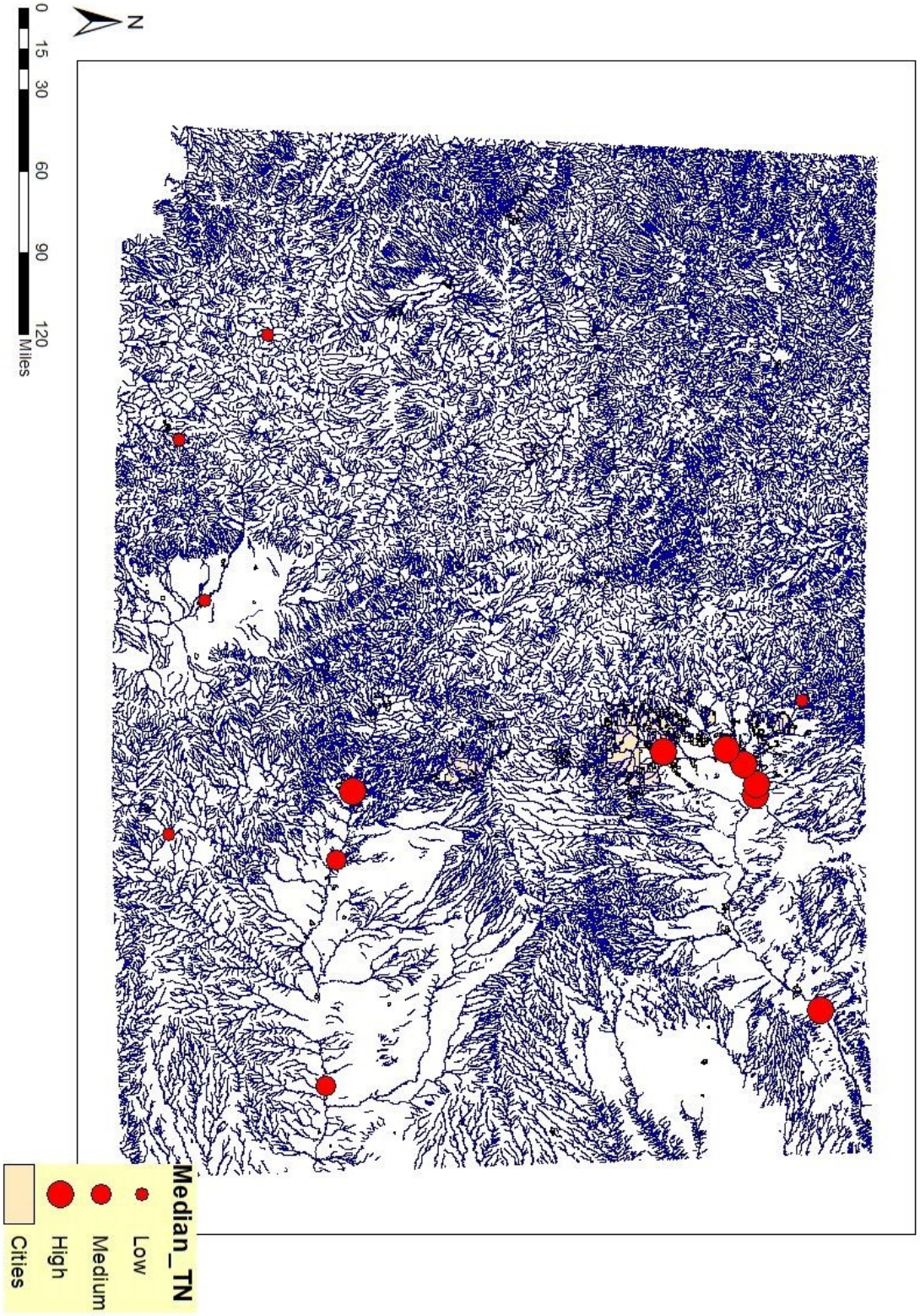

Figure 6. Map showing spatial distribution of three classes of TP (total phosphorus) in stream samples: low (<0.03 mg/L), medium (0.03 mg/L – 0.10 mg/L), and high (>0.10 mg/L). Classes are not based on any standard.

