

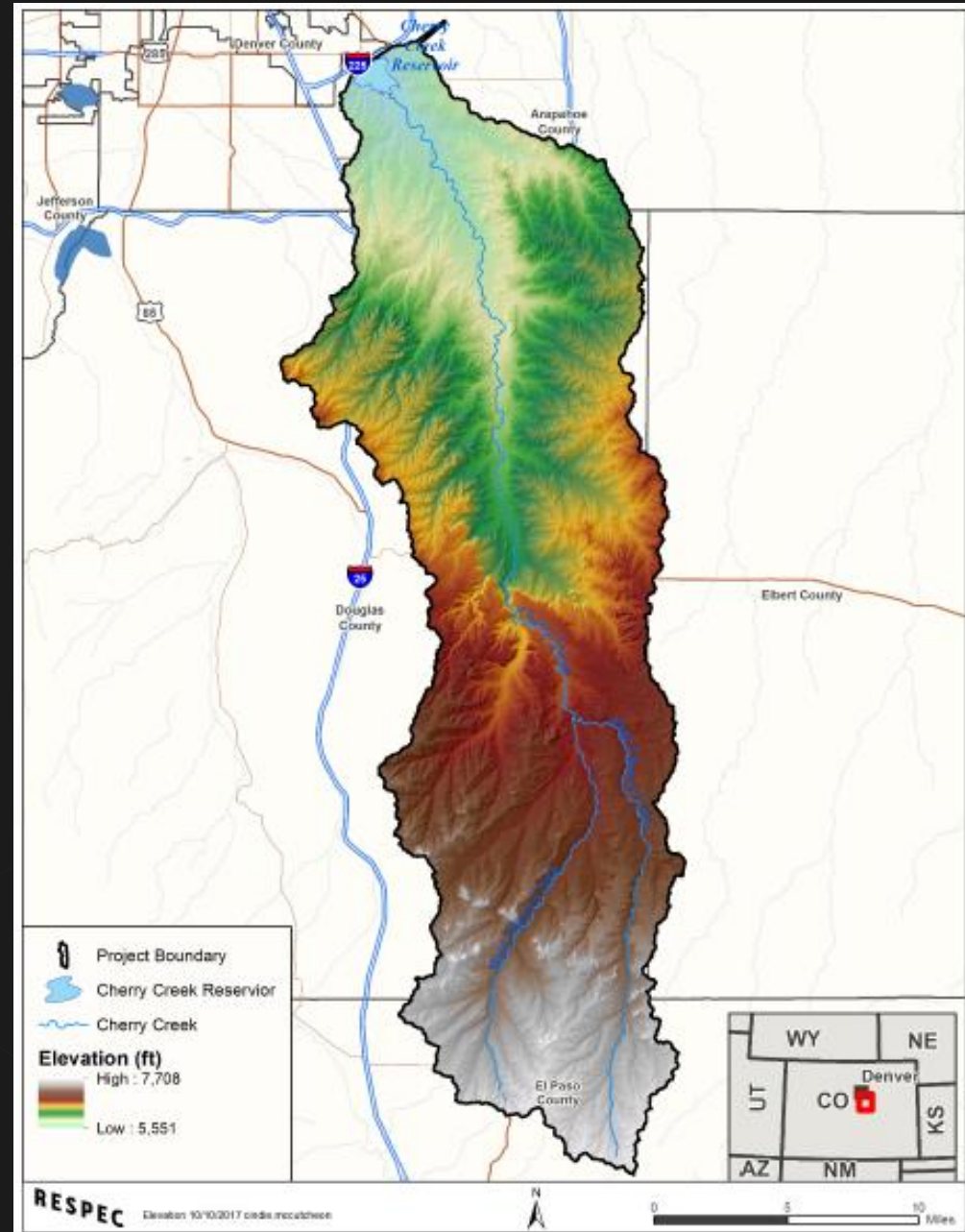


INTRIGUING COMPARISONS RESULTING FROM DATA MINING DURING THE WATERSHED MODEL DEVELOPMENT

CHERRY CREEK STEWARDSHIP PARTNERS 2019 CONFERENCE

OVERVIEW

- › Cherry Creek Watershed Model
- › Results – Part 1
- › Results – Part 2

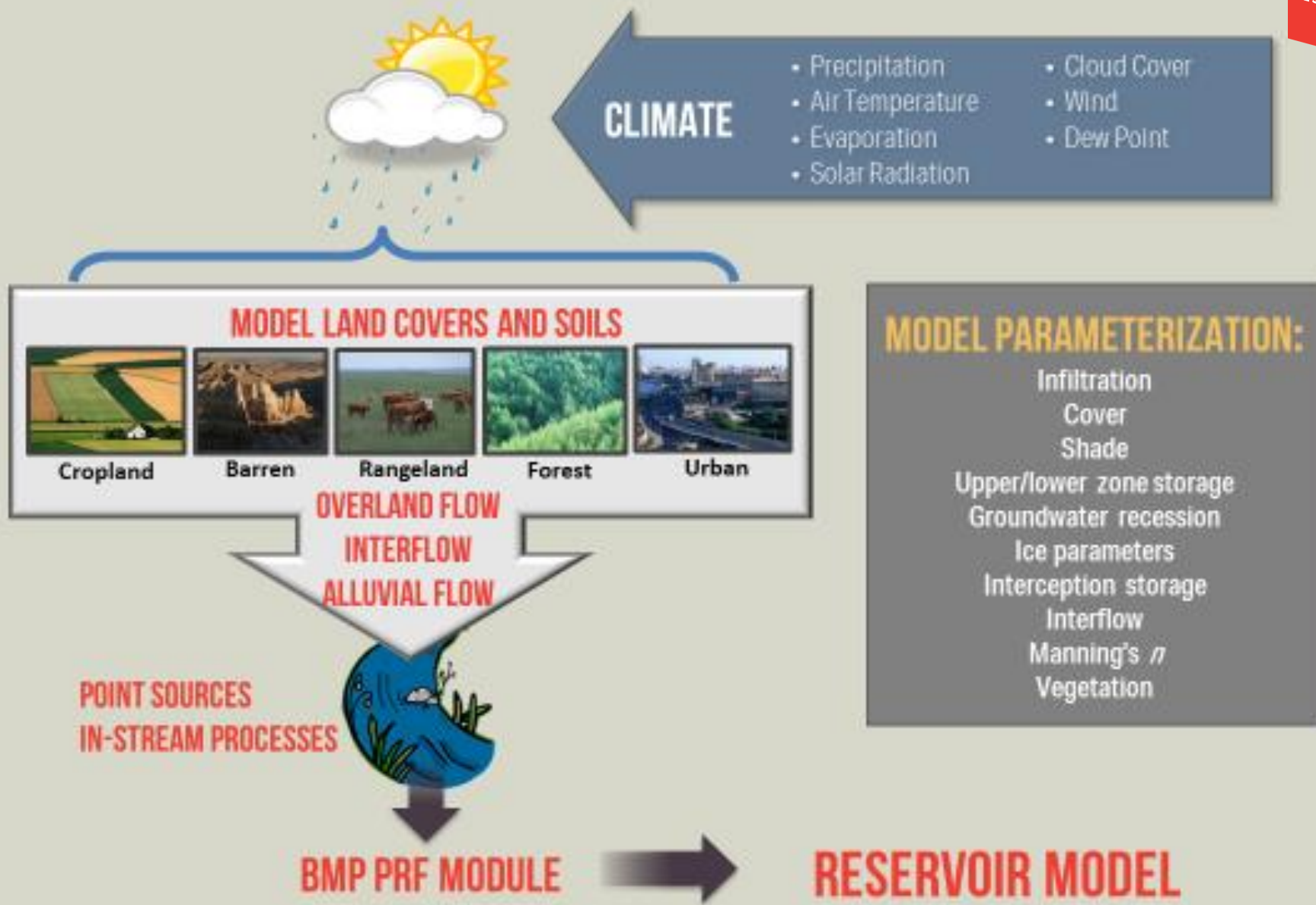


HSPF MODEL CALIBRATED PARAMETERS

- / HYDROLOGY
- / TEMPERATURE
- / DISSOLVED OXYGEN
- / SEDIMENT
- / PHOSPHORUS SPECIES
- / NITROGEN SPECIES
- / ORGANIC CARBON

