



**Fountain Creek:
Streamflow, Water Quality,
Sediment, Geomorphology,
Biology,
Precipitation**



<https://apps.usgs.gov/Colorado-water/fountain-creek-watershed.html>

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Dept. of Interior**

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Overview

- **Fountain Creek is one of the most intensively monitored watersheds of its size in the United States. Unlike 'research watersheds', monitoring is driven by management concerns and funded by cooperators.**
- **Numerous entities contribute to monitoring work on Fountain Creek because they see value in understanding processes and trends**
- **The partnerships have enabled high quality science. Even more sophisticated understanding will be possible in the future thanks to refinement of the monitoring program.**

USGS Monitoring Program

- Over 50 sites monitored within the watershed

- Streamflow
- Precipitation
- Continuous water quality
- Discrete water quality
- Sediment
- Geomorphology assessments
- Biology

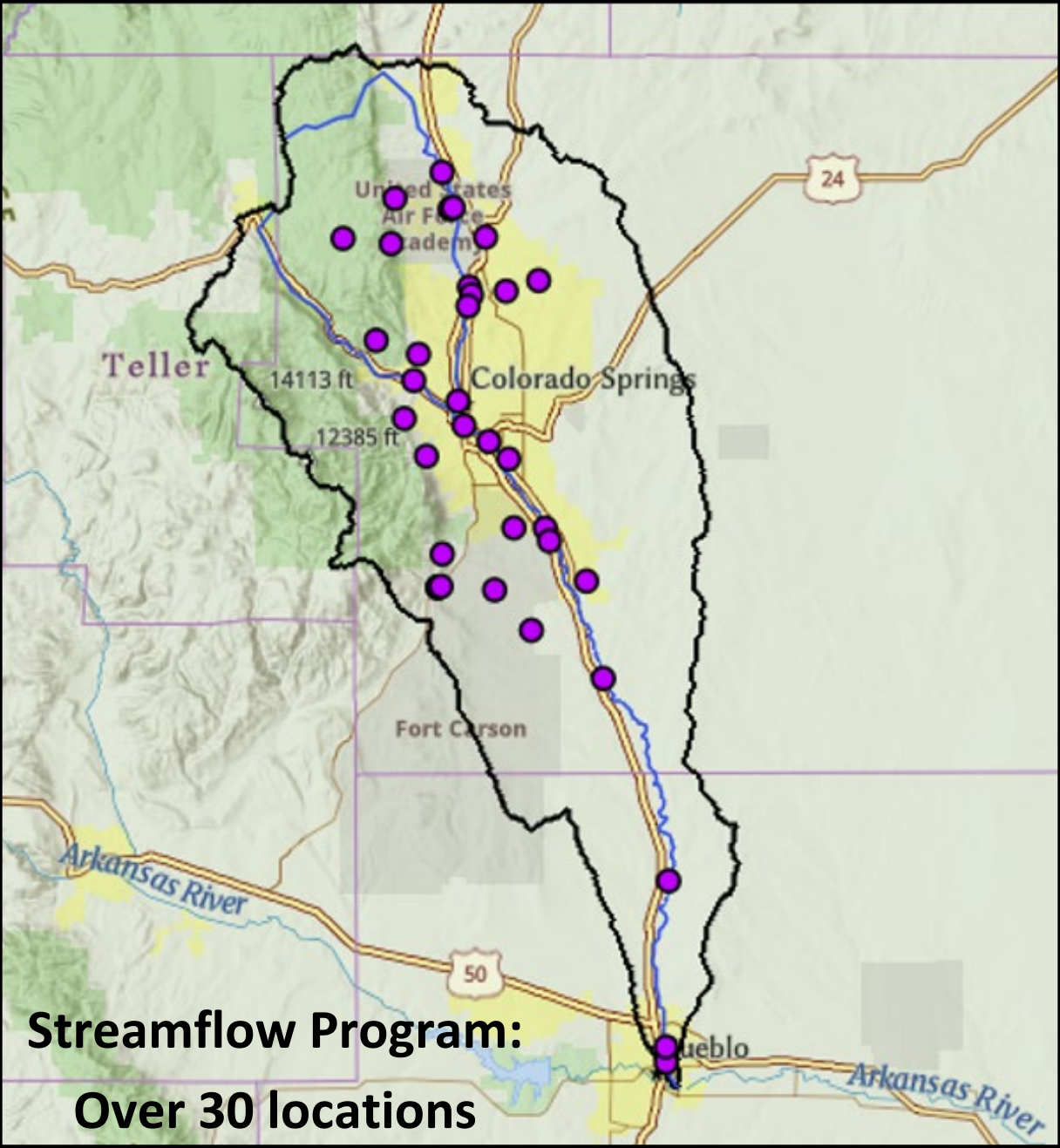
- 10 core sites

- Backbone of future watershed assessments

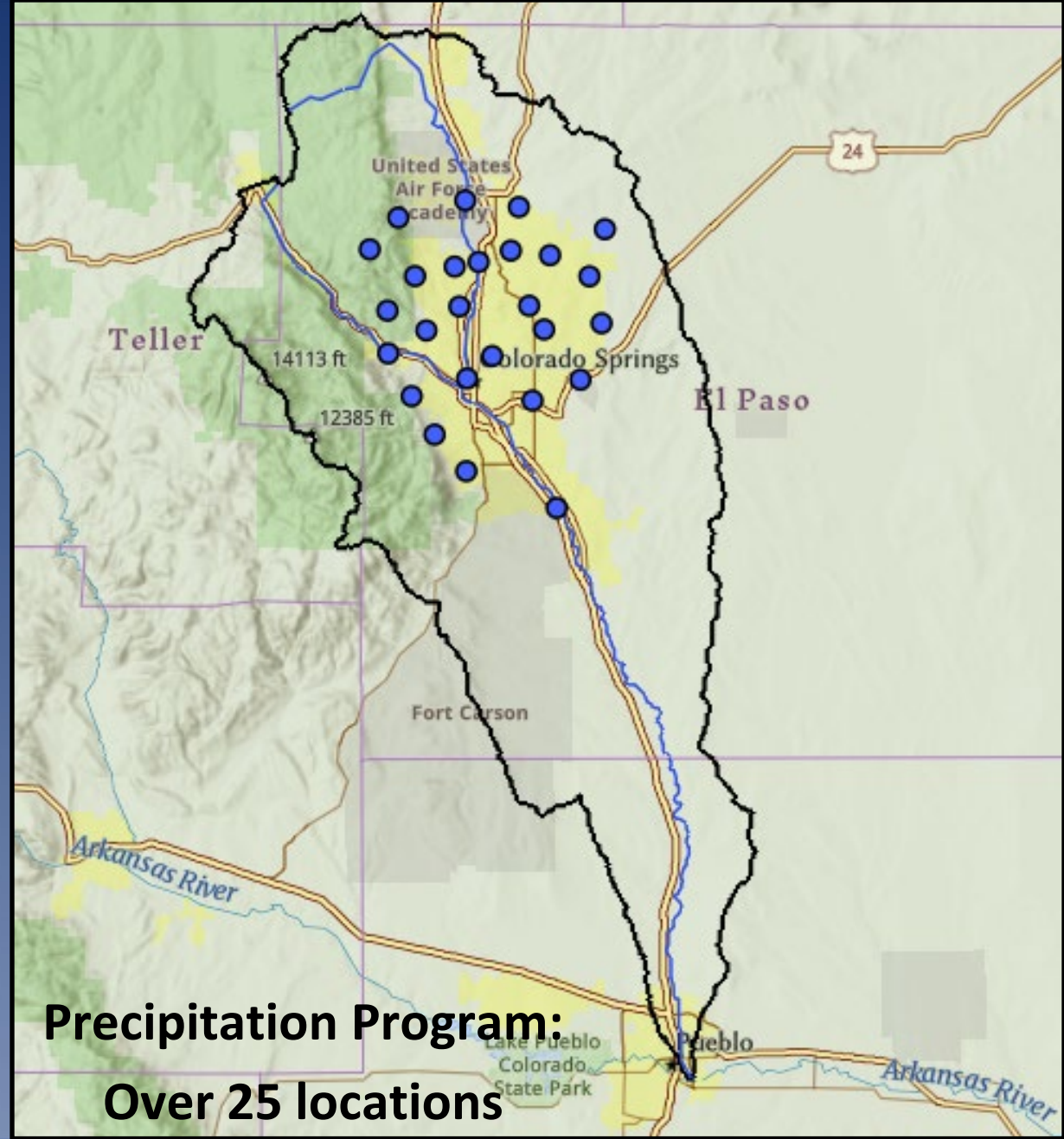
Site ID	Site name	Core Site	Discharge	Temperature	Water Quality	Biology	Sediment Record	Geomorph
07103700	Fountain Creek near Colorado Springs	Yes	Yes	Yes**	Yes	Yes	Yes	No
07103703	Camp Creek at Garden of Gods	No	Yes	No	No	No	No	No
07103707	Fountain Creek at 8th Street	Yes	No	Yes**	Yes	Yes	No	No
07103780	Monument Creek at North Gate AFA1	No	Yes	No	No	No	No	No
07103797	West Monument Creek below Rampart Res.	No	Yes	No	No	No	No	No
07103960	Kettle Creek above USAFA	No	Yes	No	Yes	No	No	No
07103987	Cottonwood Creek at Union Blvd.	No	Yes	No	No	No	No	No
07103970	Monument Creek above Woodmen Rdv	Yes	Yes	Yes**	Yes	Yes	Yes	No
07103980	Cottonwood Creek at Woodmen	No	Yes	No	No	No	No	No
07103990	Cottonwood Creek at mouth	No	Yes	No	Yes	No	No	No
07104000	Monument Creek at Pikeview	No	Yes	No	Yes	No	No	No
385124104501301	Mesa Creek at Sonderman Park	No	No	No	Yes	No	No	No
07104905	Monument Creek at Bijou	Yes	Yes	Yes**	Yes	Yes	Yes	No
07105000	Bear Creek near Colorado Springs	No	Yes	No	No	No	No	No
07105490	Cheyenne Creek at Evans Ave	No	Yes	No	No	No	No	No
07105500	Fountain Creek at Colorado Springs	Yes	Yes	Yes**	Yes	Yes	No	No
384905104485901	Shooks Run	No	No	No	No**	No	No	No
384833104473900	Spring Cr. blw Las Vegas St	No	No	No	No**	No	No	No
07105530	Fountain Creek below Janitell	Yes	Yes	Yes**	Yes	Yes	Yes	No
07105600	Sand Creek above Mouth	No	Yes	No	Yes	No	No	No
	S-01 Geomorph site	No	No	No	No	No	No	Yes
07105800	Fountain Creek at Security	Yes	Yes	Yes**	Yes	Yes	Yes	No
07105900	Jimmy Camp Creek at Fountain	No	Yes	Yes**	Yes	Yes	No	No
	S-02 Geomorph site	No	No	No	No	No	No	Yes
383854104413601	Fountain Creek below Jimmy Camp Creek	No	No	No	Yes*	No	No	No
07106000	Fountain Creek near Fountain	Yes	Yes	Yes	Yes	Yes	No	No
	S-03 Geomorph site	No	No	No	No	No	No	Yes
	S-04 Geomorph site	No	No	No	No	No	No	Yes
383347104373401	Williams Creek	No	No	No	No**	No	No	No
	S-05 Geomorph site	No	No	No	No	No	No	Yes
	S-06 Geomorph site	No	No	No	No	No	No	Yes
382625104353701	Collection Gallery/Sutherland Ditch nr Pinon	No	No	No	Yes*	Yes	No	No
07106300	Fountain Creek at Pinon	Yes	Yes	Yes**	Yes	Yes	Yes	No
	S-07 Geomorph site	No	No	No	No	No	No	Yes
381840104361001	Fountain above 40th Street	No	No	No	Yes*	No	No	No
381601104355801	Fountain at E. River Street	No	No	No	Yes*	No	No	No
07106500	Fountain Creek at Pueblo	Yes	Yes	Yes	Yes	Yes	Yes	No
	S-08 Geomorph site	No	No	No	No	No	No	Yes
	S-09 Geomorph site	No	No	No	No	No	No	Yes
	S-10 Geomorph site	No	No	No	No	No	No	Yes
07099970	Arkansas River at Moffat Street	No	Yes	Yes	Yes*	No**	No	No
07109500	Arkansas River near Avondale	No	Yes	Yes	Yes*	No**	No	No
07099973	Arkansas River Trib above Hwy 227 at Pueblo	No	Yes	No	No	No	No	No
07099050	Beaver Creek above Upper Beaver Cemetary	No	Yes	No	No	No	No	No
07099060	Beaver Creek above Highway 115	No	Yes	No	No	No	No	No

