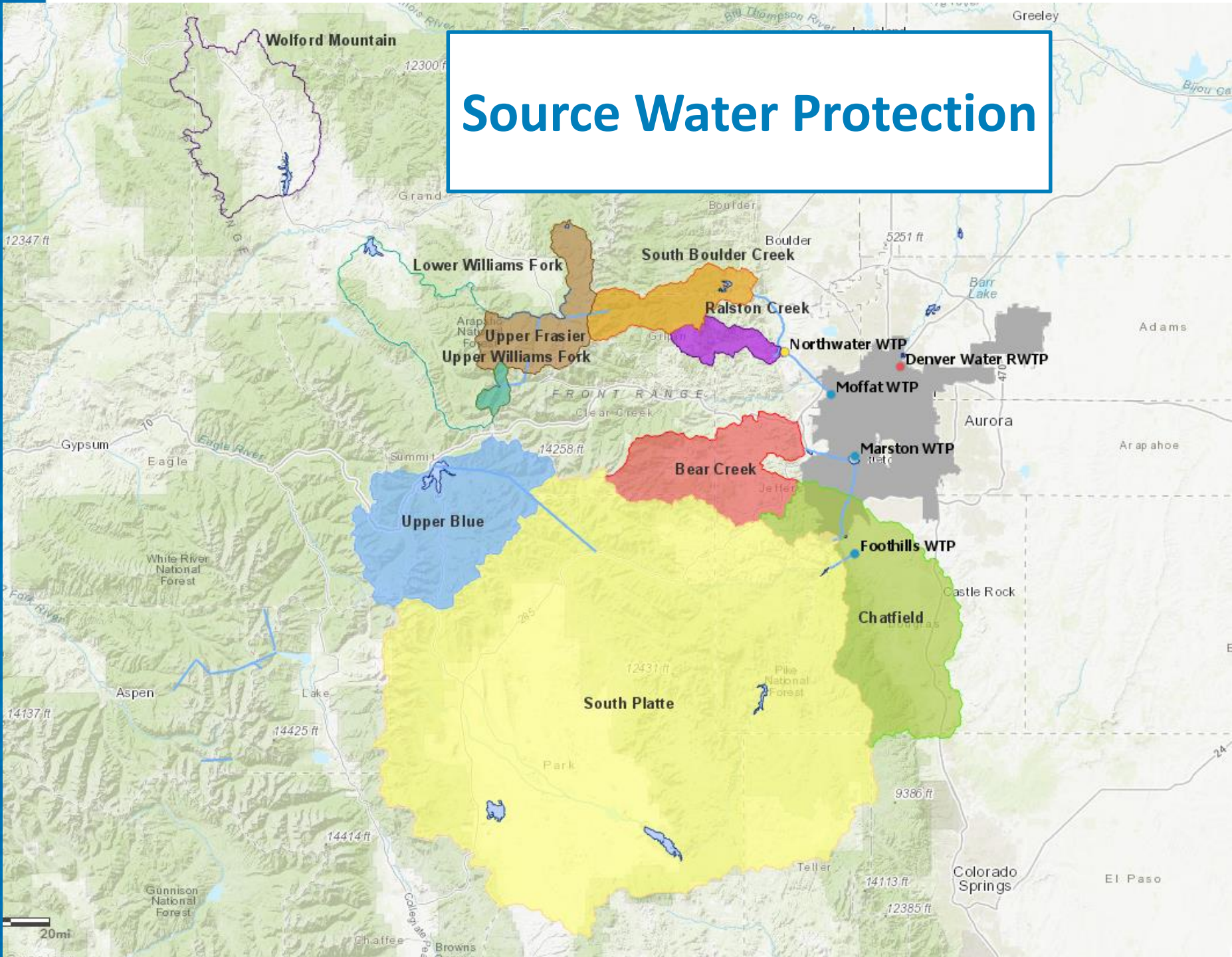


# Collaboration & Planning for Source Water Protection

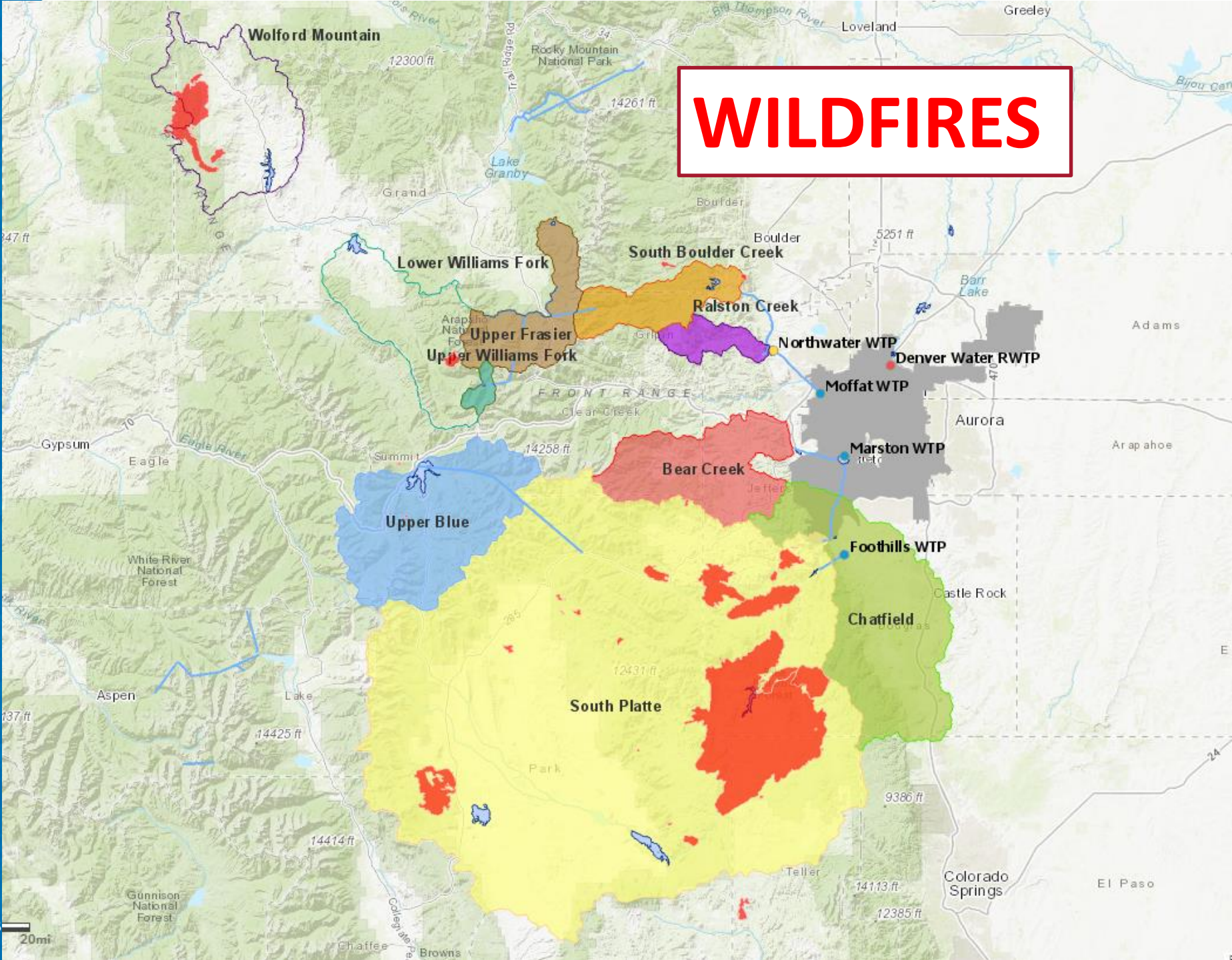


*2019 Sustaining Colorado Watersheds Conference  
October 9, 2019*

# Source Water Protection



# WILDFIRES



# 2008 White Paper to Denver Water Board

**Phase 1:** Develop and implement **prioritized treatment** for watersheds at high risk of wildfire.

## From Forests to Faucets Partnership

2010: Partnership with USFS

2017: Partnership with USFS, CSFS, NRCS, TNC



**Phase 2:** Identify and prioritize actions to mitigate **non-fire** risks to raw water supply, such as mine drainage, failing septic systems, and land disturbances from agriculture and development

# Adaptive Management Framework

Phase 1

Phase 2

## INVENTORY

Identify risks and threats, actions implemented and planned, and compile monitoring data (water quality, biologic indicators, etc.).