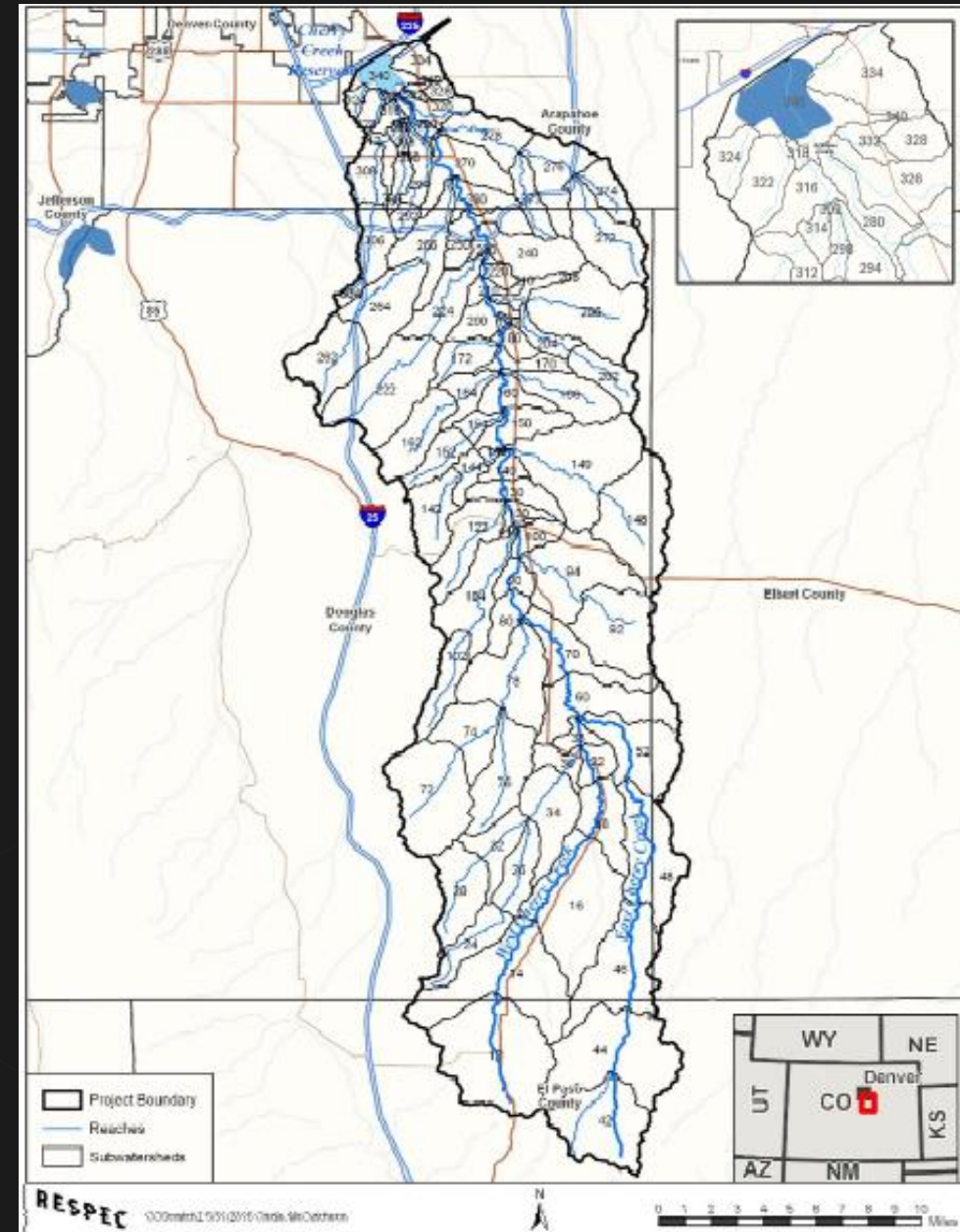


HSPF MODEL OVERVIEW



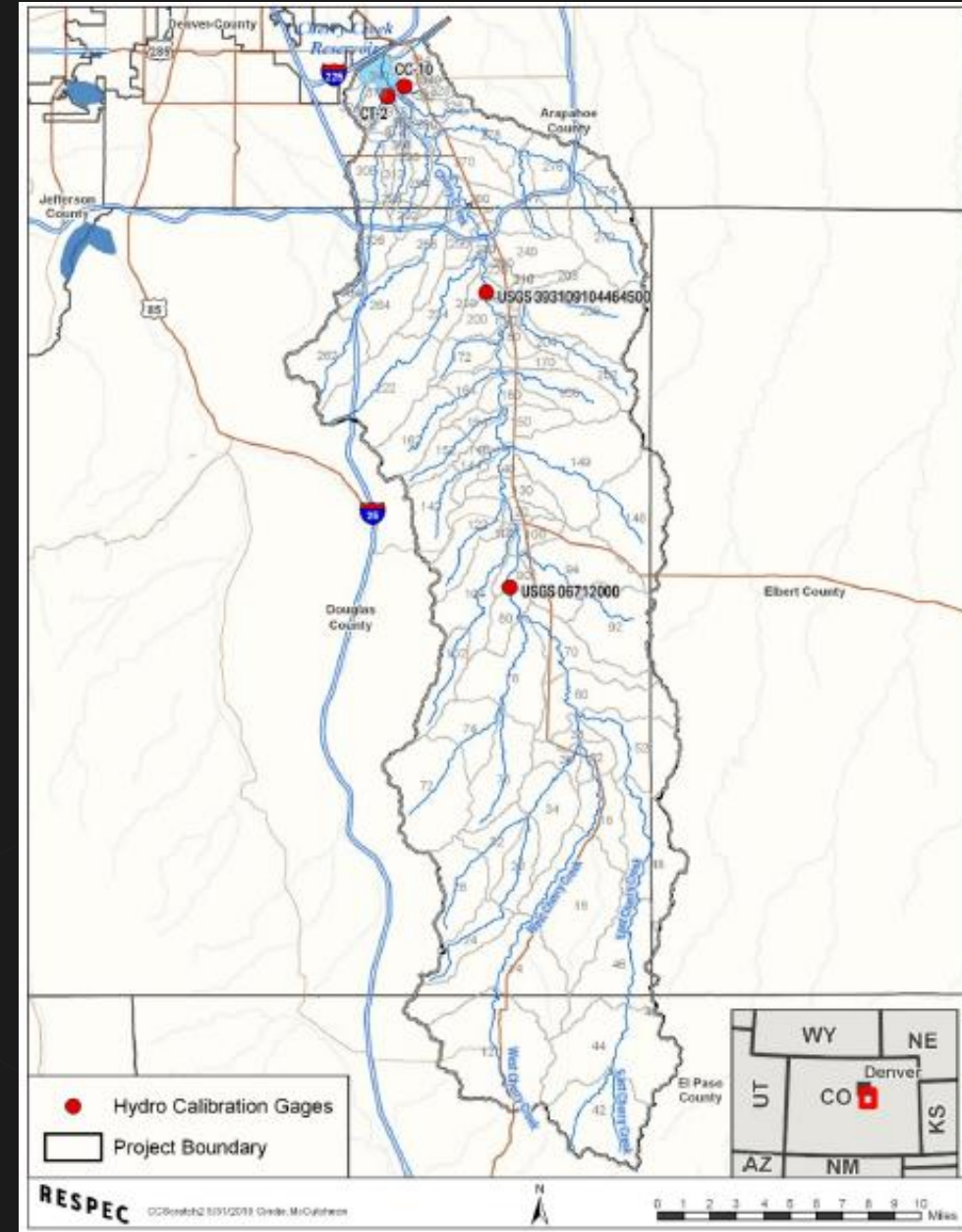
CHERRY CREEK WATERSHED

- › Counties
 - / El Paso
 - / Douglas
 - / Elbert
 - / Arapahoe
- › Cities/Towns
 - / Centennial
 - / Aurora
 - / Parker
 - / Foxfield
 - / Lone Tree



CHERRY CREEK WATERSHED

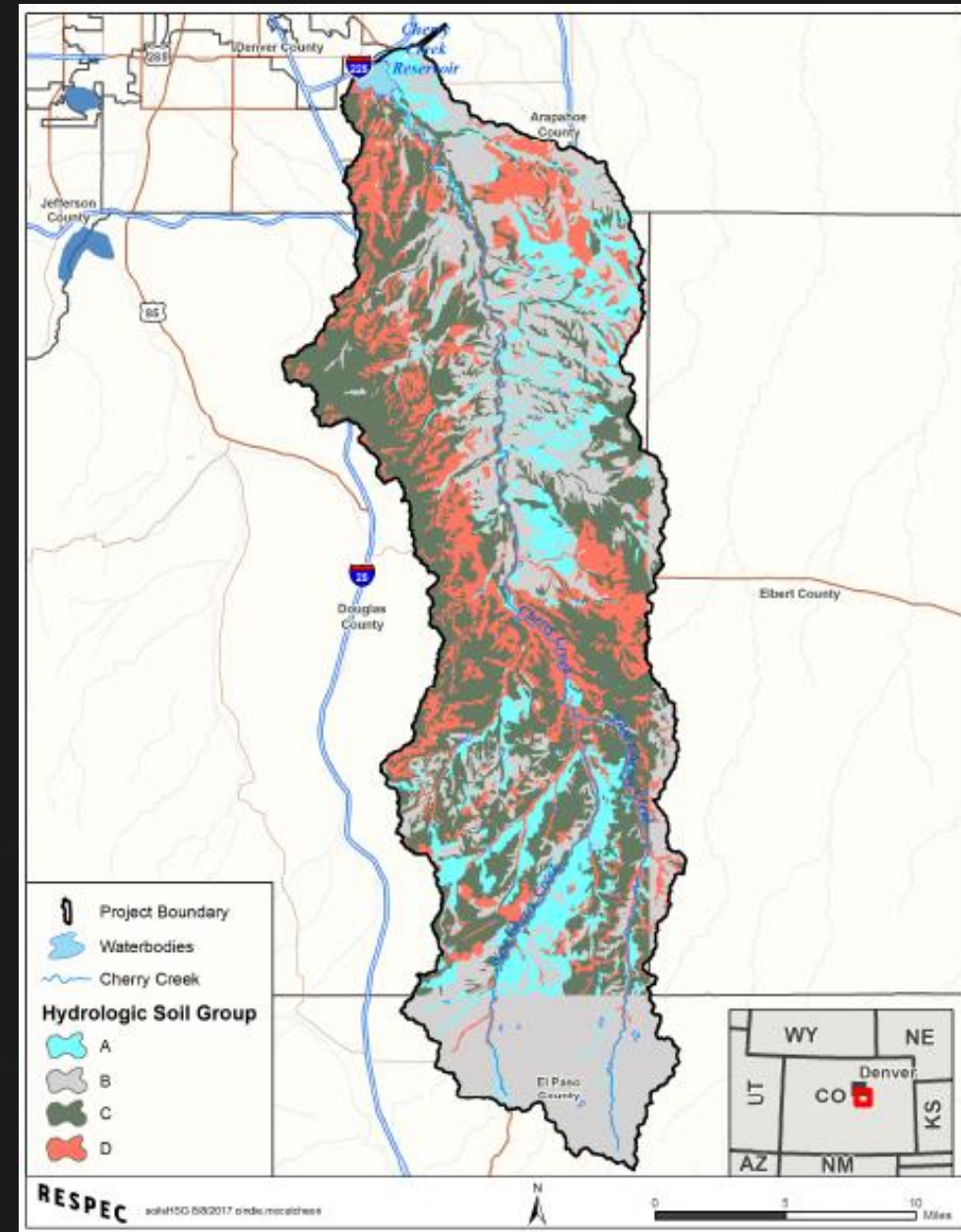
- › 386 Square Miles
- › 40 Miles Long
- › 96 Sub-Watersheds
- › Four Gaging Stations Used For Calibration (2-USGS, 2-CCBWQA)



CHERRY CREEK WATERSHED

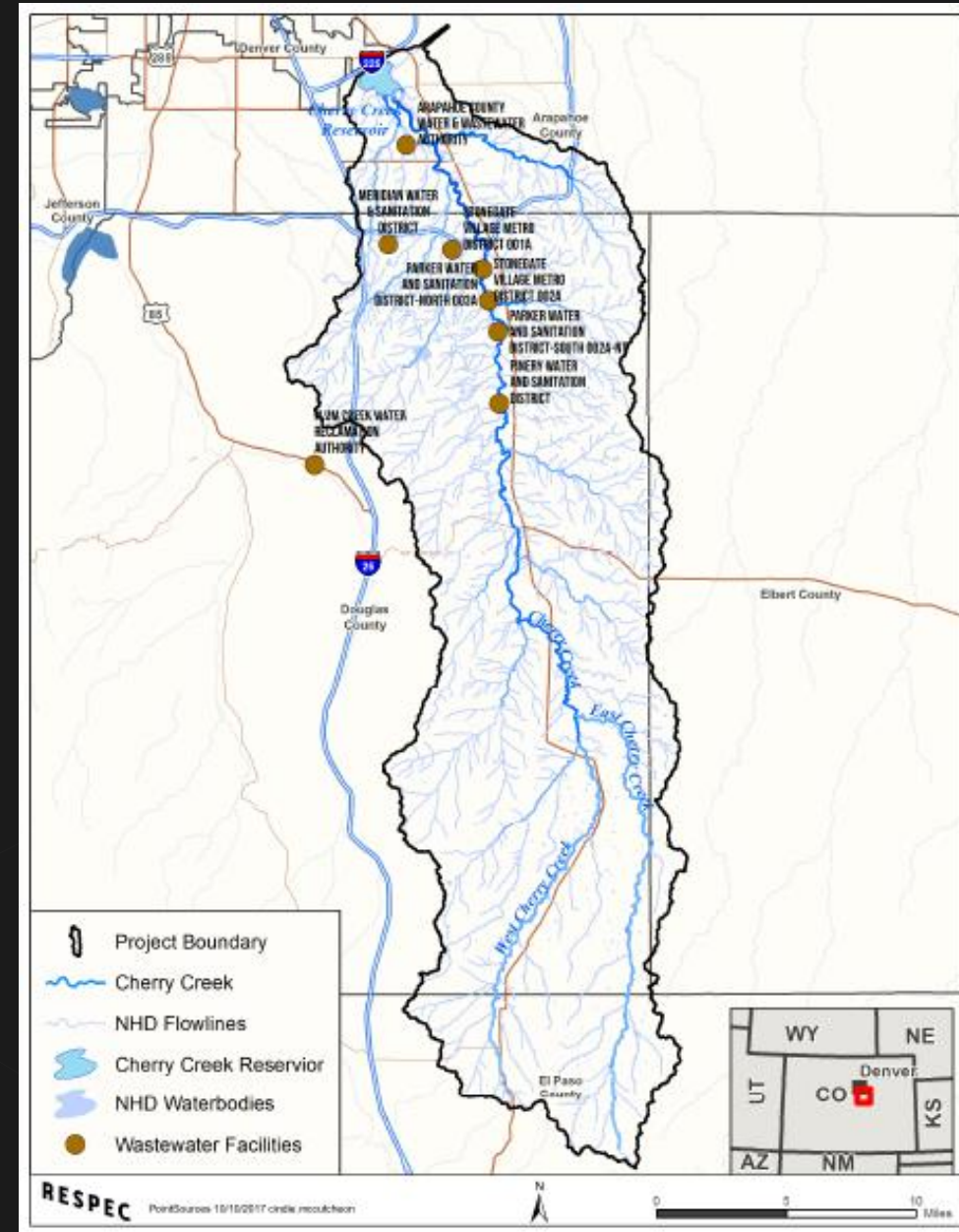
› Hydrologic Soil Groups

Soil Type	Area (ac)	Percent Total
A	30,821	13%
B	83,741	34%
C	82,993	34%
D	47,962	20%