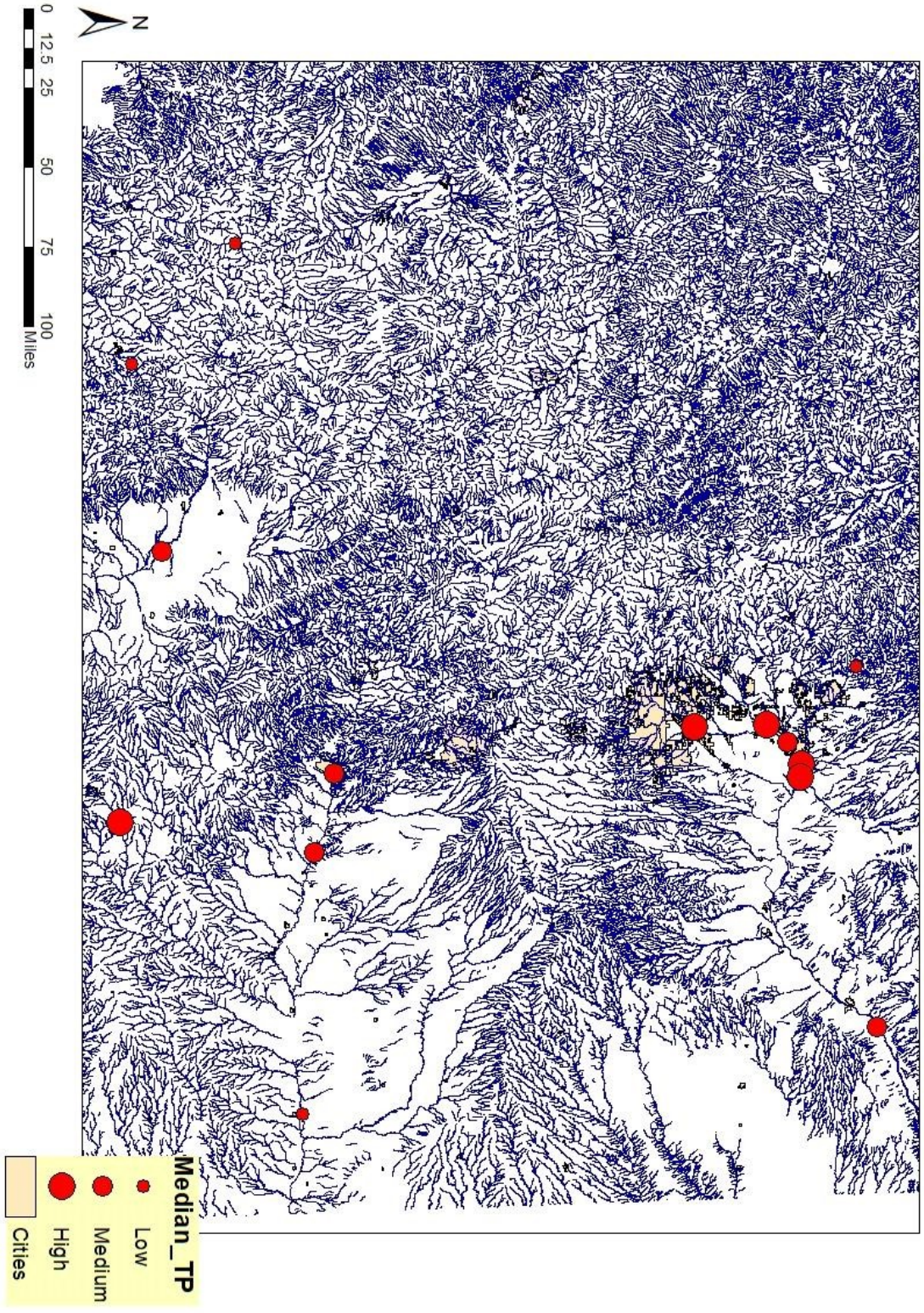

Figure 7. Map showing spatial distribution of nitrate (NO_3-N) in stream samples, classified as above or below the U.S. EPA Drinking Water Standard of 10.0 mg/L.

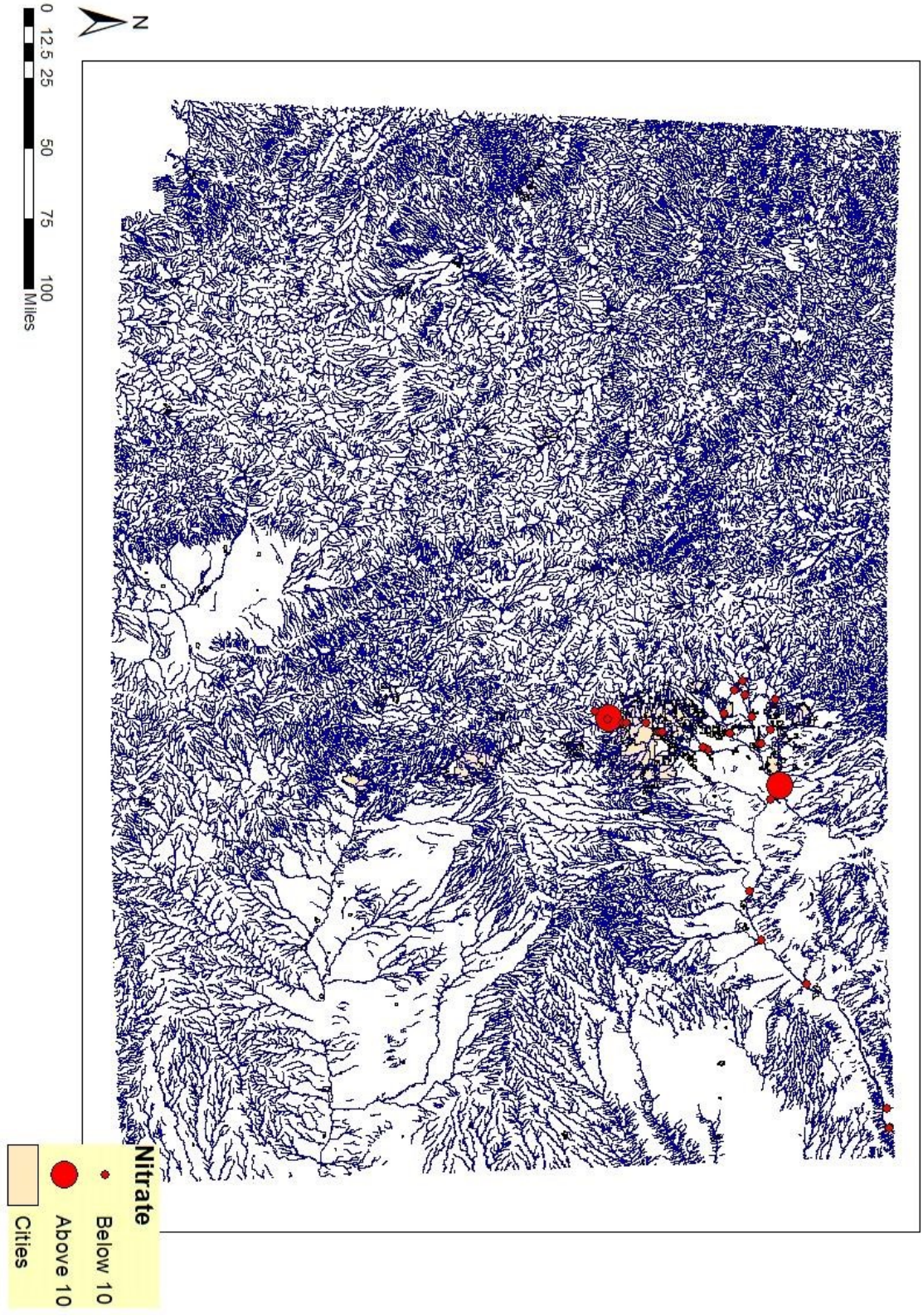

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Figure 8. Map showing spatial distribution of electrical conductivity in stream samples which is classified according to Colorado State University Extension Fact Sheet #0.506.