## ASSESS

Use inventory to assess state of the watershed and progress or impact made. Frequency and level of detail based on audience and needs.

ONGOING  
Monitoring  
Implementation

## EVALUATE

Determine the ROI on the actions and the impacts to the prioritized areas and threats. Estimate future budget needs. Adapt action planning as needed.

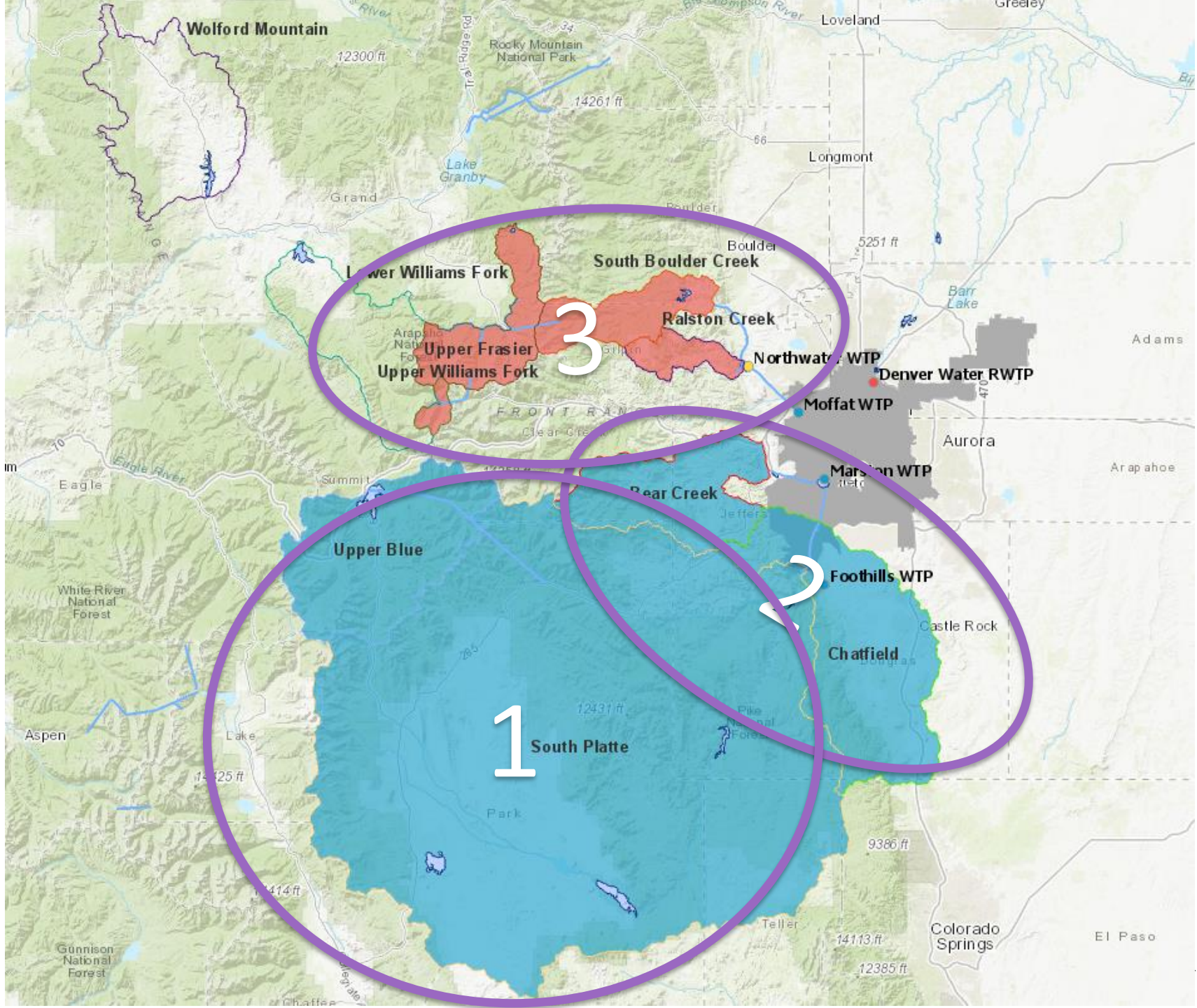
## PLAN

Use IRP Watershed Toolbox and other existing and new actions that will target prioritized areas and threats. Identify partners and stakeholders for watershed actions.