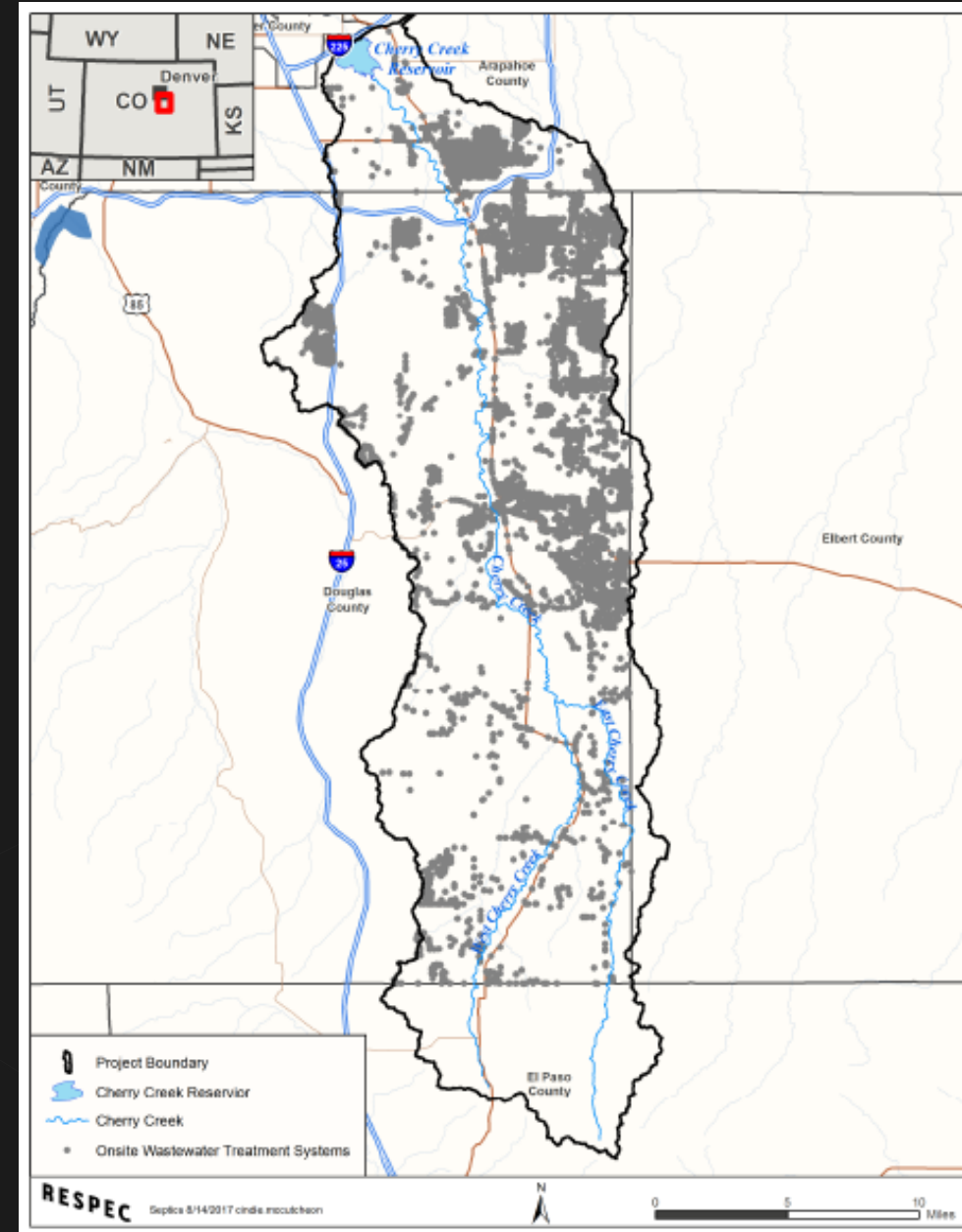
CHERRY CREEK WATERSHED

- › Wastewater Treatment Facilities Point Sources
 - / Pinery
 - / ACWWA (Inverness and Cottonwood)
 - / Parker
 - / Stonegate
 - / Castle Rock (Plum Creek Water Reclamation Facility)
 - / Meridian (non-discharge)



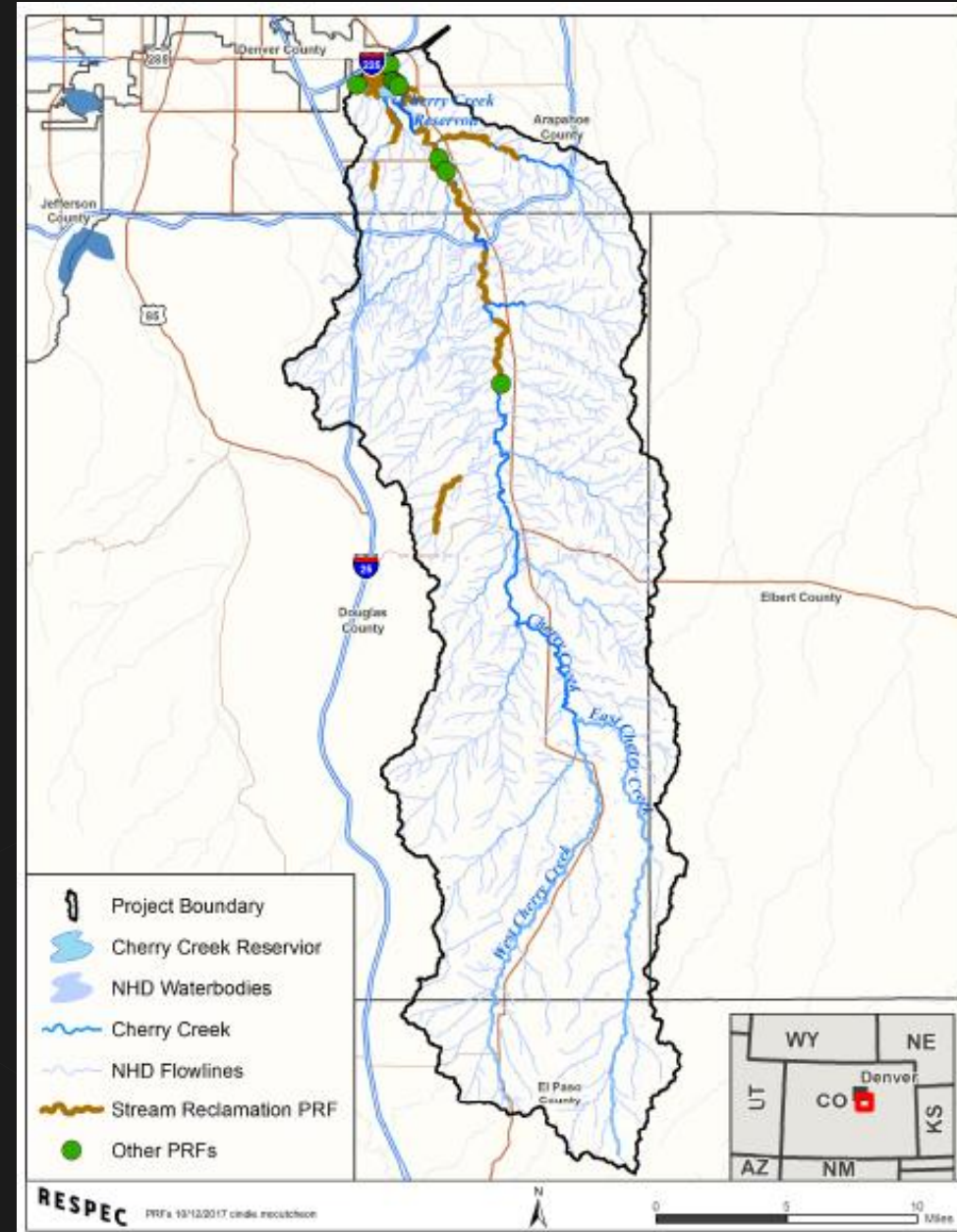
CHERRY CREEK WATERSHED

› 9000+ Onsite Wastewater Treatment Facilities



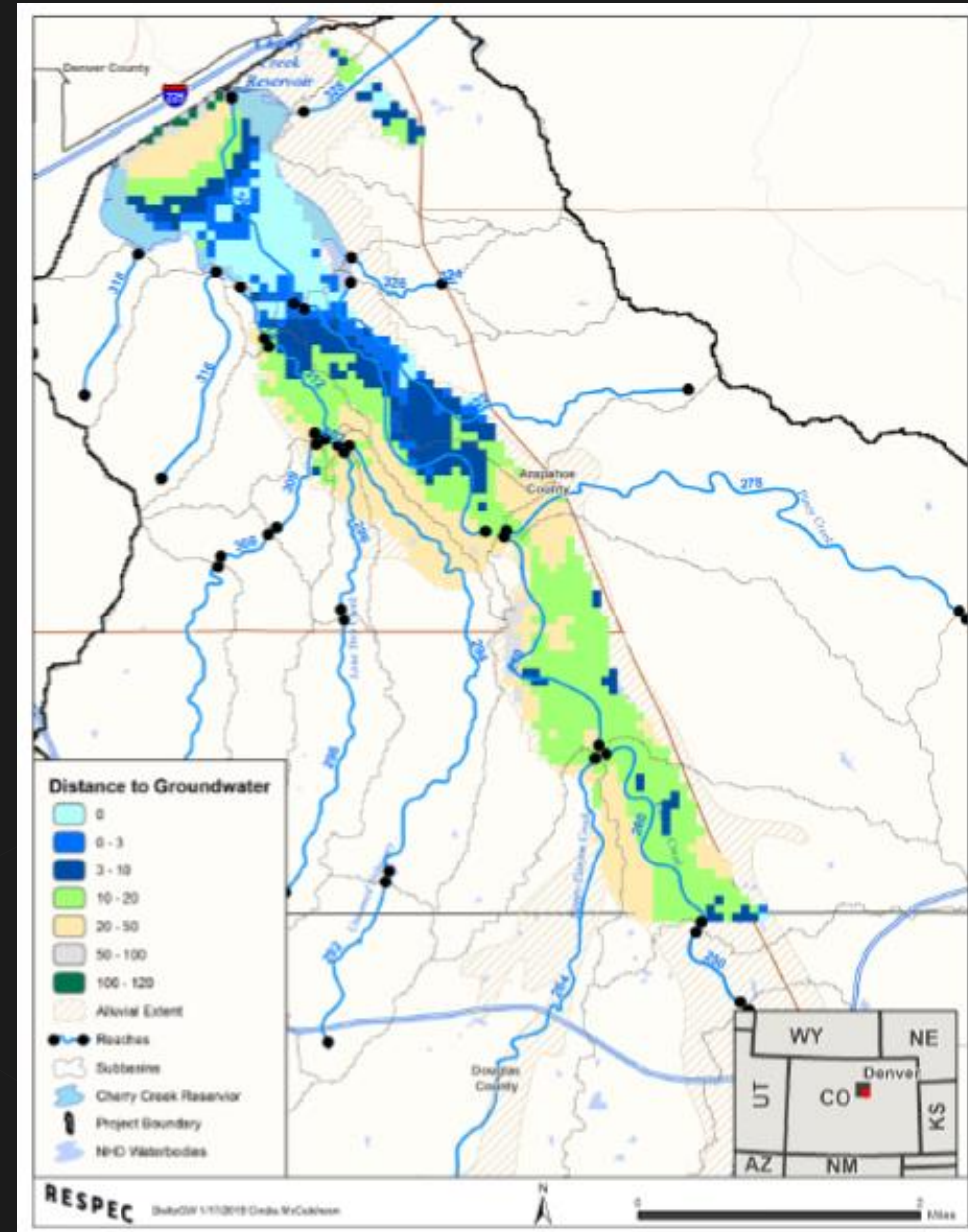
CHERRY CREEK WATERSHED

› Pollution Reduction Facilities (PRFs) – 23 represented in the model



CHERRY CREEK WATERSHED

- › Groundwater Alluvium-Modelled interaction between surface water and groundwater (did not model aquifer flow)