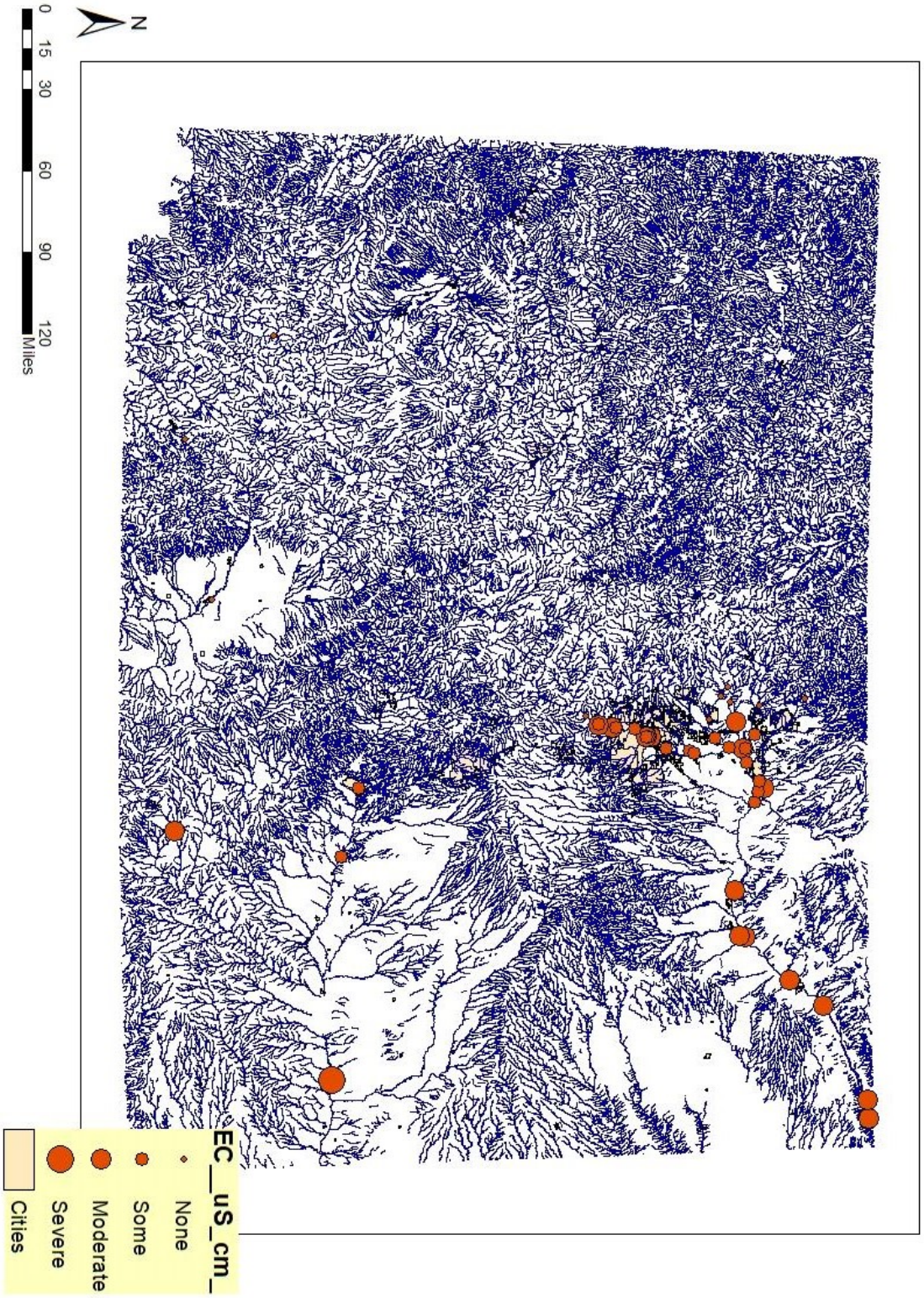
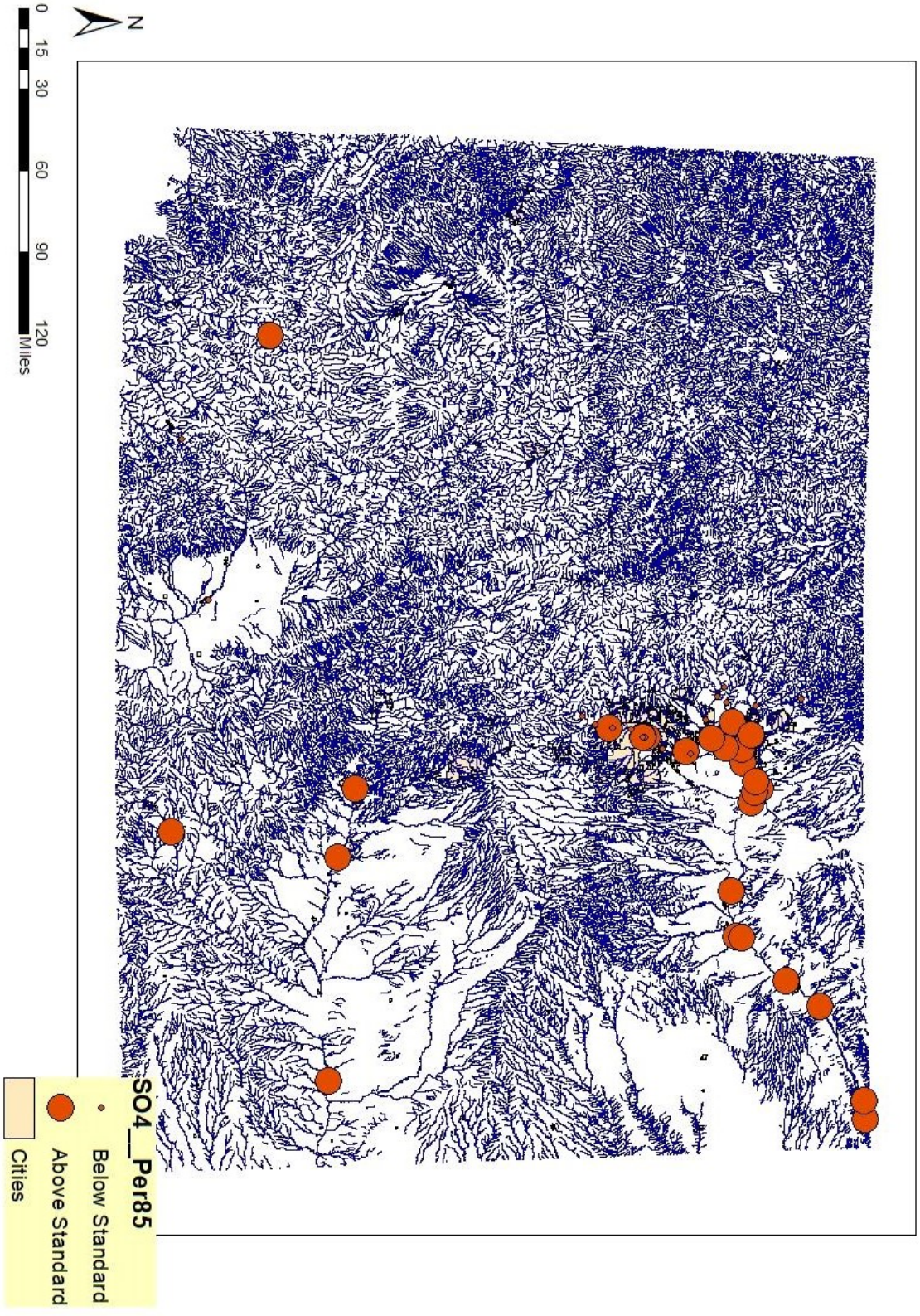