*Preliminary Information-Subject to Revision.
Not for Citation or Distribution.*





**Streamflow Program:
Over 30 locations**



**Precipitation Program:
Over 25 locations**

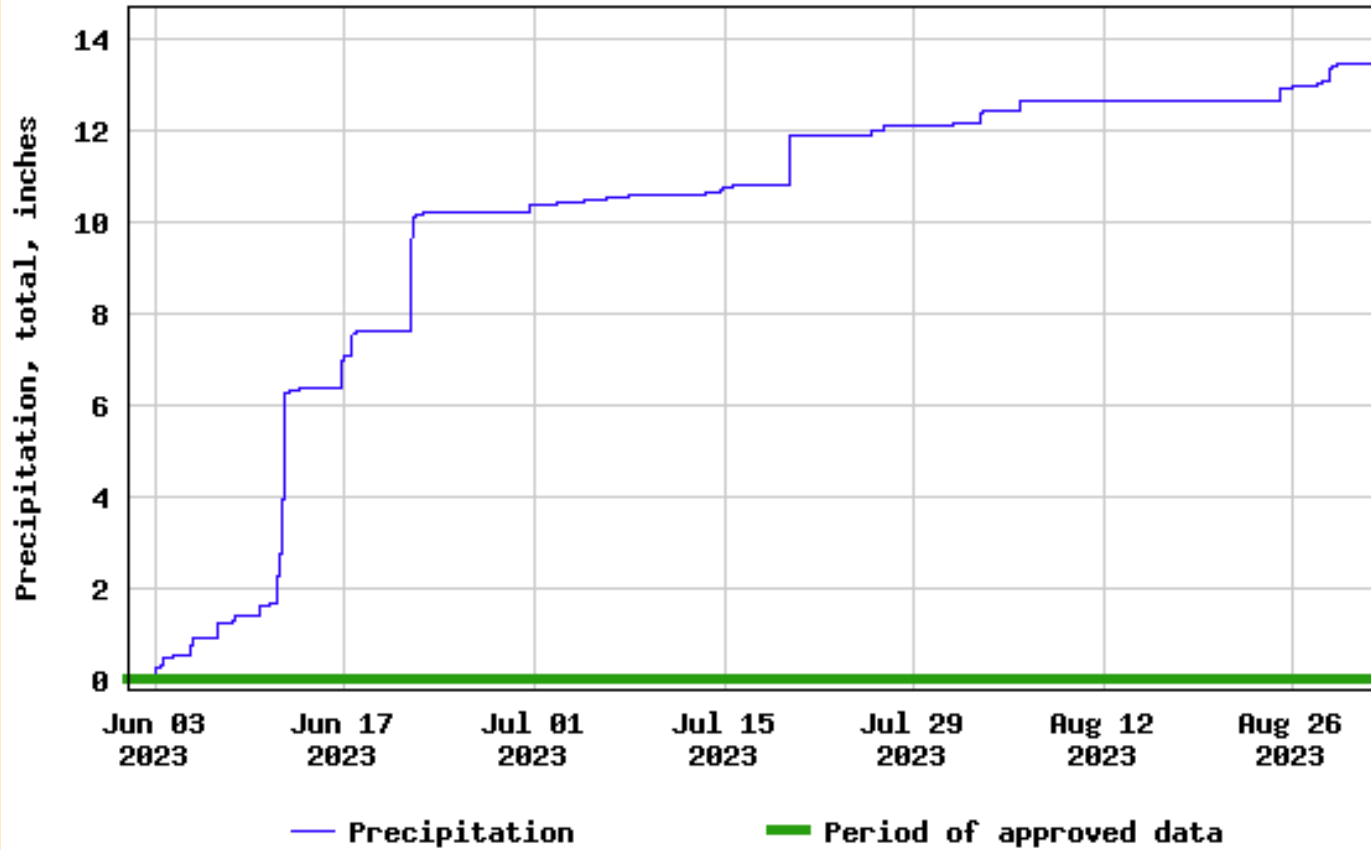


How Precipitation is Monitored





USGS 07105800 FOUNTAIN CREEK AT SECURITY, CO



Streamflow Program:
Over 30 locations

Precipitation Program:
Over 25 locations



www.usgs.gov/cowsc

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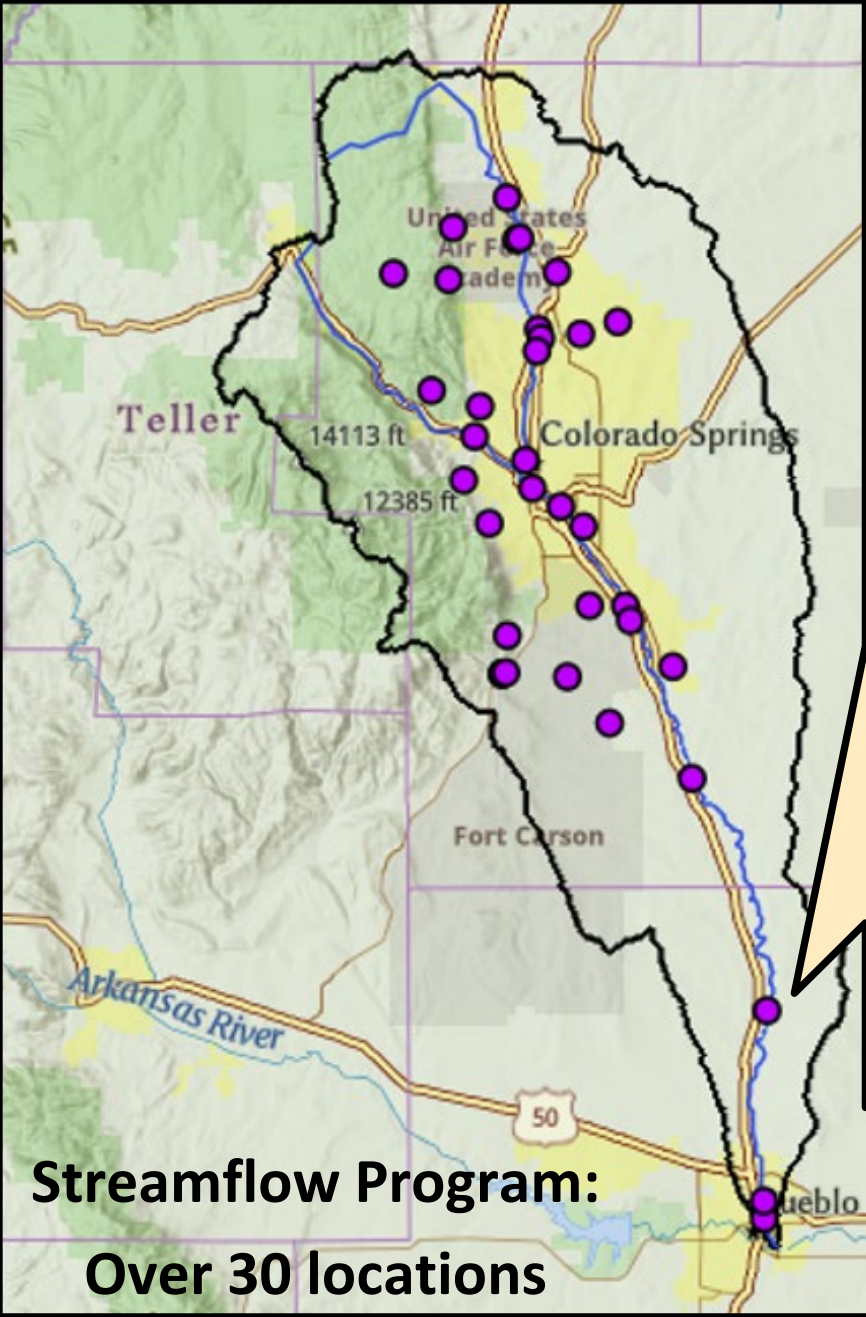
How Streamflow is Monitored