CHERRY CREEK WATERSHED



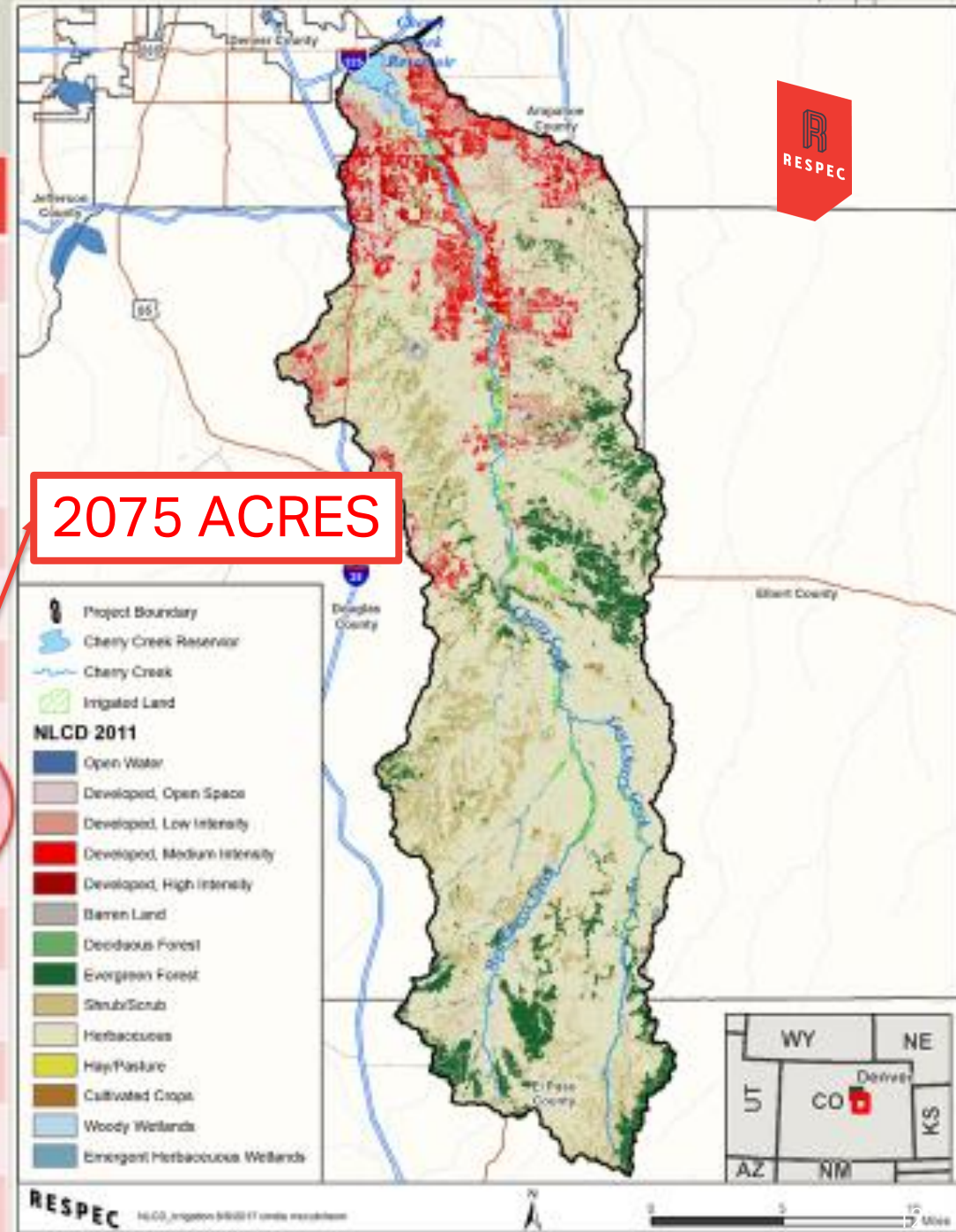
› And the results are (Part 1) ...



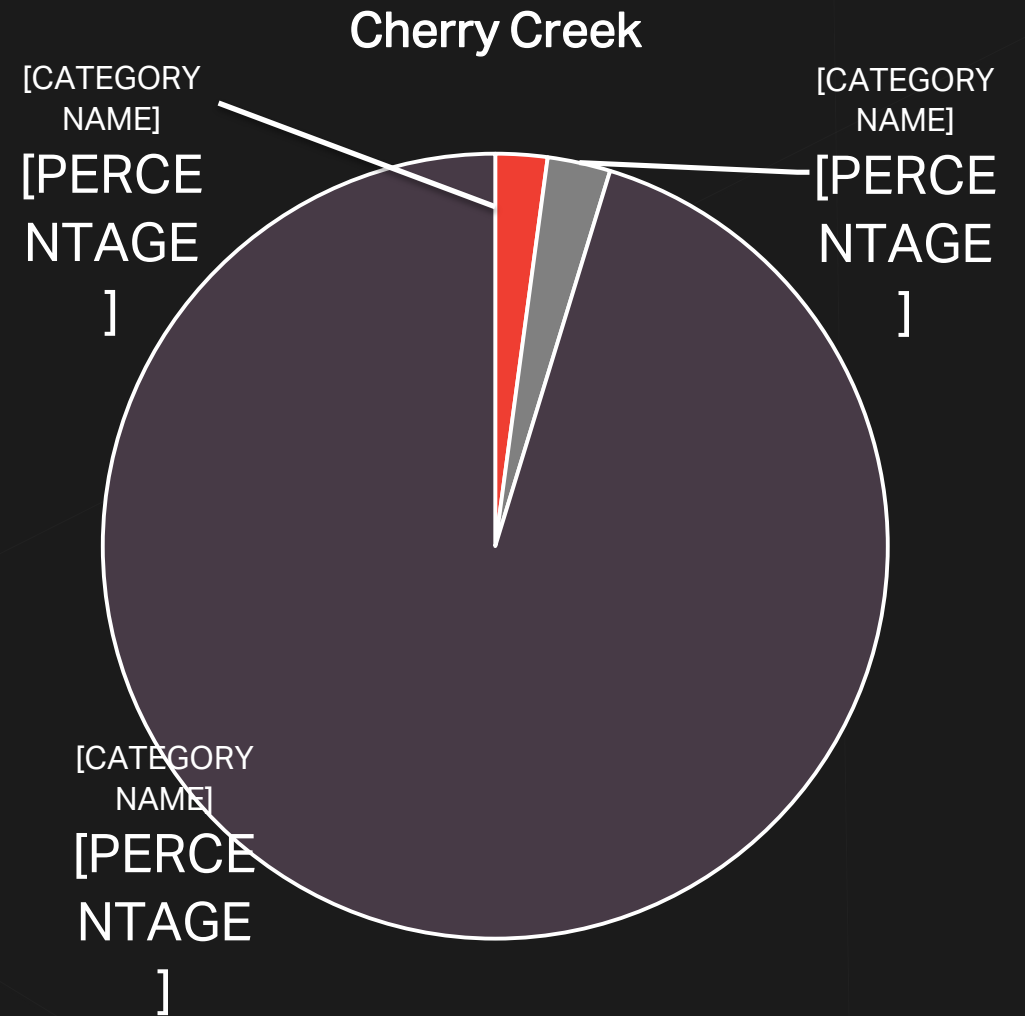
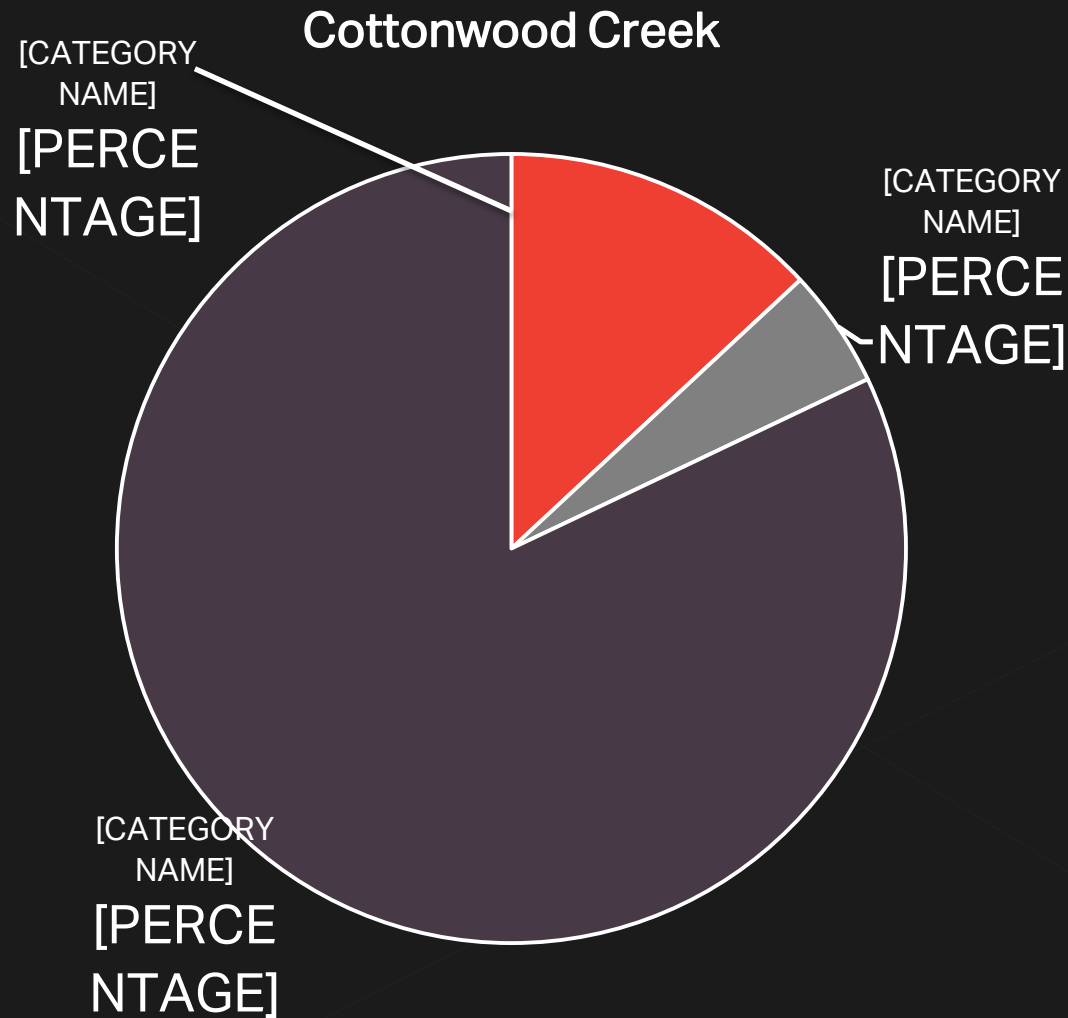


LAND COVER DATA (NLCD)

NLCD Class	2006 Area (ac)	2011 Area (ac)	Δ from 2006 (ac)
Deciduous Forest	1,627	1,625	-2
Evergreen Forest	17,783	17,705	-78
Pasture/Hay	50	57	7
Grasslands/Herbaceous	139,459	137,813	-1,646
Shrub/Scrub	37,278	37,082	-196
Barren (rock/sand/clay)	233	482	249
Developed, Open Space	19,550	19,294	-256
Dev., Low Intensity	12,347	12,614	267
Dev., Medium Intensity	8,861	10,227	1366
Developed, High Intensity	1,385	1,827	442
Woody Wetlands	2,829	2,793	-36
Em. Herbaceous Wetlands	2,864	2,830	-34
Cultivated Crops	1,332	1,213	-119
Open Water	1,122	1,158	36
Totals	246,720	246,720	0