Figure 9. Map showing spatial distribution of sulfate in stream samples classified as either above or below the water quality standard of 250 mg/L.



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Glyphosate was detected samples from the Little Thompson River (1.05 µg/L), Crow Creek (2.35 µg/L), the South Platte River (1.27 µg/L), St Vrain Creek (1.02 µg/L), Cherry Creek (3.34 µg/L) and Bear Creek (6.94 µg/L). It was also discovered at two of the six stormwater locations in Denver-metro with a median concentration of 1.46 µg/L. Considering the water quality standard for glyphosate in Colorado is 700 µg/L, all the results meet the standard.

LC-QTOF Analysis - Pesticides with Evidence of Presence			
Pesticide Compound	**Type**	**Pesticide Compound**	**Type**
2,4-DCP	H (DEG)	Fluoxypyr	H
Ametryne	H	MBC_Benomyl	F
Aminopyralid	H	Methoxyfenozide	I
Avermectin B1a	I	Metolachlor_ CGA 357704	H (DEG)
Camphor	REP	Metolachlor_CGA 50267	H (DEG)
Carbendazim	F	Metolachlor_NOA 413173	H (DEG)
Cyprodinil	F	Oryzalin	H
Demeton-O-methyl	I	Oxyfluorfen	H
Desethyl-Desisopropyl_Atrazine	H (DEG)	Pendimethalin	H
Diazoxon	I (DEG)	Phorate oxon	I (DEG)
Diethyltoluamide (DEET)	REP	Phorate_sulfone	I (DEG)
EPTC	H	Piperonyl butoxide	I
Etridiazole	F	Propiconazole	F
Famoxadone	F	Siduron	H
Fludioxonil	F	Spirodiclofen	I
Flufenacet_ESA	H (DEG)	Terbufos	I
Flumioxazin	H	Terbuthylazine_Hydroxy	A (DEG)
"A" = Algaecide; "DEG" = degradant; "F" = fungicide; "H" = herbicide; "I" = insecticide; "REP" = Repellant			

Table 4. *Pesticide compounds discovered using qualitative LC-QTOF analysis. Samples were collected from surface water sites by or on behalf of the Ag Water Quality Program in 2020.*

LC-QTOF analysis revealed evidence of 61 pesticide compounds present in one or more samples – 34 of which are not on the current LC/MS/MS method (**Table 4**). To narrow down which compounds the program should be screening for, AWQP reviewed Colorado's pesticide product registration status/history; U.S. EPA aquatic and human health benchmarks for pesticides (when available); and results of other monitoring programs in neighboring states or the USGS in the US Dept of Interior. This further analysis was done on a list of about 325 compounds which includes the 61 compounds discovered via LC-QTOF. A final list of 66 pesticide compounds was presented to the CDA lab to determine fitment on the existing LC/MS/MS direct-injection method. At the time of writing this report, it has been determined that about 35-45 of the compounds could be added to the screen for the 2021 analysis year.

CONCLUSION

The AWQP allocated most of its resources and analytical capacity toward accomplishing its first intensive sampling of surface water in Colorado in 2020. Due to SARS-CoV-2 travel restrictions, nearly all sampling

activity was restricted to within the SPRB with exception to some split samples obtained through collaboration with WQCD. The program successfully collaborated with Colorado School of Mines for urban storm-water samples, and its colleagues at CSU Extension to acquire Edge-Of-Field samples in the SPRB. Groundwater sampling was limited to 19 sites in the SPRB which were primarily sites added to the program's new legacy monitoring network.

Results seen for groundwater samples agreed with historical results for the locations sampled. Median nitrate-N in the eight legacy MWs in the rural-agricultural land use area was 8.5 mg/L compared to 3.5 mg/L for four legacy MWs sampled in the Denver-metro urban land use area. About 75% of the 19 wells detected one or more pesticide compounds and the herbicide metolachlor and its major degradants account for 56% of the 41 detects of 13 different compounds.

While this was the first year of sampling by the program in surface waters of the state, WQCD was able to use the limited results to assess against established standards or, at least for nutrients, against their long-term understanding of quality in the streams they have sampled. Nitrogen was assessed to a limited extent using classes of TN and TP results, and to a greater extent using (NO_3+NO_2)-N compared to the drinking water standard. TN and TP results in the SPRB reveal that high levels could be presenting, and TP results in the ARB show a similar response. Two stream sites and one stormwater site in the SPRB exceeded the nitrate standard. Sulfate results show it exceeding the 250 mg/L standard at nearly all sites; however, this may not indicate impairment since the standard in Regulation 31 is either existing quality as of January 1, 2000 or 250 mg/L. Salinity was assessed based on measured EC and showed levels in the mainstem of the South Platte River of 600-1500 µS/cm up to Fort Morgan, CO and then a gradual increase to above 2,000 µS/cm before the water leaves the state near Julesburg, CO

Pesticide analysis in surface water showed quantified detections of glyphosate at several sites but all levels were significantly below the water quality standard of 700 µg/L. Qualitative pesticide analysis using an LC-QTOF instrument provided useful information to AWQP and assisted in the development of a list of 60+ pesticide compounds the program desires to add to its water quality screening capability over the next few years. The AWQP hopes to be screening for upwards of 140 pesticide compounds in 2021.