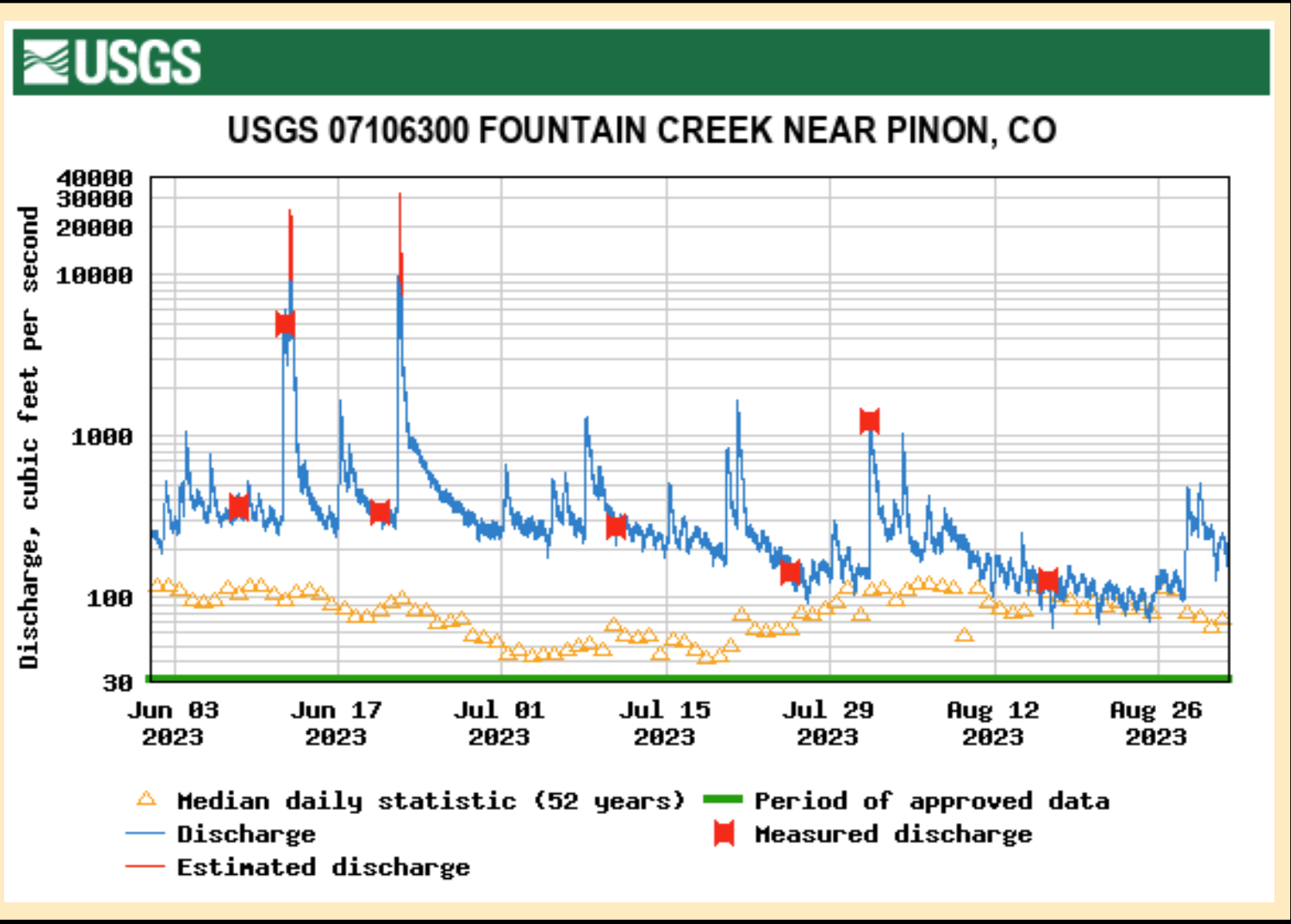
Gage Height =
Height of Water

Discharge =
Velocity x Area





**Streamflow Program:
Over 30 locations**

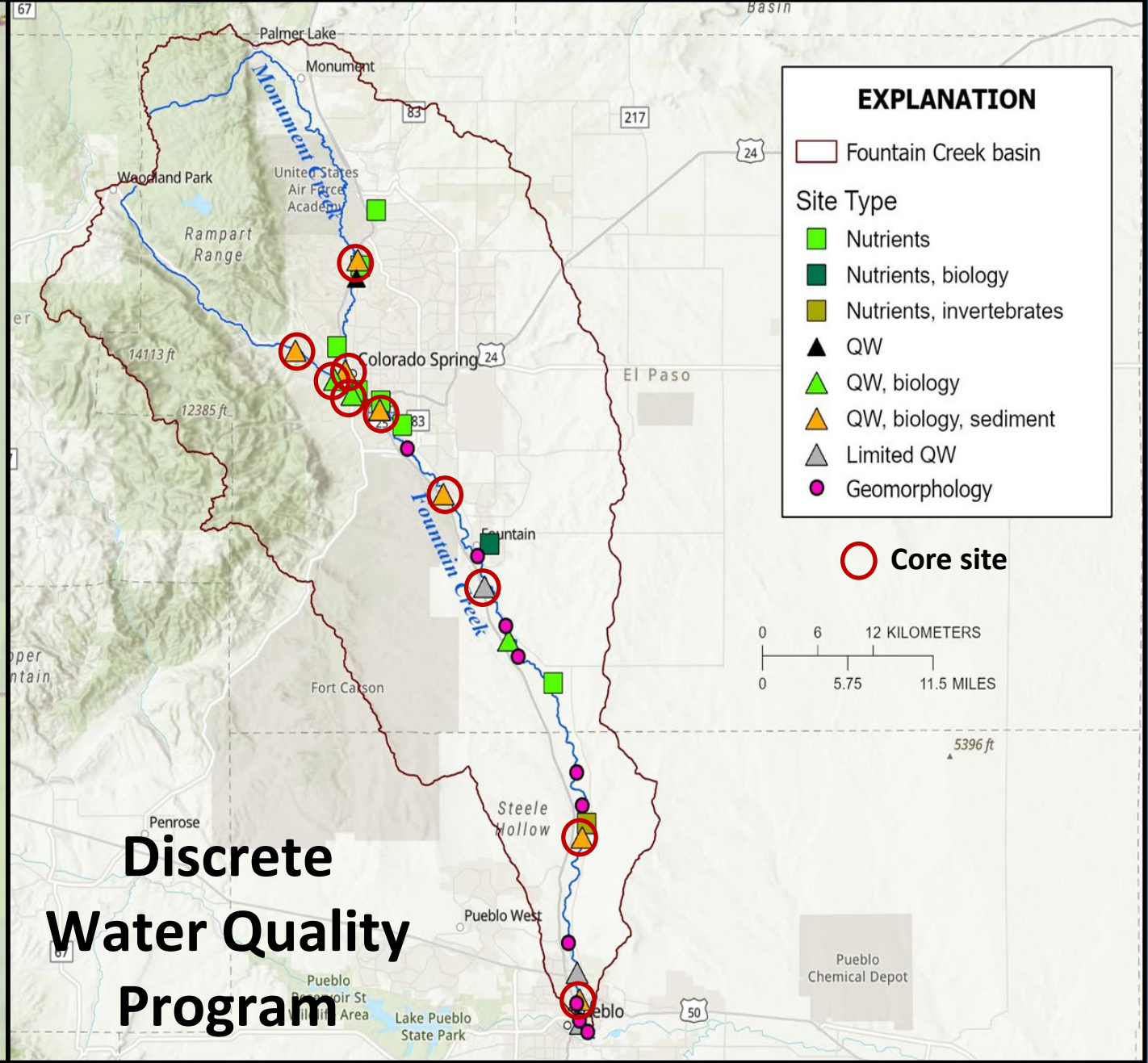


**Precipitation Program:
Over 25 locations**