SIMPLIFIED WATER BALANCE

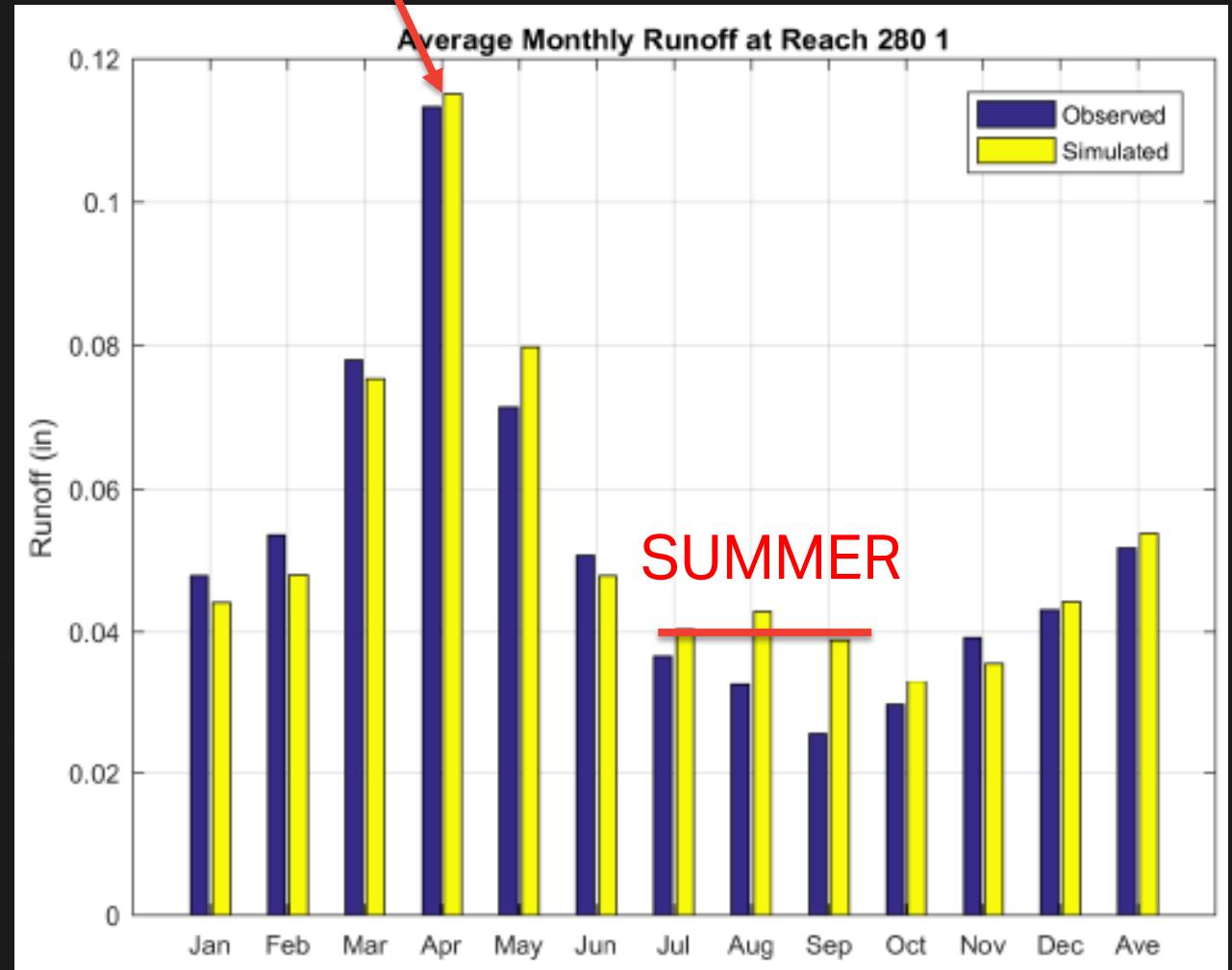


AVERAGE MONTHLY RUNOFF

APRIL

› Cherry Creek

- / Peak runoff occurs in April
- / April runoff about 3 times larger than the summer average runoff
- / March, April, and May peak above the average yearly flow
- / Partially due to alluvial pumping during summer months

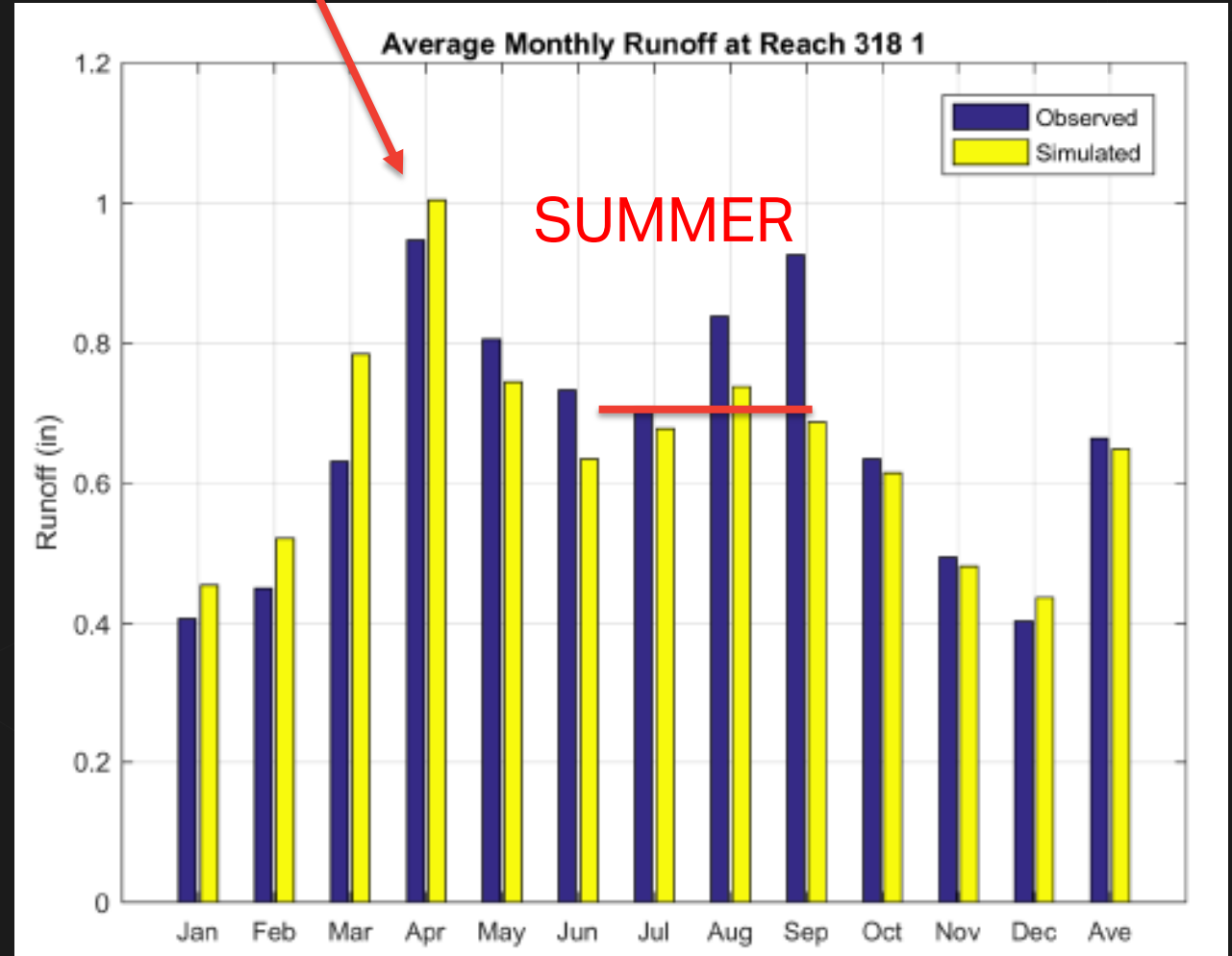


AVERAGE MONTHLY RUNOFF



APRIL

- › Cottonwood Creek
 - / Peak runoff still occurs in April
 - / April peak only about 30% larger than summer peaks
 - / Fairly even distribution from March to October
 - / Significantly influenced by impervious surface runoff and lawn irrigation return flows



WATER QUALITY

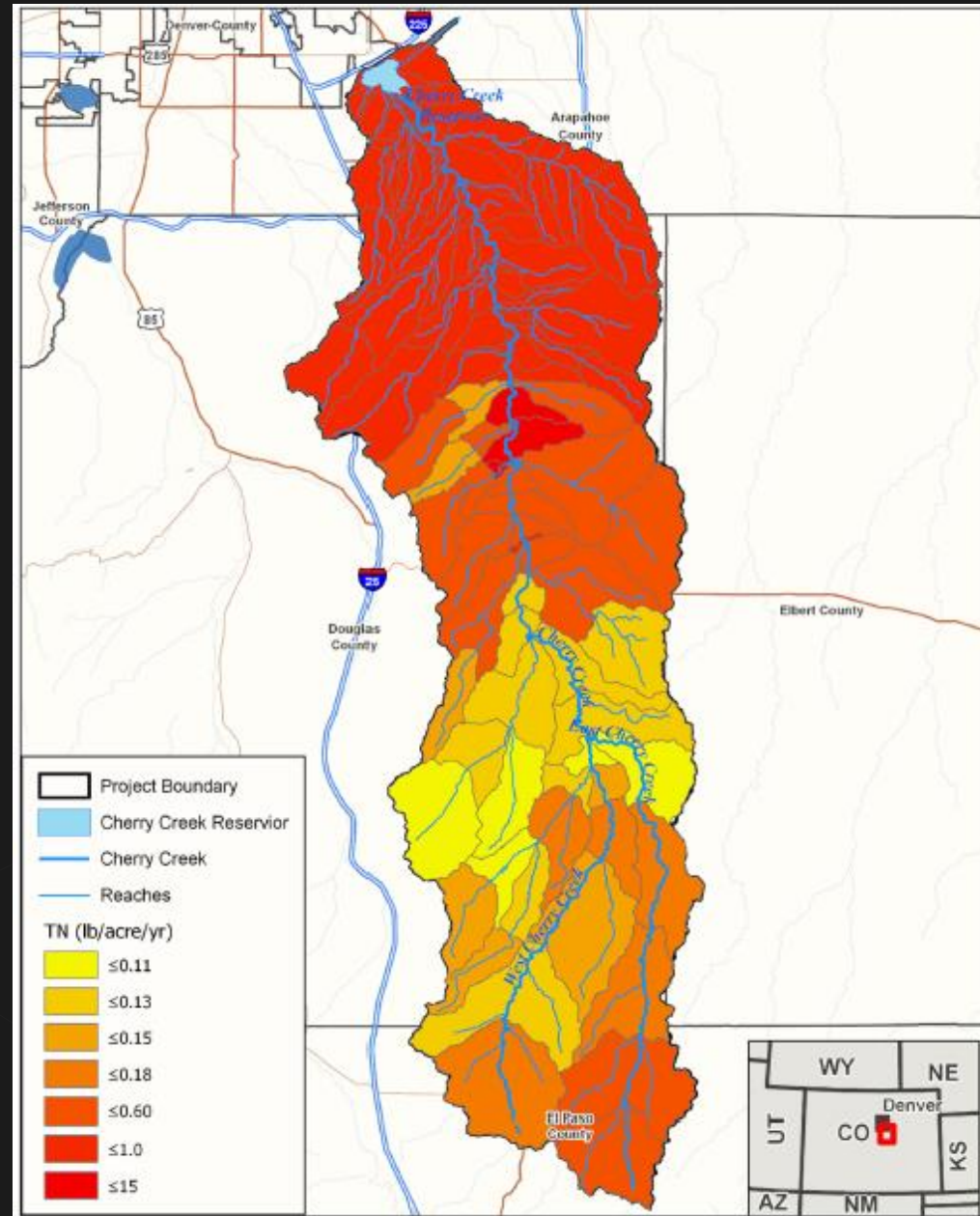
› Total Nitrogen
/ Over 10 times variation