AWQP plans to continue expanding monitoring of surface water in 2021 but will work to conduct its full groundwater sampling plan as well. Surface water work will focus on collaborating with WQCD to obtain samples from most of the 29 legacy monitoring sites they sample as well as integrating with their SPRB-focused plans to efficiently optimize coverage throughout the basin. The program will also continue collaborating with CSU to collect samples from stream segments above and below several agricultural fields equipped with EOF monitoring equipment. Requests for water quality testing from some towns on the Western Slope of Colorado may find AWQP conducting some limited sampling in watersheds outside of the SPRB, but otherwise, nearly all sampling work will intensively focus on the mainstem and tributaries of the SPRB in 2021. Groundwater efforts will see intensive sampling of the South Platte alluvial aquifer; the Front Range Urban network, and the San Luis Valley.

APPENDIX A – *Reporting limits for pesticide and inorganic parameters analyzed by the Colorado Dept of Agriculture's Division of Laboratory Services in 2021. Only groundwater samples were quantitatively analyzed for the pesticides in this list. Both groundwater and surface water samples were quantitatively analzyed for the Inorganic Anions.*

Parameter Reporting Limits For CDA Laboratory LC/MS/MS Direct-Inject Method Used for Pesticide Analysis and For Inorganic Anion Analysis

Parameter	Reporting Limit	Unit	Parameter	Reporting Limit	Unit	Parameter	Reporting Limit	Unit	Parameter	Reporting Limit	Unit
2,4-D	0.10	ug/L	Desisopropyl_Atrazine	0.10	ug/L	Malathion	0.10	ug/L	Terbacil	0.25	ug/L
2,4-DB	0.10	ug/L	Dicamba	0.25	ug/L	MCPA	0.10	ug/L	Thiamethoxam	0.10	ug/L
2,4-DP	0.10	ug/L	Dichlorvos	0.10	ug/L	MCPP	0.10	ug/L	Triadimefon	0.10	ug/L
3-Hydroxycarbofuran	0.10	ug/L	Dimethenamid	0.10	ug/L	Metalaxyl	0.10	ug/L	Triallate	0.10	ug/L
Acetochlor	0.10	ug/L	Dimethenamid_ESA	0.10	ug/L	Metconazole	0.10	ug/L	Triasulfuron	0.10	ug/L
Acetochlor_ESA	0.10	ug/L	Dimethenamid_OA	0.10	ug/L	Methomyl	0.10	ug/L	Triclopyr	0.10	ug/L
Acetochlor_OA	0.10	ug/L	Dimethoate	0.10	ug/L	Metolachlor	0.10	ug/L	Triticonazole	0.10	ug/L
Acifluorfen	0.10	ug/L	Dinotefuran	0.10	ug/L	Metolachlor_ESA	0.10	ug/L	Glyphosate	1.00	ug/L
Alachlor	0.10	ug/L	Disulfoton_sulfoxide	0.10	ug/L	Metolachlor_OA	0.10	ug/L	AMPA	2.00	ug/L
Alachlor_ESA	0.10	ug/L	Diuron	0.10	ug/L	Metribuzin	0.10	ug/L			
Alachlor_OA	0.10	ug/L	Ethofumesate	0.25	ug/L	Metsulfuron_methyl	0.10	ug/L	**INORGANIC ANIONS**		
Aldicarb	0.10	ug/L	Ethoprop	0.10	ug/L	Nicosulfuron	0.10	ug/L	Br	0.05	mg/L
Aldicarb_sulfone	0.10	ug/L	Fenamiphos	0.10	ug/L	Norflurazon	0.10	ug/L	Cl	0.05	mg/L
Aldicarb_sulfoxide	0.10	ug/L	Florasulam	0.10	ug/L	Norflurazon_desmethyl	0.10	ug/L	F	0.05	mg/L
Aminopyralid	0.10	ug/L	Flufenacet	0.10	ug/L	Oxamyl	0.10	ug/L	Nitrate-N(NO_3-N)	0.011	mg/L
Atrazine	0.10	ug/L	Flumetsulam	0.25	ug/L	Picloram	0.10	ug/L	Nitrite-N(NO_2-N)	0.015	mg/L
Azoxystrobin	0.10	ug/L	Halofenozide	0.10	ug/L	Prometon	0.10	ug/L	Ortho-PO_4	0.10	mg/L
Bentazon	0.10	ug/L	Halosulfuron_methyl	0.25	ug/L	Propazine	0.10	ug/L	SO_4	0.05	mg/L
Bromacil	0.25	ug/L	Hexazinone	0.10	ug/L	Propoxur	0.10	ug/L			
Carbaryl	0.10	ug/L	Hydroxy_Atrazine	0.04	ug/L	Prosulfuron	0.10	ug/L			
Carbofuran	0.10	ug/L	Imazamethabenz_methyl	0.10	ug/L	Pyrimethanil	0.10	ug/L			
Chlorantraniliprole	0.10	ug/L	Imazamox	0.10	ug/L	Quinclorac	0.10	ug/L			
Chlorimuron_ethyl	0.10	ug/L	Imazapic	0.10	ug/L	Simazine	0.10	ug/L			
Chlorsulfuron	0.10	ug/L	Imazapyr	0.10	ug/L	Sulfentrazone	0.25	ug/L			
Clopyralid	0.10	ug/L	Imazethapyr	0.10	ug/L	Sulfometuron_methyl	0.10	ug/L			
Clothianidin	0.10	ug/L	Imidacloprid	0.10	ug/L	Sulfosulfuron	0.10	ug/L			
Cyproconazole	0.10	ug/L	Isoxaflutole	0.25	ug/L	Tebuconazole	0.10	ug/L			
Cyromazine	0.10	ug/L	Kresoxim_methyl	0.10	ug/L	Tebufenozide	0.10	ug/L			
Desethyl_Atrazine	0.10	ug/L	Linuron	0.10	ug/L	Tebuthiuron	0.10	ug/L			