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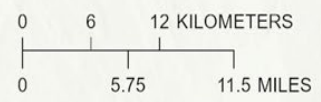
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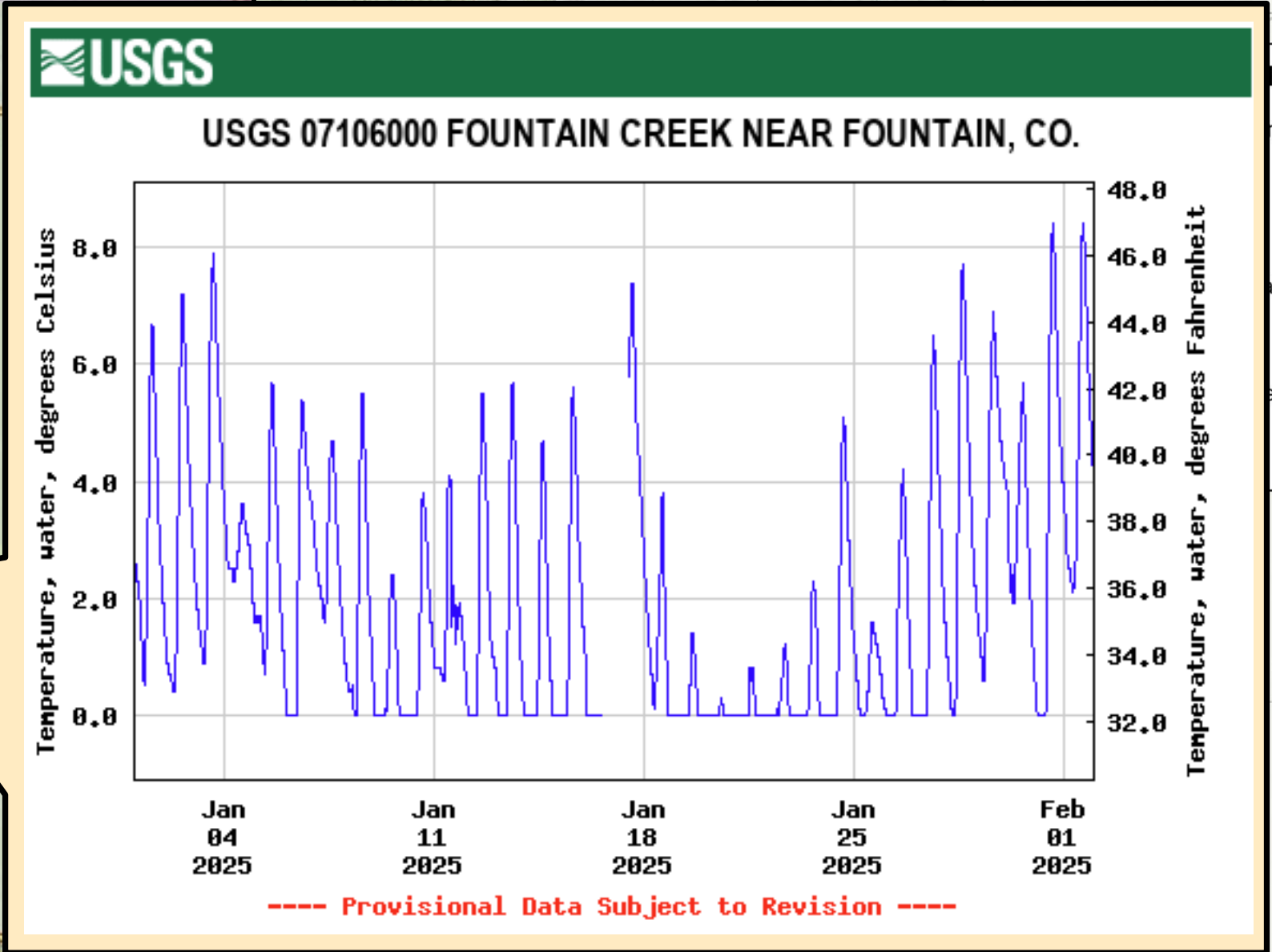
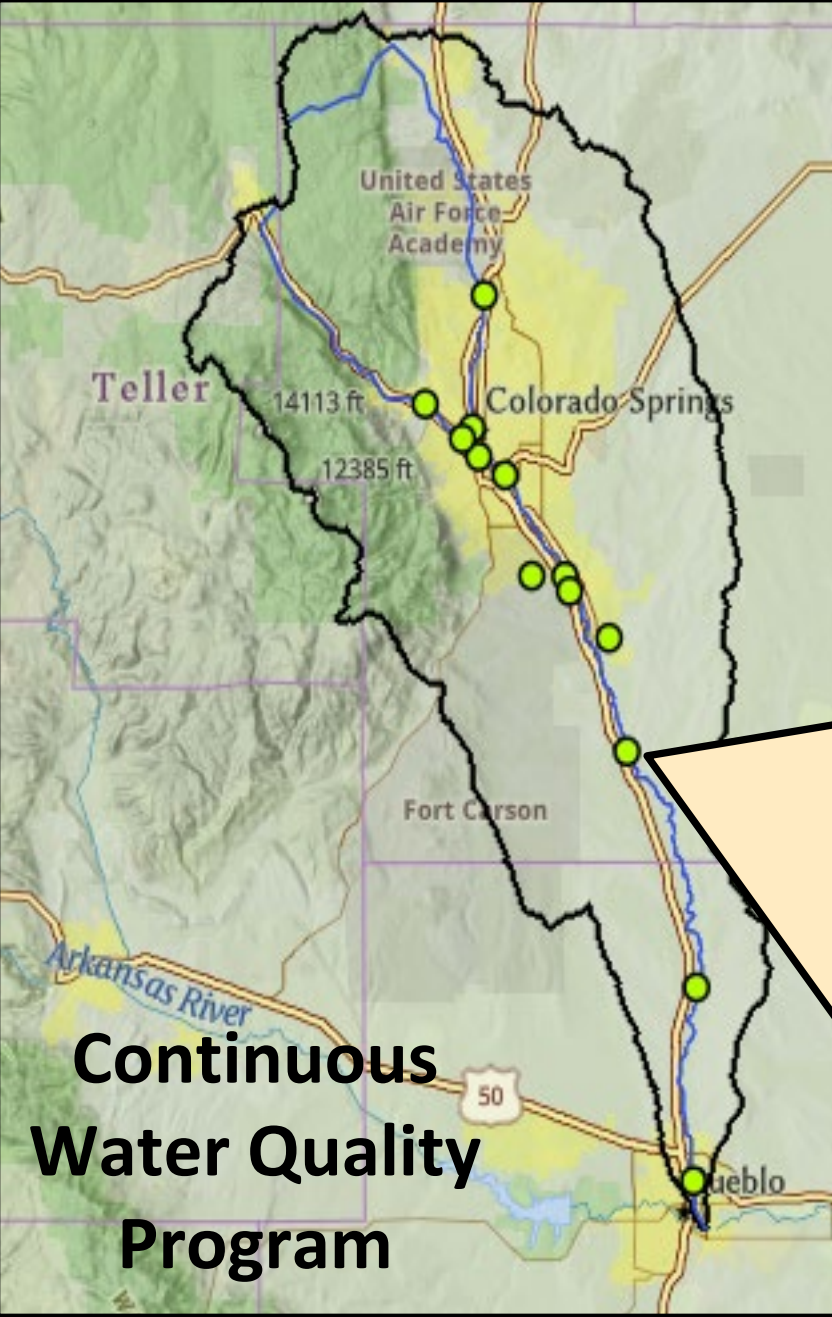