<0.11 lbs/acre/year



<15 lbs/acre/year



WATER QUALITY

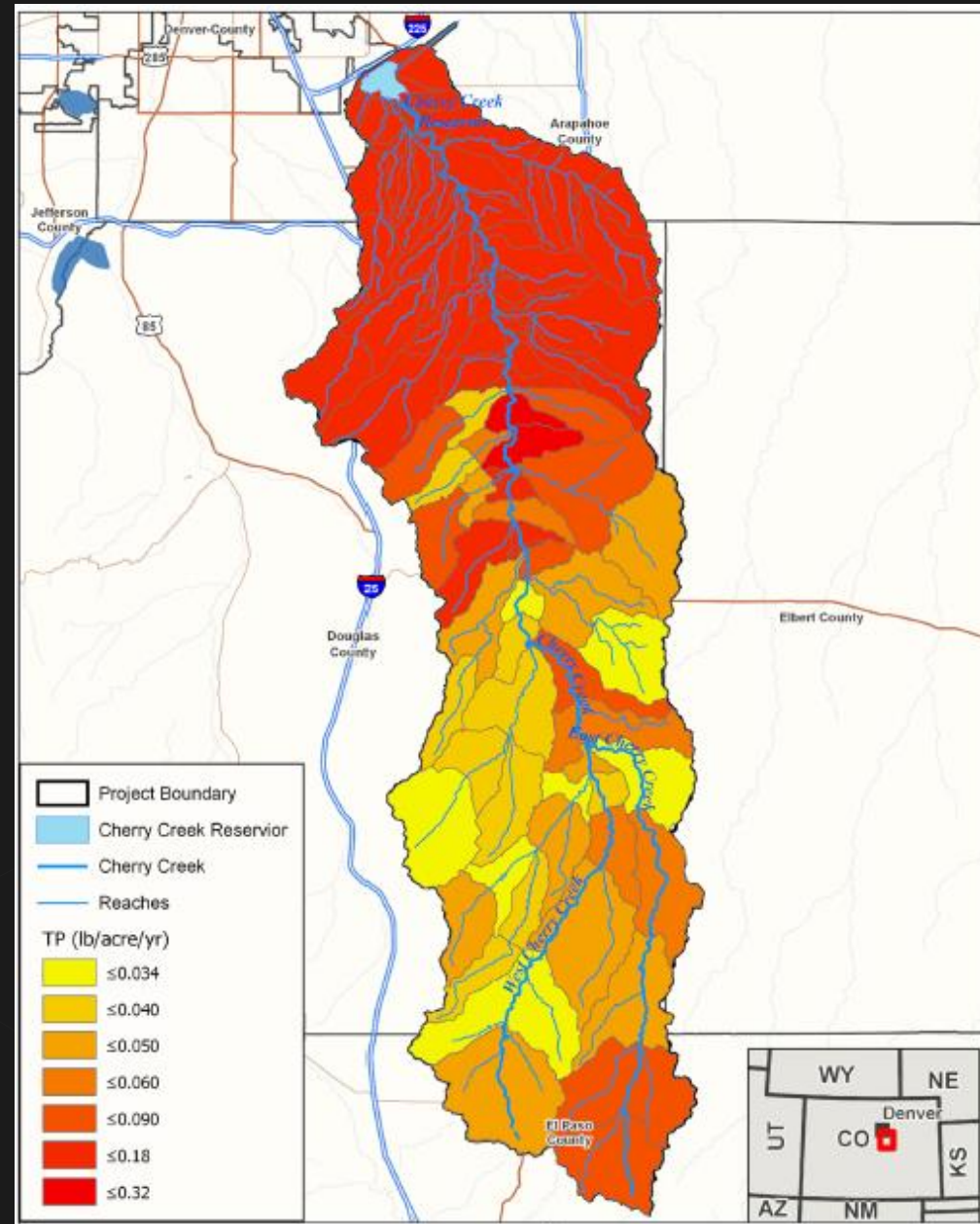
› Total Phosphorus
/ About 10 times variation



<math>< 0.034 \text{ lbs/acre/year}</math>



<math>< 0.32 \text{ lbs/acre/year}</math>



WATER QUALITY

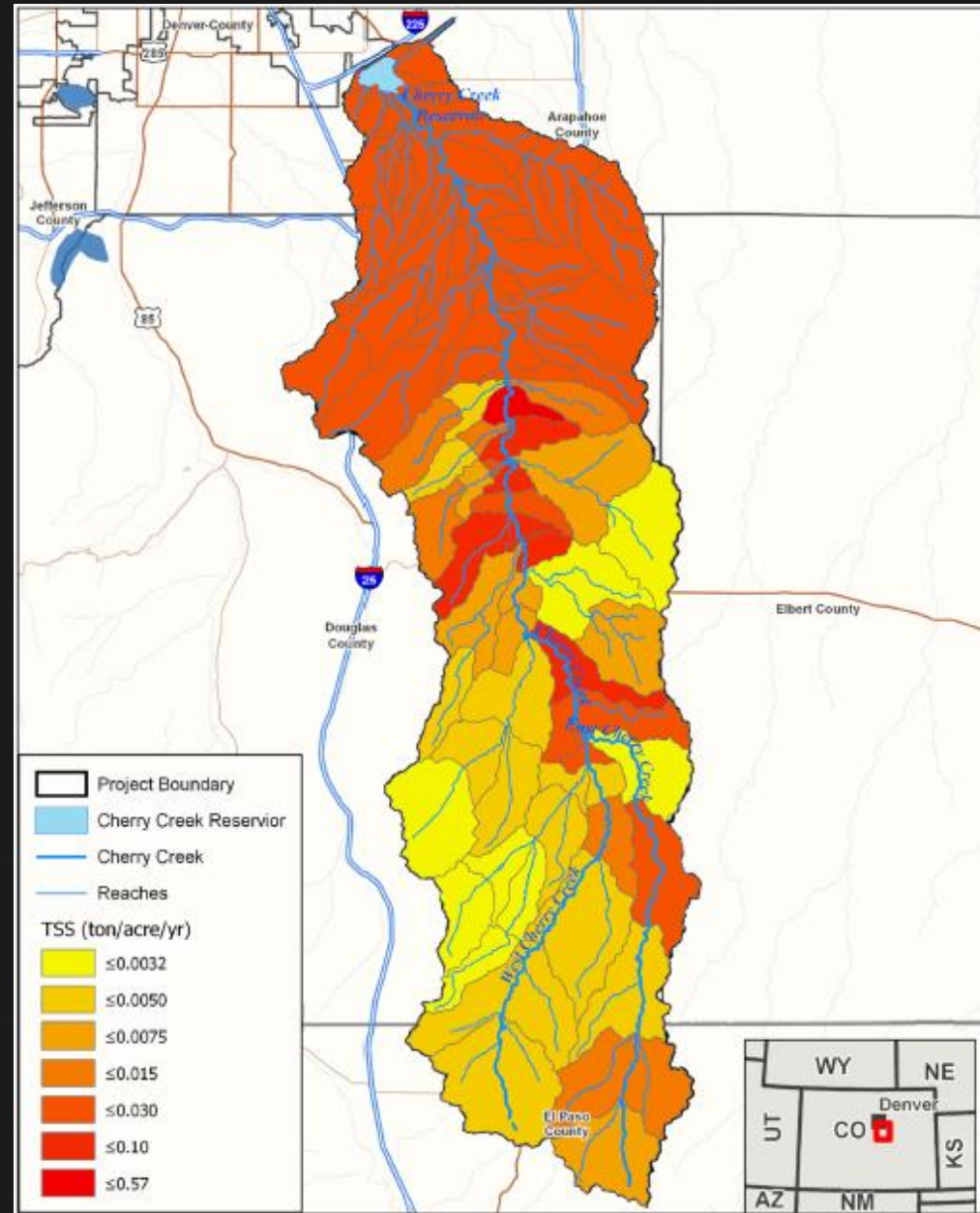
› Total Suspended Solids
/ Over 100 times variation