APPENDIX B – *Lab results and field measurements for surface water sites sampled by or on behalf of CDA's Agricultural Water Quality Program in 2021. Laboratory results only include data reported by the CDA lab. "ND" = Not Detected.*

Site Locations & Data for Stream or Storm-water Samples Collected in 2020

SITE INFORMATION					FIELD MEASUREMENTS					LABORATORY RESULTS							
					Temperature	pH	Conductivity	Dissolved O2	Turbidity	Br	Cl	F	(NO3+NO2)-N	Ortho-PO4	SO4	Glyphosate	AMPA
CDA ID	Waterbody Name	Latitude	Longitude	Sample Date	°C	-	µS/cm	mg/L	FNU	---------- mg/L ----------						-------- µg/L ----------	
SW4 5751	Bear Creek	39.6499	-105.0136	8/3/2020	23.4	8.3	947	8.5	1.9	0.18	135	0.40	0.40	ND	103	ND	ND
				8/27/2020	21.7	8.2	991	8.4	2.4	0.18	135	0.45	0.83	ND	106	**6.94**	**1.71**
				10/8/2020	13.1	8.3	1110	10.1	1.4	0.21	159	0.44	0.67	ND	129	ND	ND
SW23 5065	Beaver Creek	40.3355	-103.5465	8/24/2020	16.3	7.5	2137	21.8	12.9	0.60	117	0.61	2.06	ND	610	ND	ND
				10/7/2020	13.2	8.2	1552	10.5	2.5	0.50	109	0.67	2.99	0.16	446	ND	ND
SW23B	Beaver Creek	40.3058	-103.5561	8/4/2020	24.2	8.4	1606	10.2	30.0	0.57	113	0.67	3.40	0.62	461	ND	ND
				8/24/2020	23.5	8.2	1815	12.3	12.7	0.64	126	0.62	3.78	0.23	561	ND	ND
				10/7/2020	15.1	8.5	1535	12.2	5.5	0.52	108	0.65	3.77	0.22	443	ND	ND
SW3 5811	Big Dry Creek (Daniel's Park)	39.6305	-105.0138	8/3/2020	23.8	8.2	1621	7.2	4.1	0.44	229	0.59	1.88	ND	265	ND	ND
				8/27/2020	21.0	8.2	1706	8.1	1.7	0.43	238	0.52	2.30	ND	290	ND	**1.68**
				10/8/2020	11.4	8.1	1710	9.7	0.6	0.45	245	0.52	2.14	ND	319	ND	ND
SW32 5222	Big Dry Creek (Standley Lake)	40.0436	-104.8492	10/14/2020	16.0	8.2	1490	11.0	4.2	0.35	147	0.73	2.18	0.23	343	ND	ND
SW8 5221	Big Dry Creek (Standley Lake)	40.0695	-104.8329	8/3/2020	20.5	7.5	1119	6.4	35.0	0.24	131	0.66	3.03	0.39	192	ND	ND
				9/2/2020	18.0	7.4	1077	6.8	38.0	0.24	130	0.67	2.55	1.56	178	ND	**1.33**
SW15 5419C	Big Thompson River	40.4175	-105.1677	7/29/2020	19.3	7.9	101	8.4	1.8	ND	2.17	0.14	0.06	ND	15.4	ND	ND
				8/25/2020	17.5	7.7	185	8.8	1.3	ND	2.38	0.17	0.01	ND	41.2	ND	ND
				10/6/2020	12.0	8.2	397	11.2	0.8	ND	5.16	0.22	ND	ND	125	ND	ND
SW16 5417	Big Thompson River	40.3946	-104.9647	7/30/2020	22.0	8.3	619	7.7	11.1	0.06	21.9	0.36	1.00	ND	412	ND	ND
				8/25/2020	23.5	7.9	814	9.8	3.5	0.10	32.2	0.56	0.92	ND	235	ND	ND
				10/6/2020	12.6	7.8	992	8.9	3.0	0.12	44.3	0.60	6.01	ND	303	ND	ND
SW17 5418	Big Thompson River	40.3449	-104.8678	7/29/2020	25.9	8.1	1003	8.5	41.6	0.10	26.6	0.44	1.27	ND	339	ND	ND
				8/25/2020	22.4	7.9	1222	9.2	17.2	0.14	26.8	0.46	0.21	ND	435	ND	ND
				10/6/2020	11.3	7.9	1199	9.3	10.9	0.14	38.2	0.55	3.19	ND	417	ND	ND
SW20	Bijou Creek	40.2798	-103.8769	8/4/2020	18.1	7.6	1613	4.4	0.2	0.45	88.5	0.55	8.33	ND	502	ND	ND
				8/24/2020	17.3	7.5	1624	5.1	5.7	0.46	89.5	0.57	8.76	ND	513	ND	ND
				10/7/2020	15.6	7.7	1589	5.8	1.7	0.46	93.6	0.61	8.20	ND	507	ND	ND
SW5 5241	Cherry Creek	39.7525	-105.0089	7/29/2020	17.6	8.1	1173	7.5	5.7	0.30	169	0.45	2.25	ND	168	**1.35**	ND
				9/1/2020	16.1	8.0	1162	7.7	44.8	0.27	157	0.47	1.50	0.11	187	**5.32**	**1.19**
				10/15/2020	11.1	8.5	1481	10.4	1.5	0.42	237	0.50	2.06	ND	213	ND	ND
SW7 5600	Clear Creek	39.8272	-104.9502	7/28/2020	24.0	8.9	629	11.7	1.8	0.13	81.5	0.50	0.40	0.15	68.2	ND	**3.85**
				8/28/2020	22.0	7.9	1311	7.5	1.0	0.34	200	0.59	0.19	ND	150	ND	**3.12**
				10/15/2020	12.5	8.5	1510	12.3	3.3	0.38	241	0.69	ND	ND	169	ND	**6.6**
SW19 5207	Crow Creek	40.3919	-104.4910	7/30/2020	20.1	8.1	1290	7.6	50.9	0.33	57.7	0.53	6.69	0.97	403	**1.14**	ND
				8/25/2020	26.6	8.6	1193	9.5	33.5	0.38	58	0.60	5.78	3.13	355	**3.56**	**1.44**
				10/14/2020	12.7	8.1	1399	9.2	9.4	0.42	81.8	0.64	9.44	2.61	417	ND	ND
SW2B	Dutch Creek (u/s WWTP)	39.5558	-105.0346	8/27/2020	20.3	8.2	1644	8.5	1.7	0.53	267	0.52	1.02	ND	204	ND	ND
				10/8/2020	9.8	7.4	1664	8.9	0.7	0.54	279	0.54	0.98	ND	218	ND	ND