EXPLANATION

- Fountain Creek basin
- Site Type**
- Nutrients
- Nutrients, biology
- Nutrients, invertebrates
- QW
- QW, biology
- QW, biology, sediment
- Limited QW
- Geomorphology

Core site





**Continuous
Water Quality
Program**

Program



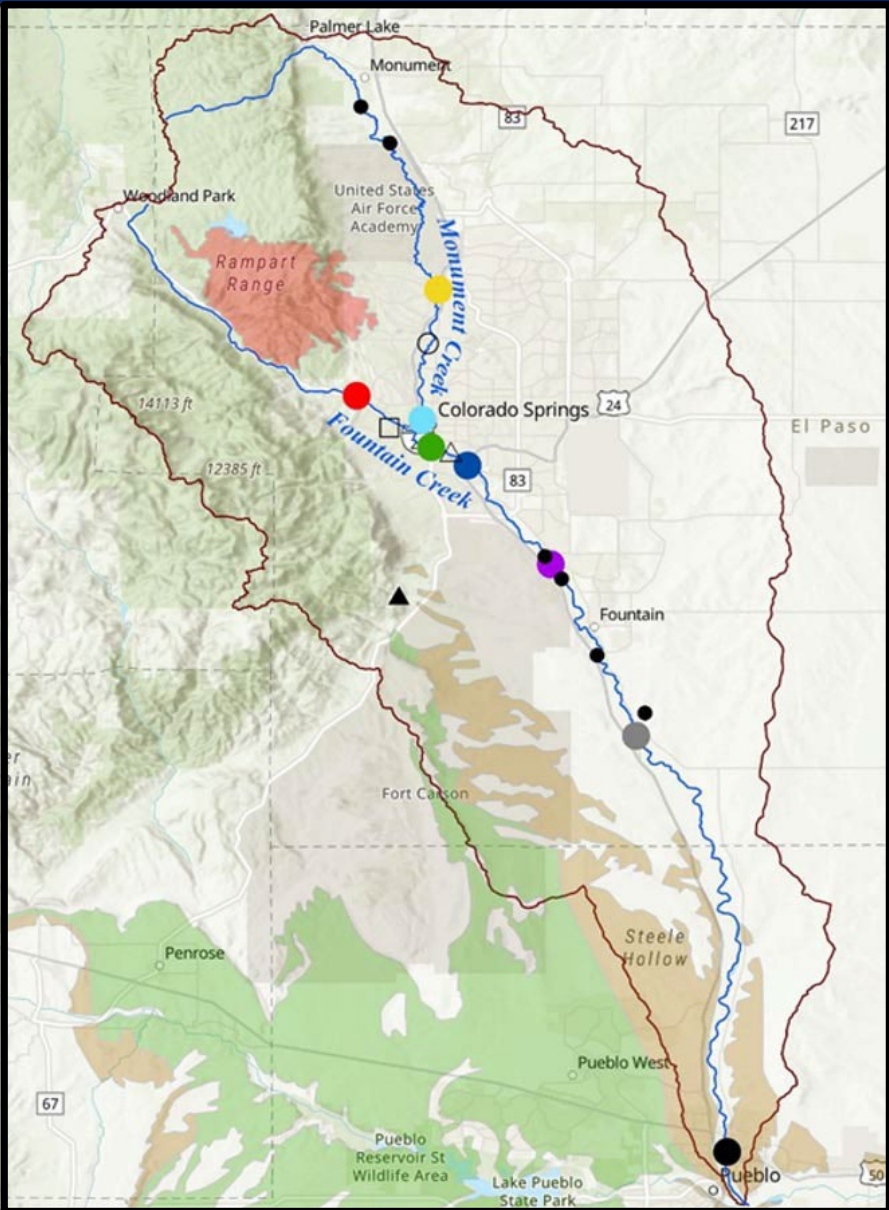
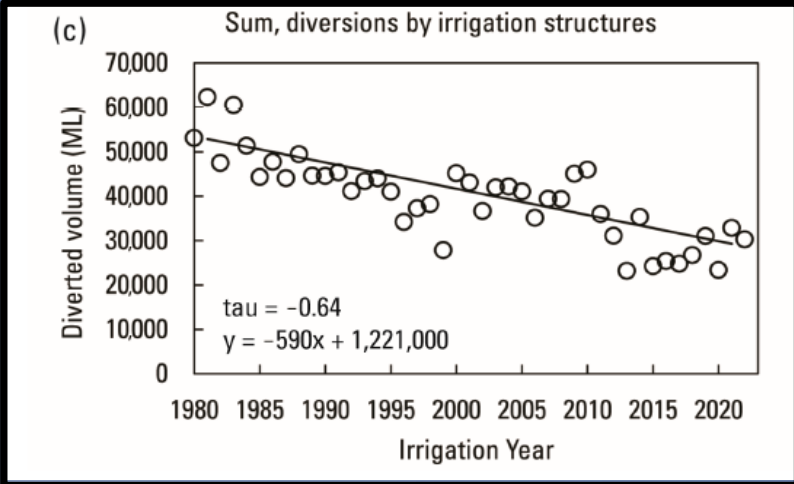
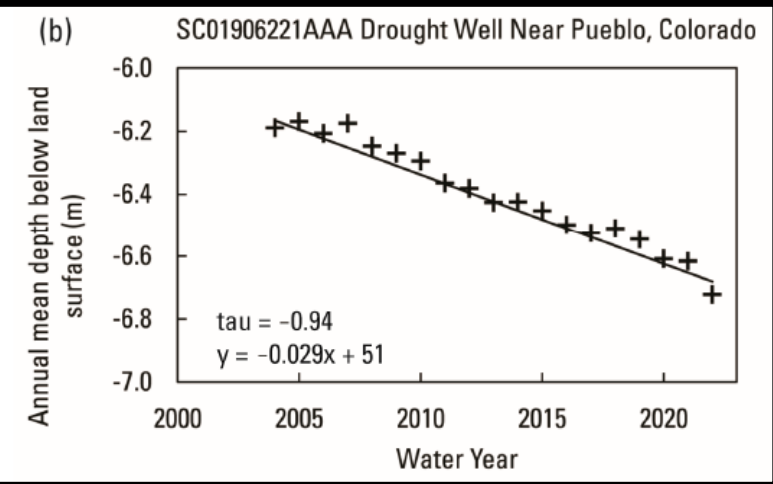
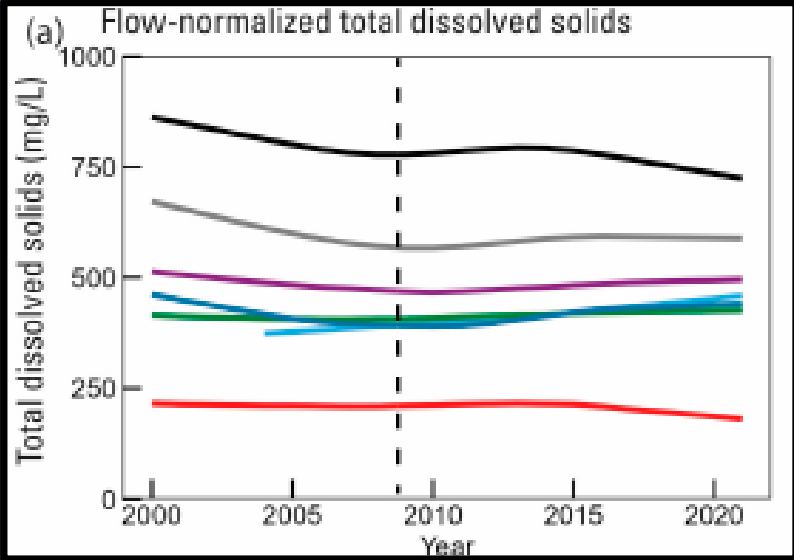
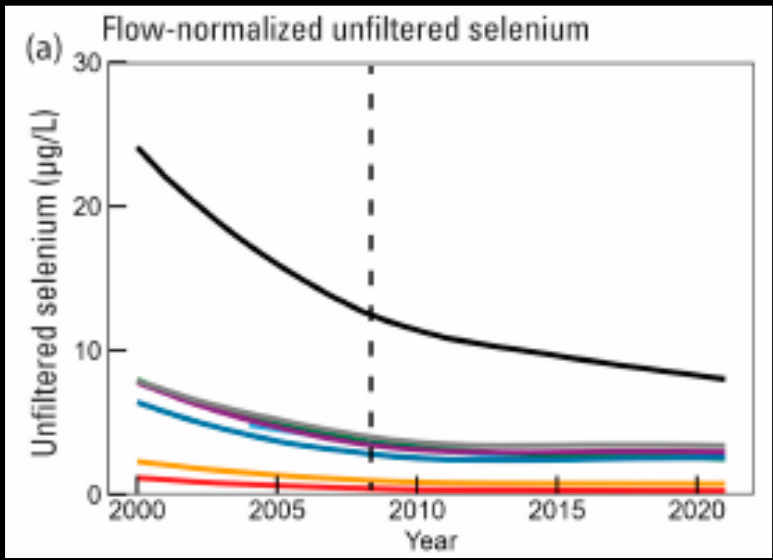
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Water Quality