<0.0032 tons/acre/year

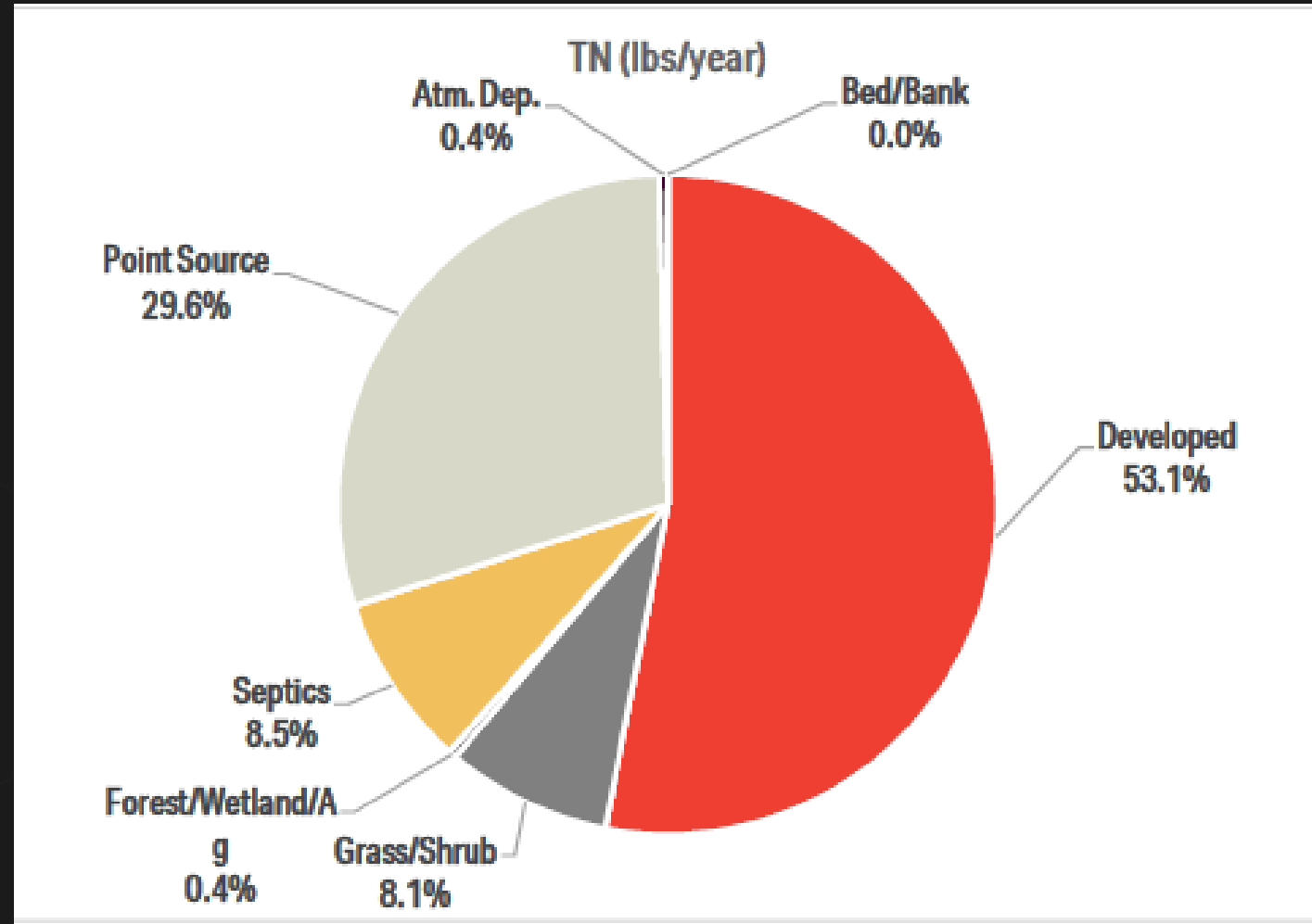


<0.57 tons/acre/year



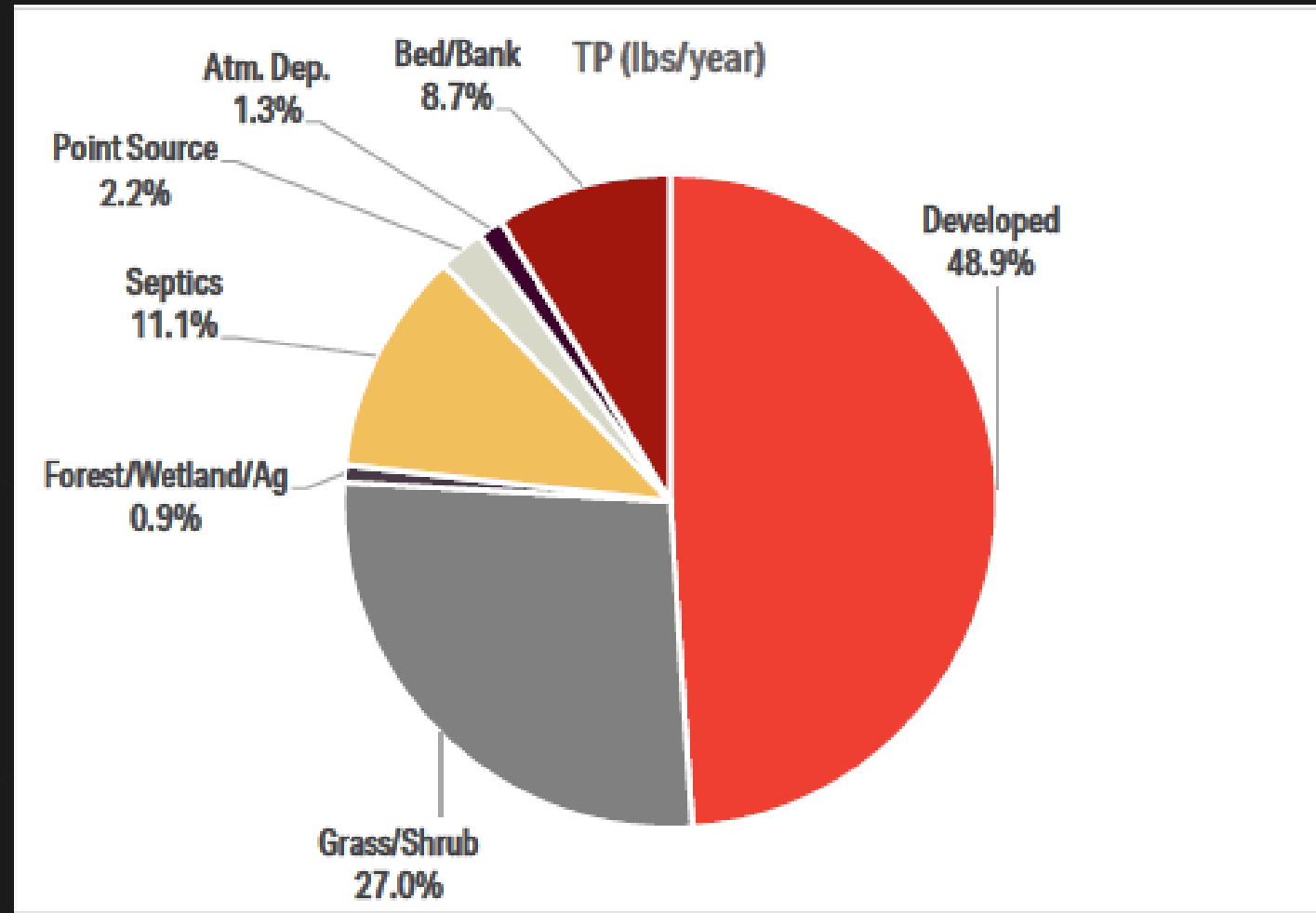
WATER QUALITY

› Total Nitrogen



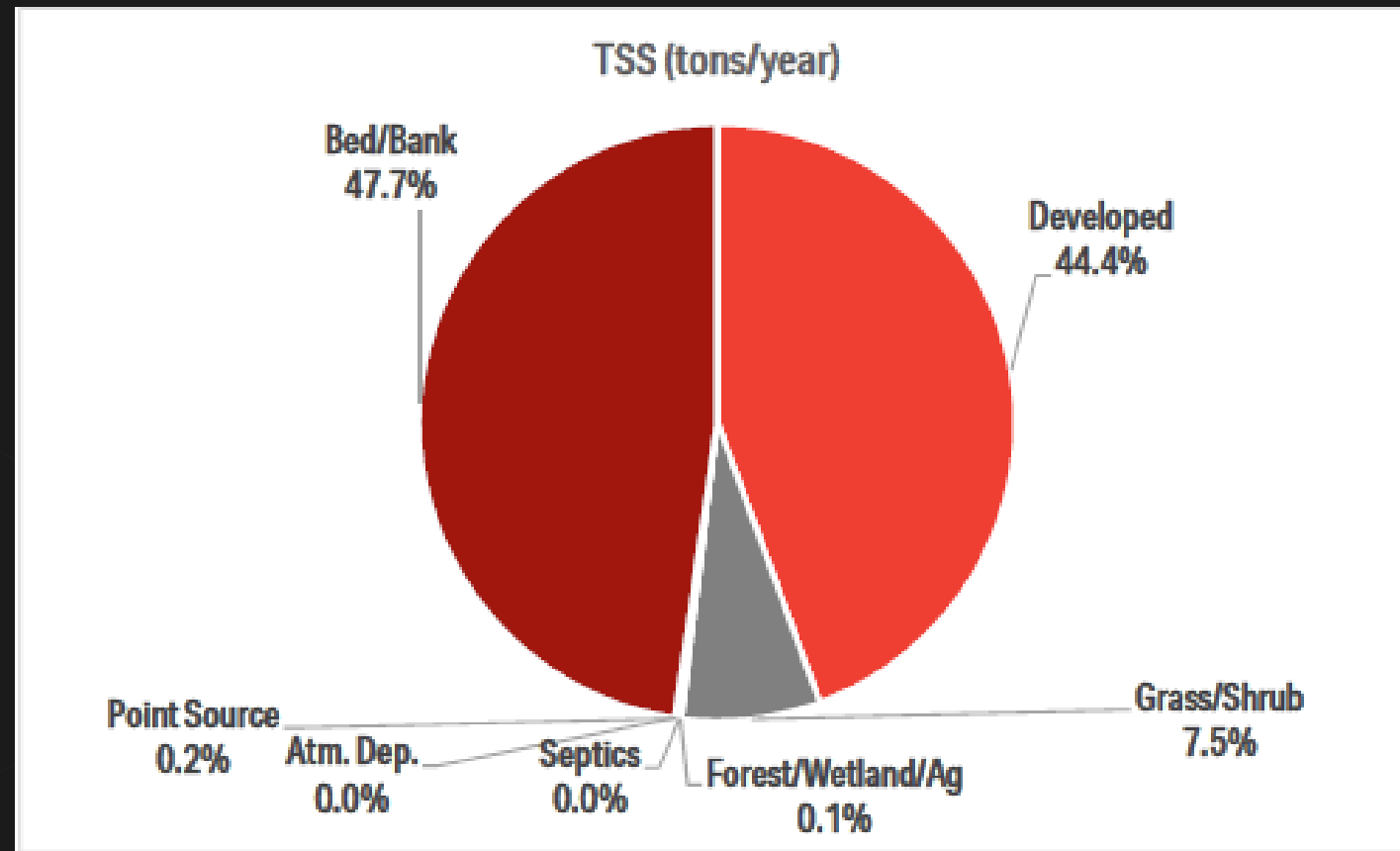
WATER QUALITY

› Total Phosphorus



WATER QUALITY

› Total Suspended Solids



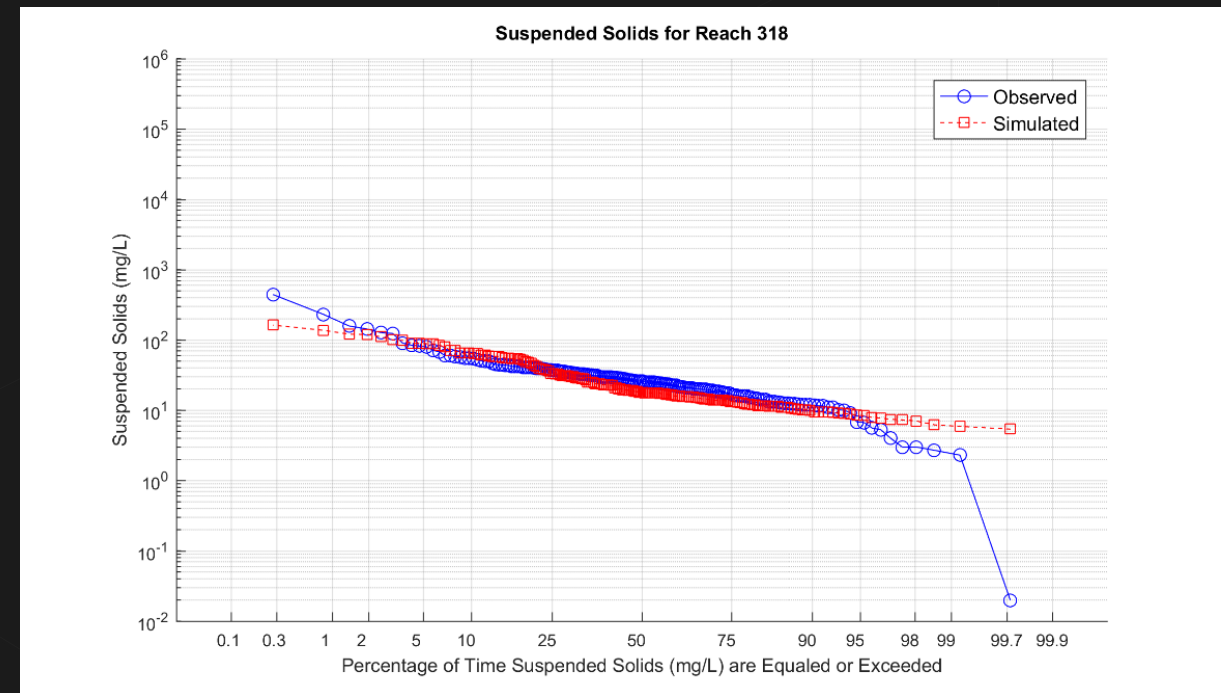
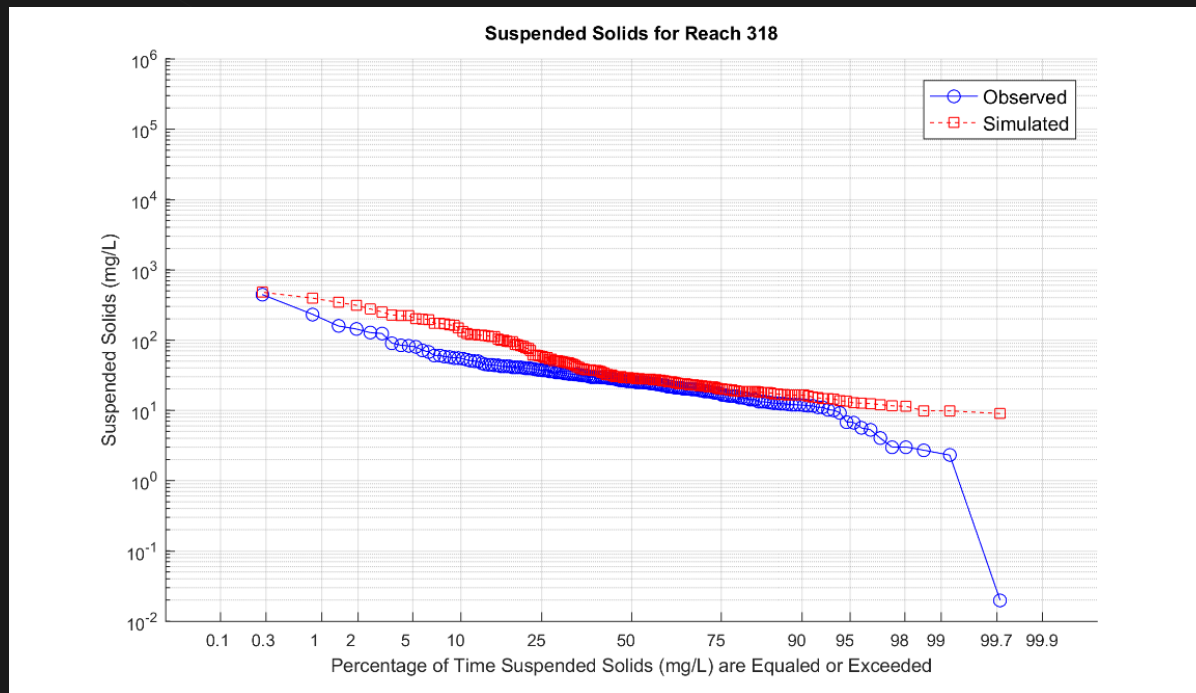
WATER QUALITY BENEFITS OF PRFS