APPENDIX B – *Continued…*

Site Locations & Data for Stream or Storm-water Samples Collected in 2020

SITE INFORMATION					FIELD MEASUREMENTS					LABORATORY RESULTS							
					Temperature	pH	Conductivity	Dissolved O_2	Turbidity	Br	Cl	F	(NO_3+NO_2)-N	Ortho-PO_4	SO_4	Glyphosate	AMPA
CDA ID	Waterbody Name	Latitude	Longitude	Sample Date	°C	-	µS/cm	mg/L	FNU	---------- mg/L ----------						-------- µg/L ----------	
SW2 5816	Dutch Creek (d/s WWTP)	39.5605	-105.0400	7/31/2020	22.1	7.9	1022	7.3	4.1	0.23	145	0.79	14.70	1.58	114	ND	ND
				8/27/2020	23.7	8.2	1143	7.4	2.2	0.27	171	0.77	18.50	1.18	117	ND	ND
				10/8/2020	20.9	7.8	1328	7.3	6.9	0.29	227	0.68	15.80	ND	159	ND	ND
SW12 5456	Little Thompson River	40.2606	-105.1973	7/30/2020	22.2	9.0	164	8.5	1.2	ND	2.56	0.17	ND	ND	27.8	ND	ND
				8/31/2020	13.7	8.2	154	8.8	1.6	ND	2.11	0.16	0.02	ND	26.7	ND	ND
				10/6/2020	15.1	8.6	131	9.2	1.1	ND	1.73	0.15	ND	ND	22.6	ND	ND
SW13 5455	Little Thompson River	40.2966	-105.0553	7/30/2020	21.5	8.0	1570	7.4	170.0	0.13	26.1	0.46	1.37	ND	635	**1.05**	ND
				8/31/2020	13.4	7.9	2123	8.0	30.0	0.18	32.4	0.50	1.75	ND	954	ND	ND
				10/6/2020	11.2	7.9	1519	9.7	5.5	0.11	22.4	0.43	0.84	ND	639	ND	ND
SW14 000124A	Little Thompson River	40.3344	-104.8686	7/29/2020	20.4	8.0	1316	6.8	131.2	0.12	25.9	0.52	4.06	ND	496	ND	ND
				8/25/2020	19.5	7.9	1425	6.9	87.0	0.18	31.6	0.57	5.34	ND	532	ND	ND
				10/6/2020	11.1	7.4	1808	8.5	10.1	0.20	36.2	0.63	5.75	0.14	743	ND	ND
SW25B	Lodgepole Creek	40.9682	-102.3855	8/4/2020	22.5	8.6	1950	12.3	40.0	0.73	135	0.46	0.72	ND	697	ND	ND
				8/26/2020	23.5	8.7	1886	12.5	9.1	0.71	133	0.50	1.09	ND	668	ND	ND
				10/7/2020	14.0	8.3	2069	10.1	22.0	0.75	145	0.48	1.31	ND	774	ND	ND
SW18 0027707	Lone Tree Creek	40.4423	-104.5889	7/30/2020	17.3	8.2	1307	9.3	12.9	0.21	46.9	0.46	6.94	ND	189	ND	ND
				8/25/2020	22.5	8.3	1430	9.4	123.0	0.26	49.6	0.48	8.17	ND	467	ND	ND
				10/14/2020	11.5	7.9	1873	15.0	2.0	0.39	66.5	0.41	14.65	ND	666	ND	ND
SW24	Pawnee Creek	40.5672	-103.2385	8/4/2020	24.1	8.5	1673	11.0	65.0	0.59	116	0.65	0.79	ND	531	ND	ND
				8/26/2020	24.1	8.5	1773	7.9	68.0	0.62	119	0.64	1.95	ND	562	ND	ND
				10/7/2020	13.9	8.4	1776	10.1	24.0	0.62	122	0.62	1.48	ND	610	ND	ND
SW6 5261	Sand Creek	39.8128	-104.9521	7/28/2020	22.1	8.0	1133	7.4	10.6	0.27	144	0.57	4.71	1.00	176	ND	ND
				8/28/2020	20.8	7.9	1350	7.5	7.4	0.36	180	0.58	5.30	1.02	225	ND	ND
				10/15/2020	14.1	8.4	2033	10.3	1.7	0.71	278	0.55	1.96	0.55	487	ND	**1.2**
SW1 5722	South Platte River	39.4885	-105.0932	7/31/2020	14.2	7.4	241	8.7	2.9	ND	12	0.44	0.15	ND	52	ND	ND
				8/27/2020	19.2	8.9	346	8.6	0.8	ND	29.1	0.46	0.06	ND	42.1	ND	ND
				10/8/2020	11.1	8.3	396	9.4	1.4	ND	36.6	0.44	ND	ND	47.3	ND	ND
SW26 5049	South Platte River	40.9744	-102.2497	8/4/2020	21.6	8.3	2125	9.9	8.4	0.73	130	0.35	2.75	ND	792	ND	ND
				8/26/2020	23.4	8.2	2112	10.9	3.1	0.72	134	0.36	3.08	ND	861	ND	ND
				10/7/2020	14.8	8.0	2142	10.4	5.6	0.74	142	0.41	1.86	ND	805	ND	ND
SW39 5262	South Platte River	39.8389	-104.9487	10/15/2020	12.1	8.3	2293	9.2	7.1	0.58	310	0.69	0.04	ND	595	ND	ND
SW40 SP64	South Platte River u/s WWTP	39.8122	-104.9593	10/15/2020	13.5	7.7	2109	8.2	3.7	0.41	312	1.13	3.97	0.37	452	ND	ND
SW41	South Platte River d/s WWTP	39.8128	-104.9521	10/15/2020	21.6	7.7	910	6.7	3.4	0.22	110	0.64	2.30	2.72	125	ND	ND