Salinity and selenium declines



• Fountain Creek at Pueblo

○ Trends 1999-2022

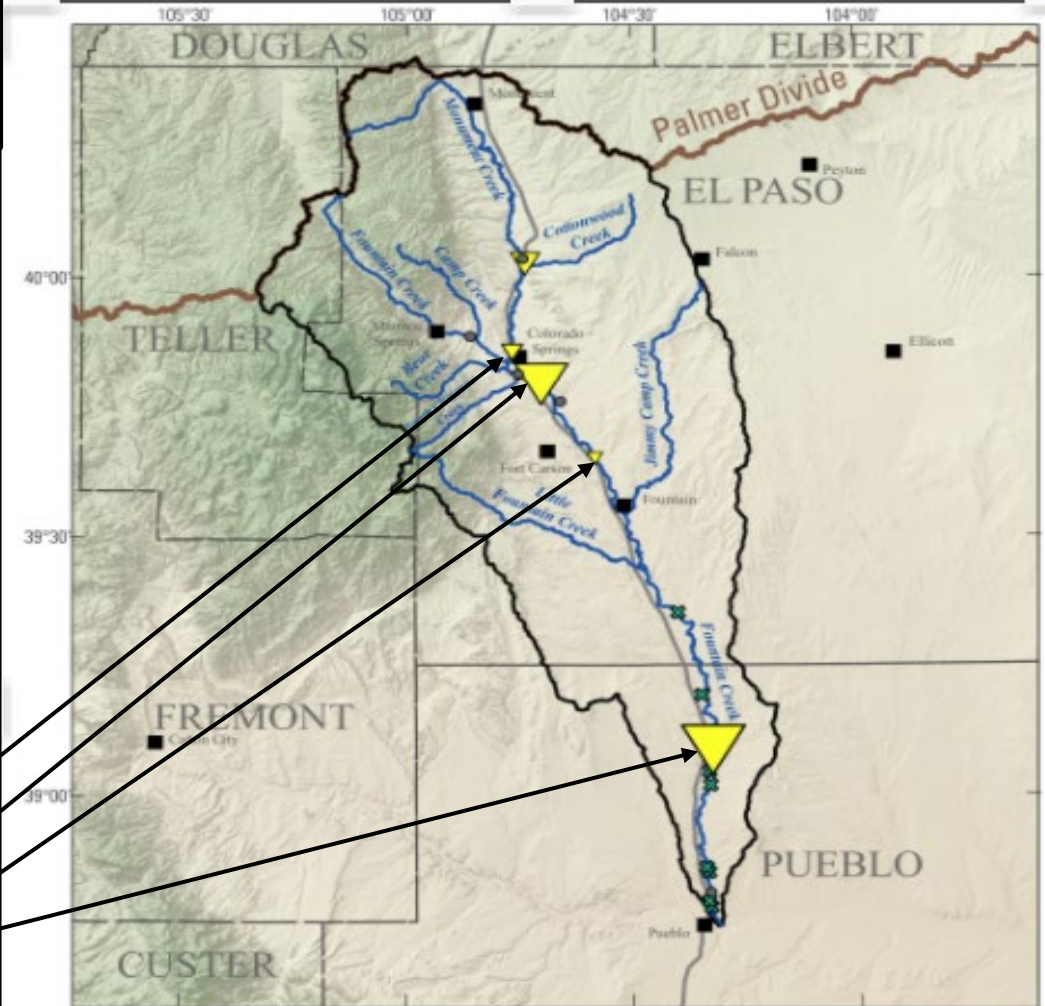
Constituent	Concentration Trend Likelihood	Load Trend Likelihood	Total Estimated Concentration Change	Total Estimated Load Change
Phosphorus, unfiltered	Downward trend is highly likely	Downward trend is likely	-0.17 mg/L (-0.27 to -0.03)	-18,810 kg/yr (-55,740 to 2073)
Orthophosphate	Downward trend is highly likely	Downward trend is highly likely	-0.14 mg/L (-0.29 to -0.04)	-15,810 kg/yr (-37,600 to -3310)
Total nitrogen	Upward trend is highly likely	Upward trend is likely	+1.02 mg/L (+0.24 to 1.64)	+96,200 kg/yr (-66,000 to +197,600)
Nitrate plus nitrite	Upward trend is likely	Upward trend is likely	+0.27 mg/L (-0.16 to +0.65)	+45,920 kg/yr (-29,400 to +97,000)
Ammonia and ammonium	Downward trend is highly likely	Downward trend is highly likely	-0.018 mg/L (-0.03 to -0.007)	-2911 kg/yr (-4935 to -622)
Total dissolved solids	Downward trend is highly likely	Downward trend is highly likely	-134 mg/L (-167 to -102)	-16,270 mg/yr (-19,400 to -11,600)
Selenium, unfiltered,	Downward trend is highly likely	Downward trend is highly likely	-16.1 µg/L (-18.5 to -13.9)	-1625 kg/yr (-1930 to -1370)
Selenium, filtered	Downward trend is highly likely	Downward trend is highly likely	-14.9 µg/L (-17.3 to -12.9)	-1362 kg/yr (-1570 to -1140)
Arsenic, unfiltered	Downward trend is highly likely	Either trend is likely as not	-1.8 µg/L (-2.3 to -0.84)	NA
Arsenic, filtered *	Downward trend is highly likely	Downward trend is highly likely	-0.4 µg/L (-0.56 to -0.14)	-67 kg/yr (-92 to -28)
Iron, unfiltered *	Downward trend is likely	Downward trend is likely	-4541 µg/L (-8097 to +2071)	-2227 mg/yr (-4300 to +7803)
Manganese, filtered	Either trend is likely as not	Either trend is likely as not	NA	NA