Cottonwood Creek Peoria Pond Representation -TSS

PRF Not Represented

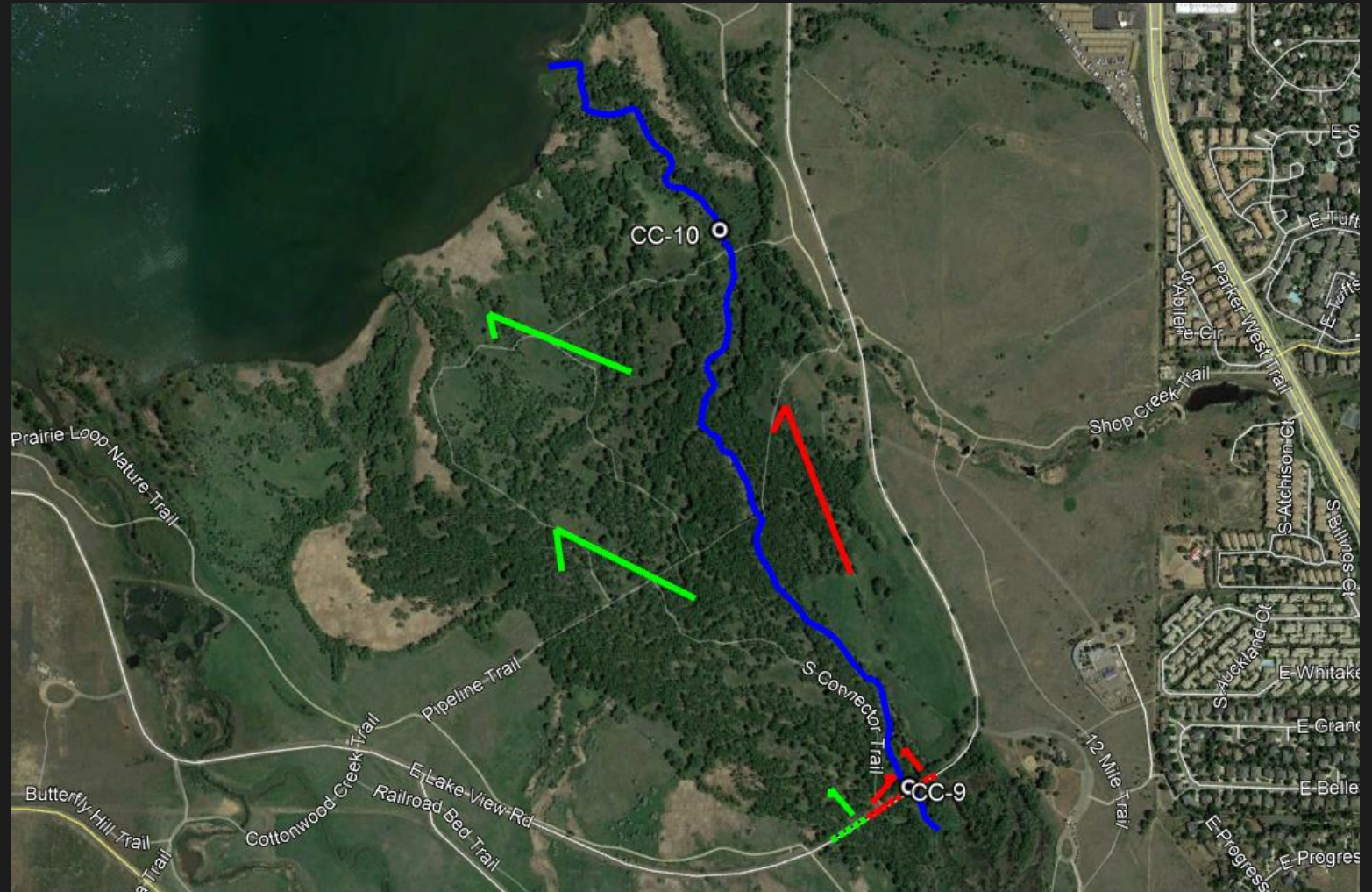
PRF Represented



CHERRY CREEK WATERSHED



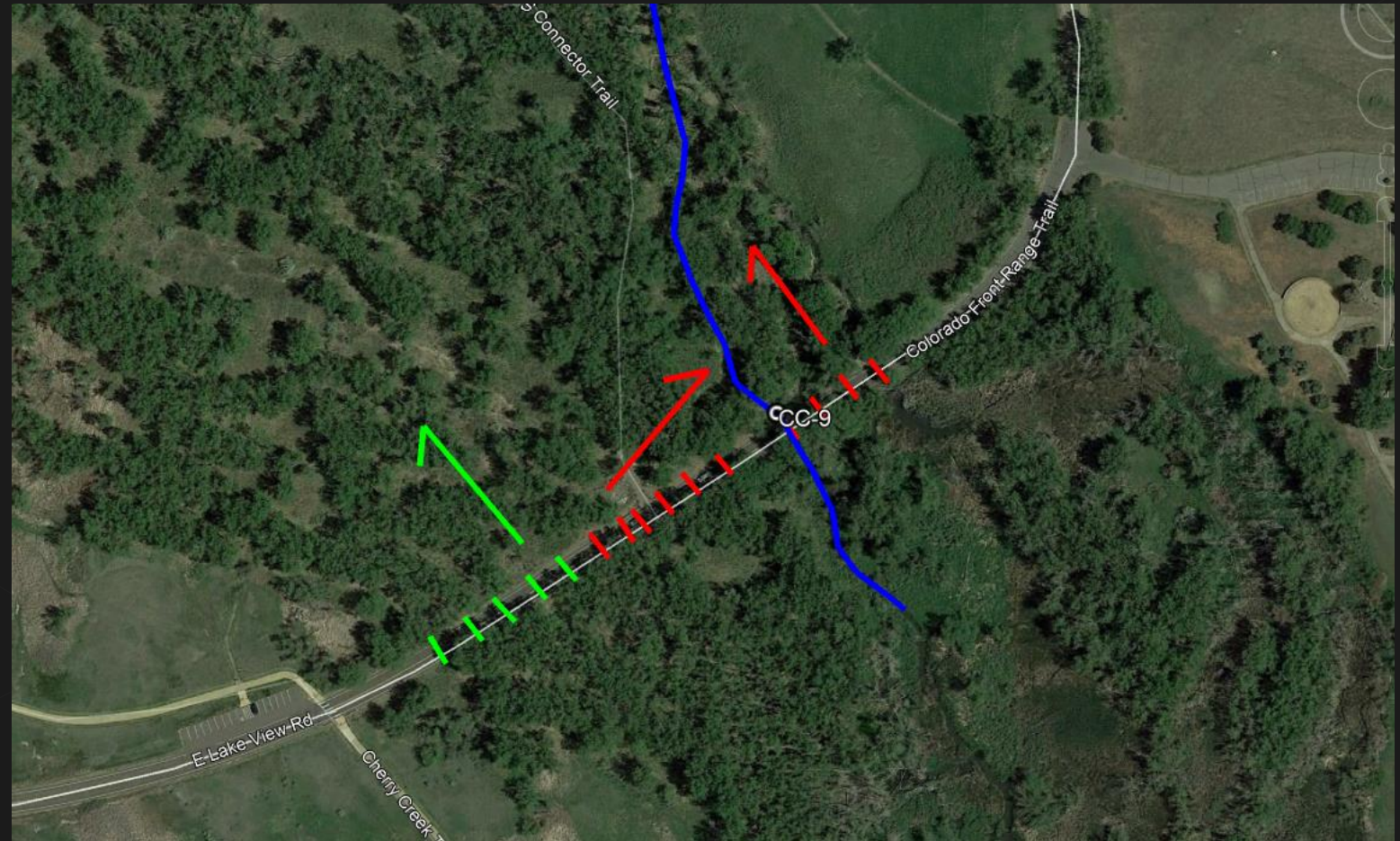
› Problems with peak storm flow calibration at CC-10



CHERRY CREEK WATERSHED



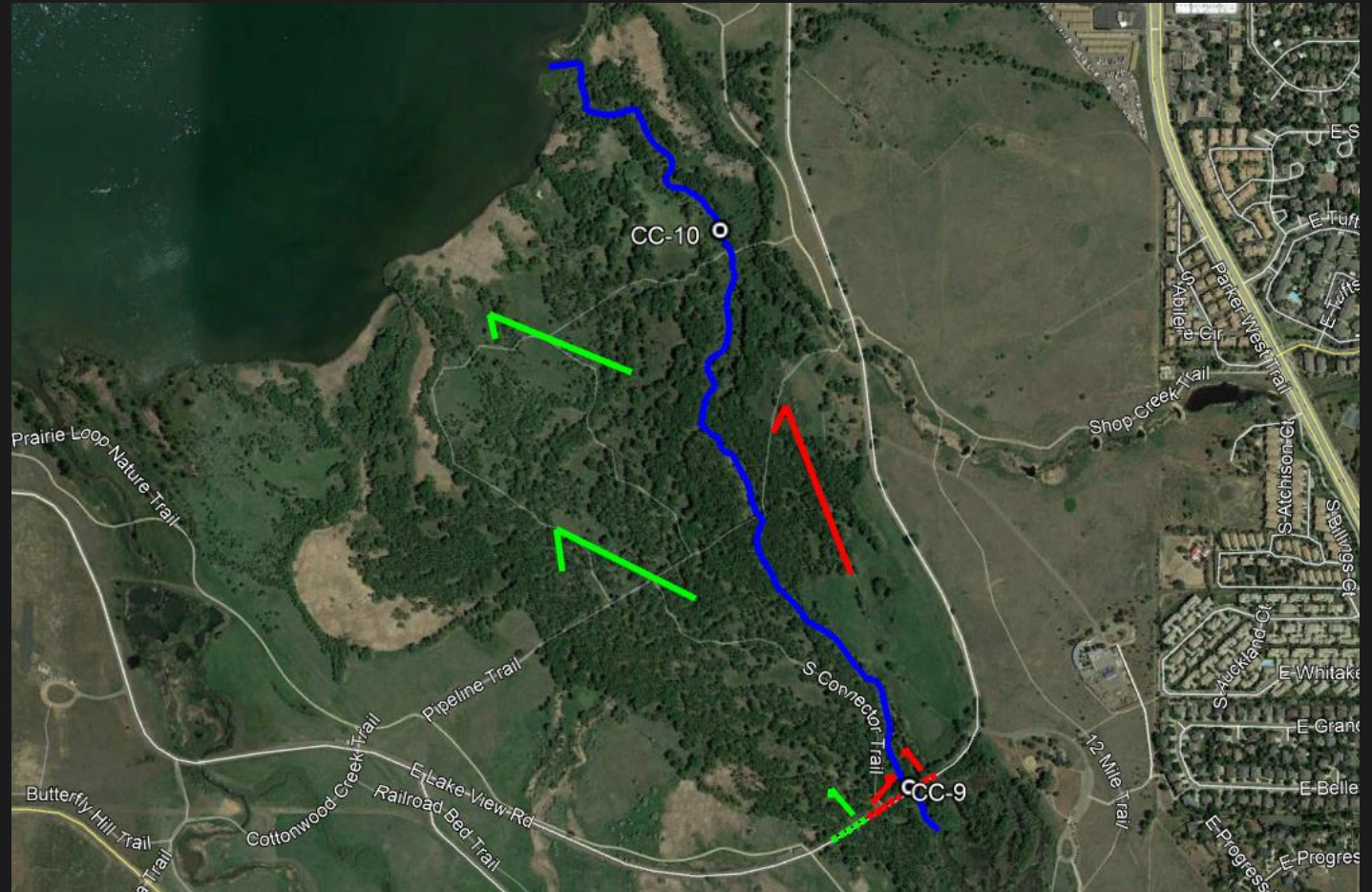
- › 14 Culverts at Lake View Drive
- › 5 of these drain away from CC-10



CHERRY CREEK WATERSHED



- › Flows that overtop the channel to the west drain away from CC-10
- › Channel is incising, directing more flow to CC-10



CHERRY CREEK WATERSHED



› And the results for Part 2 are ...



› Attend next years
Cherry Creek
Conference!!!!

› Thank You