Appendix B – *Continued…*

Site Locations & Data for Stream or Storm-water Samples Collected in 2020

SITE INFORMATION					FIELD MEASUREMENTS					LABORATORY RESULTS							
					Temperature	pH	Conductivity	Dissolved O2	Turbidity	Br	Cl	F	(NO3+NO2)-N	Ortho-PO4	SO4	Glyphosate	AMPA
CDA ID	Waterbody Name	Latitude	Longitude	Sample Date	°C	-	µS/cm	mg/L	FNU	---------- mg/L ----------						-------- µg/L ----------	
SW10 5511	St. Vrain Creek	40.1537	-105.0755	8/3/2020	21.9	8.1	597	9.3	15.0	0.06	23.4	0.44	2.69	1.66	136	ND	ND
				8/31/2020	19.7	7.9	479	9.5	7.2	ND	20.8	0.42	2.17	2.01	98.4	ND	ND
				10/14/2020	17.3	8.0	707	9.7	3.9	0.08	37.7	0.63	2.87	3.35	159	ND	ND
SW11 5503A	St. Vrain Creek	40.1633	-104.9807	8/3/2020	21.7	8.0	897	8.0	30.0	0.15	37.5	0.57	1.46	ND	255	ND	ND
				8/31/2020	19.6	8.4	807	10.0	17.3	0.17	37.5	0.62	1.47	0.97	210	ND	ND
				10/14/2020	15.1	8.6	1007	14.3	2.4	0.20	56.4	0.69	1.23	1.18	295	ND	ND
SW9 5551	St. Vrain Creek	40.2485	-105.2974	7/30/2020	19.2	8.0	25	7.7	1.1	ND	1.08	0.10	0.04	ND	1.45	ND	ND
				8/31/2020	15.5	7.6	28	8.5	1.4	ND	1.47	0.11	0.05	ND	1.57	ND	ND
				10/6/2020	11.3	8.5	42	9.8	0.9	ND	3.03	0.14	ND	ND	1.81	ND	ND
SW9B	St. Vrain Creek	40.2102	-105.2352	10/6/2020	15.2	8.1	90	9.0	1.1	ND	3.55	0.14	0.02	ND	7.99	ND	ND
5Pts	Five Points - Arkins Ct & 29th St (Stormwater Drainage)	39.7661	-104.9885	8/16/2020	18.3	8.0	1494	NOT MEASURED		0.38	233	0.40	7.14	ND	135	ND	ND
				9/7/2020	18.6	7.6	1438			0.33	249	0.45	6.39	0.10	122	ND	ND
				9/20/2020	18.0	7.6	1291			0.31	201	0.45	6.04	ND	120	ND	ND
				10/4/2020	17.1	7.7	1372			0.34	218	0.46	6.63	ND	130	ND	ND
DSk8	Denver Skate Park (Stormwater Drainage)	39.7606	-105.0019	8/16/2020	18.0	7.6	1896			0.73	345	0.58	2.68	ND	200	ND	ND
				9/7/2020	18.1	7.3	1807			0.76	317	0.61	2.76	ND	194	ND	ND
				9/20/2020	17.5	7.4	1803			0.68	317	0.62	2.72	ND	195	ND	ND
				10/4/2020	17.5	7.4	1850			0.69	335	0.60	2.86	ND	207	ND	ND
DWW	DWW - Vallejo St & W 4th Ave (Stormwater Drainage)	39.7225	-105.0131	8/16/2020	20.7	8.4	1790			0.40	140	0.96	14.20	ND	268	ND	ND
				9/7/2020	20.3	8.2	1790			0.40	142	1.00	14.60	0.11	272	ND	ND
				9/20/2020	18.4	8.2	1361			0.27	114	0.85	9.99	ND	191	ND	ND
				10/4/2020	18.1	8.2	1712			0.38	144	1.02	13.70	0.12	269	ND	ND
RiNO	River North - Arkins Ct & 36th St (Stormwater Drainage)	39.7729	-104.9799	8/16/2020	18.6	8.0	832			0.16	84.1	0.74	3.83	ND	131	**1.82**	ND
				9/7/2020	18.1	7.9	726			0.11	63.5	0.79	2.98	0.71	110	**1.61**	ND
				9/20/2020	17.4	7.9	978			0.19	108	0.81	4.25	ND	148	**1.32**	ND
				10/4/2020	16.1	8.1	988			0.16	107	0.92	4.15	0.52	155	ND	ND
WGDN	Weir Gulch @ Mouth (Stormwater Drainage)	39.7309	-105.0182	8/16/2020	25.0	8.8	1084			0.25	129	0.63	0.12	0.13	112	ND	ND
				9/7/2020	21.6	7.9	956			0.20	108	0.62	0.25	0.18	110	ND	ND
				9/20/2020	18.0	7.6	887			0.19	105	0.59	0.49	ND	105	ND	ND
				10/4/2020	17.2	8.4	1095			0.22	122	0.63	0.74	ND	127	ND	ND
WHar	W Harvard Gulch @ Mouth (Stormwater Drainage)	39.6674	-105.0035	8/16/2020	26.9	8.4	1557			0.35	161	0.94	3.94	ND	248	ND	ND
				9/7/2020	23.3	8.0	1503			0.35	158	0.91	3.17	ND	245	**1.02**	ND
				9/20/2020	19.0	7.6	1596			0.34	163	0.80	1.72	ND	232	ND	ND
				10/4/2020	18.0	7.8	1565			0.34	167	0.82	2.71	ND	243	ND	ND