Sediment

• Fountain Creek Sediment Trends

○ Trends 1998-2022

Site Name	Site Number	n	Monthly Mean SSL percent change per year (Theil-Sen slope)	SSL Mann-Kendall p-value
Fountain Cr Nr CO Springs	07103700	72	na	na
Monument Cr. At Woodmen	07103970	150	-2%	0.37
Monument Cr. At Bijou	07104905	96	-8%	<0.01
Fountain Cr. at Janitell	07105530	60	-21%	<0.01
Fountain Cr. At Security	07105800	150	-6%	<0.01
Fountain Cr. At Piñon	07106300	52	-25%	<0.01
Fountain Cr. At Pueblo	07106500	131	-3%	0.2279



Base from U.S. Geological Survey digital data, 2014
 Universal Transverse Mercator, Zone 13
 North American Datum of 1983

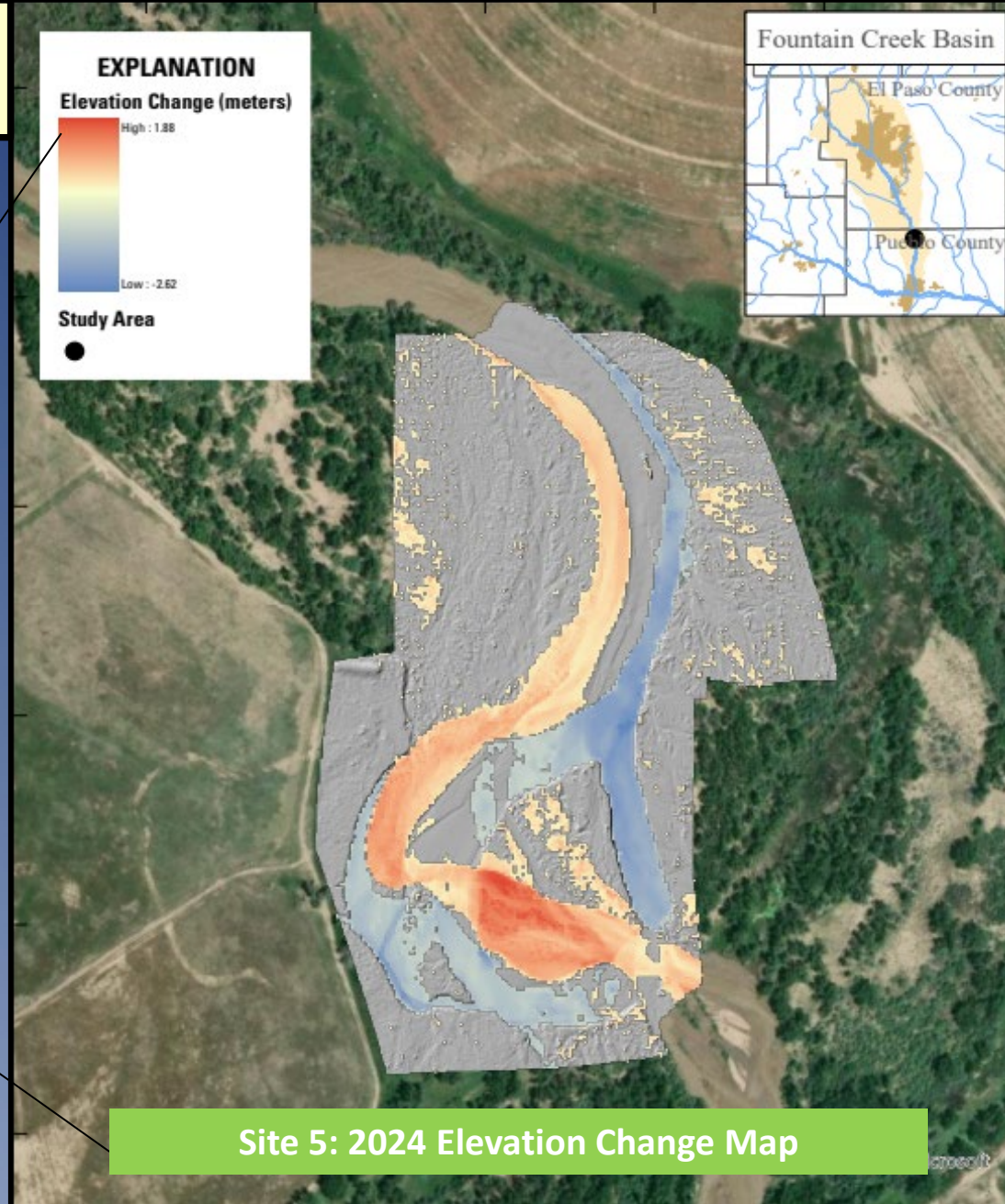
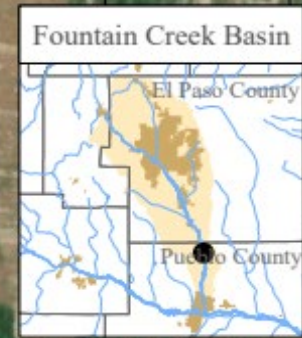
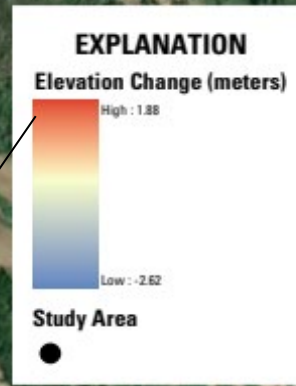
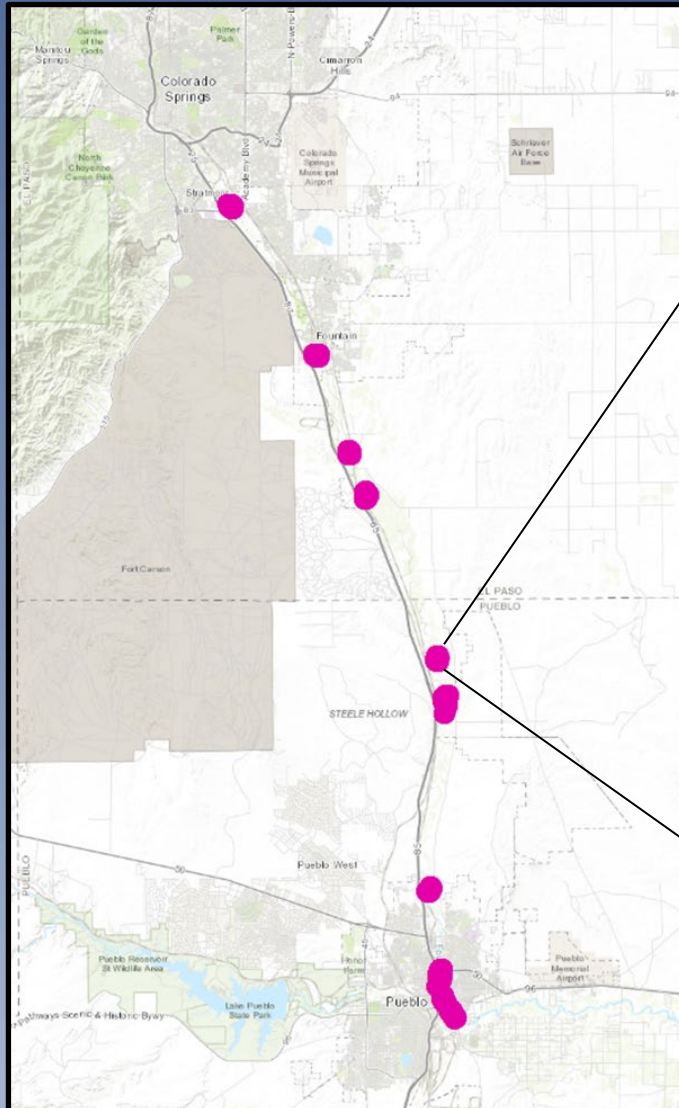
0 4 8 16 Miles
 0 2.5 5 10 Kilometers

Stabilization and Restoration Project locations from the Fountain Creek Watershed Flood Control & Greenway District, 2024



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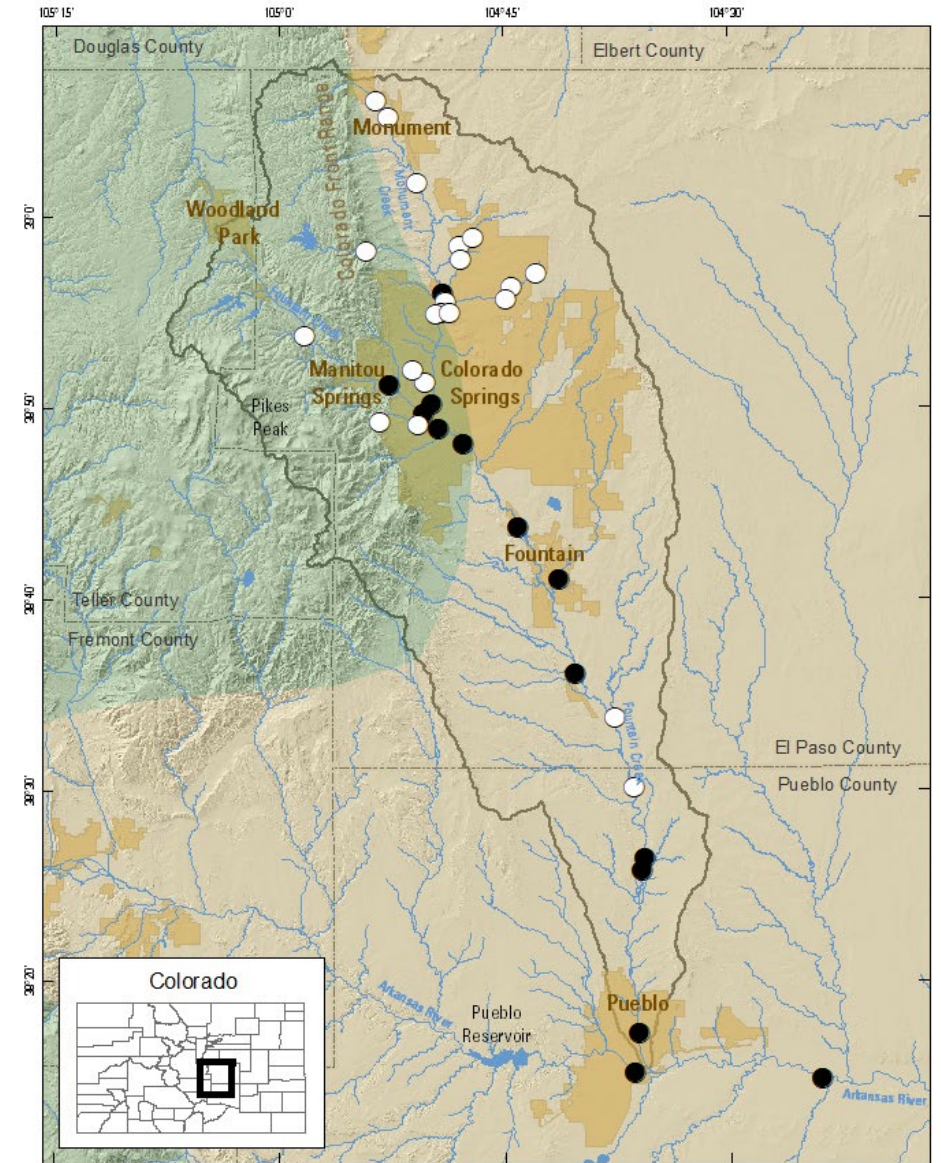
Geomorphology



Site 5: 2024 Elevation Change Map

Biology

- Inverts, fish, habitat, and streamflow data consistently collected at 10 sites since 2003
- 14 active sites
 - 12 core bio sites – continuous flow and temperature, and consistent QW



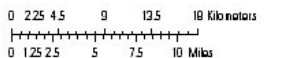
Base from U.S. Geological Survey National Elevation Dataset 10-meter digital elevation model showing land-surface elevations shaded at 10-meter intervals. Universal Transverse Mercator projection Zone 13N North American Vertical Datum of 1988 Scale 1:500,000

EXPLANATION

- Municipal Areas
- Great Plains
- Southern Rocky Mountains
- Fountain Creek Watershed

Biological Monitoring Site

- Current
- Discontinued



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- **SIR 2024-5074**

- Summarized Fountain Creek Literature and 30+ of research
- Supplemental analysis of recent data
- Changes in bio communities at some sites
 - Loss of taxa
 - Greater tolerance to increased temp
- Persistent link between bio and streamflow
- Weak link between bio and QW because of inconsistent data collection (now resolved)

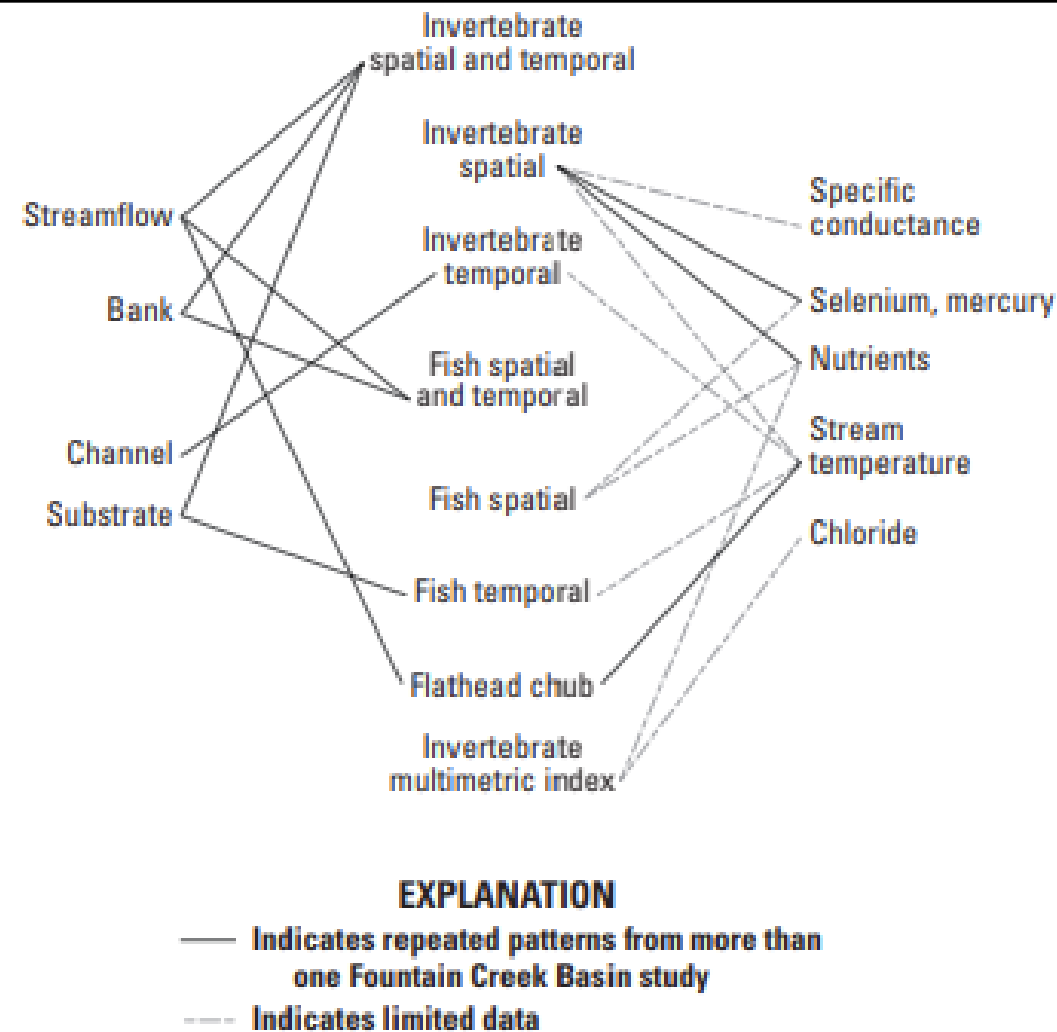


Figure 6. Conceptual model based on compiled literature and observed patterns in more recent data of the primary factors that could affect fish and invertebrate communities in the Fountain Creek Basin, 1984–2022.

Questions?



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