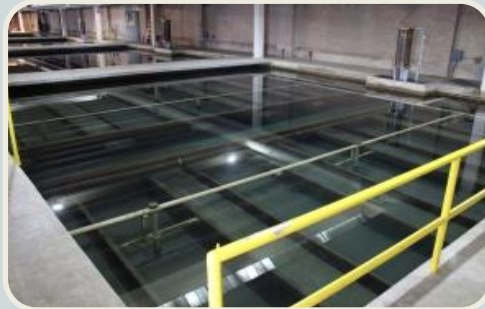
## PRIORITIZE

Identify geographic areas and categories of threats to focus implementation efforts.

DENVER WATER



# Denver Water Watershed Values



## Drinking Water Treatability

*Provide high quality  
water at an affordable  
rate*



## Infrastructure Protection

*Protect collection  
system, watershed  
assets, and access to  
assets*



## Community & Environmental Stewardship

*Foster partnerships to  
sustain healthy and  
resilient watersheds*

# The Challenge



Data → Insights

SUPPORT DECISION MAKING



# The Study Area

---

**200+** **MONITORING**  
**LOCATIONS**

---

**>130,000**  
**Sample Results**

---

**OVER 40**  
**KEY CONSTITUENTS**



---

**COVERS**  
**1.8** **MILLION**  
**ACRES**

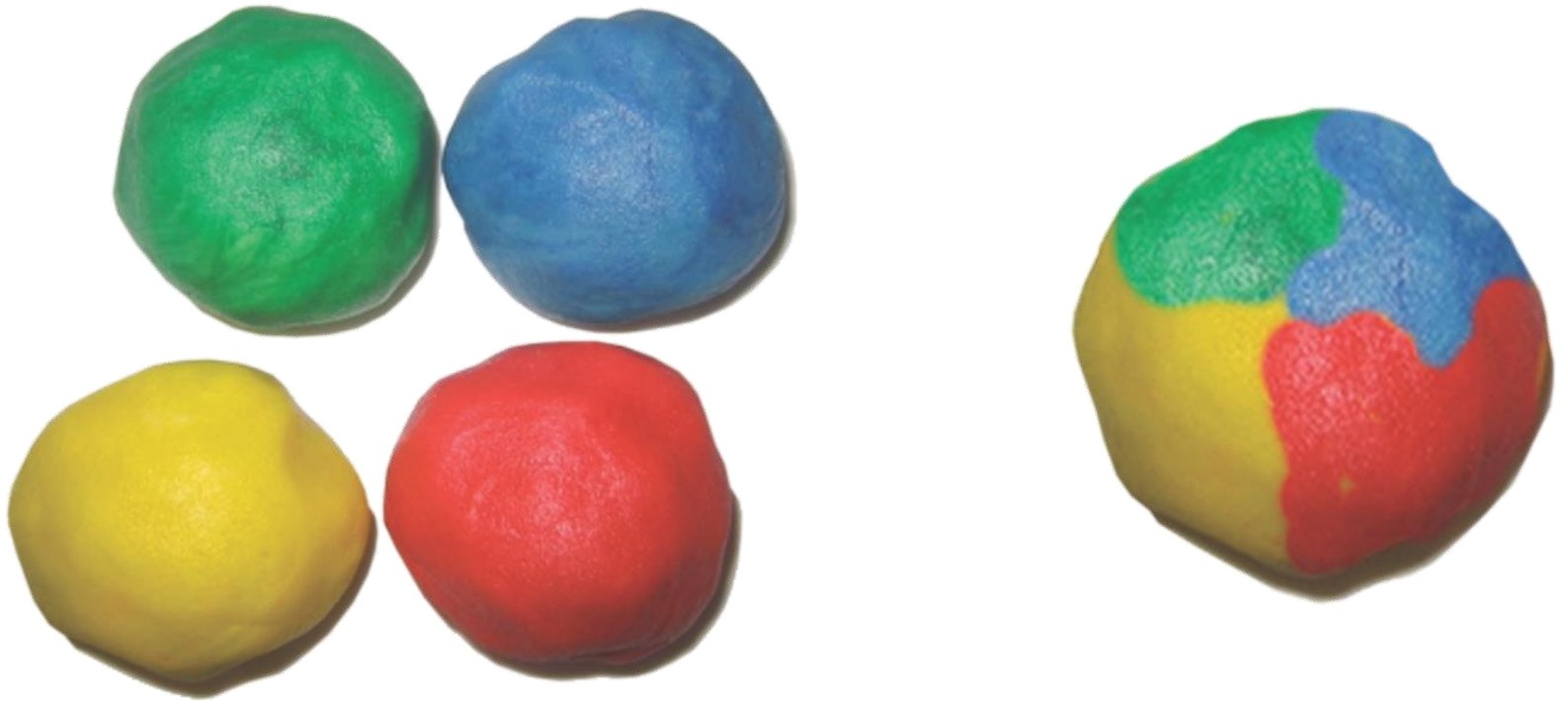
# The Analyses



- Summary statistics: Mean, 85<sup>th</sup> percentile, count
- Five flow regimes
- Trends
- Benchmarks
- Risk categorization

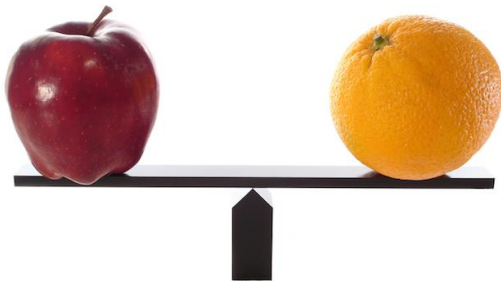
>200,000 Results!

# Many Stories to Tell...





# Translating Water Quality Results to Potential Risks



Denver Water-Specific  
Water Quality  
Benchmarks



Trends over  
Time

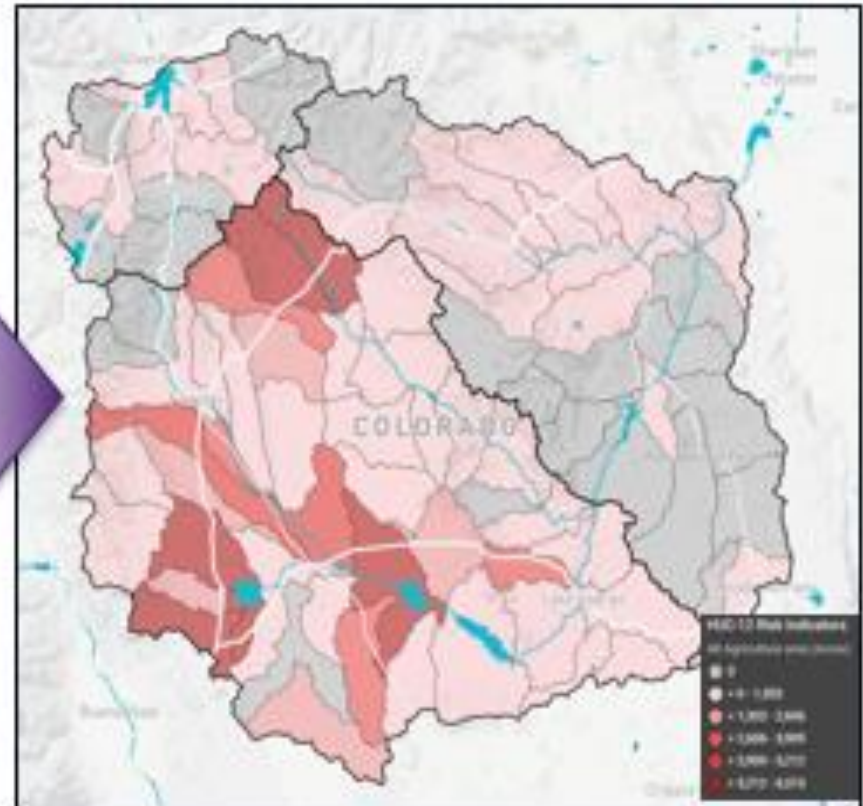


# Assessment Basin Summary



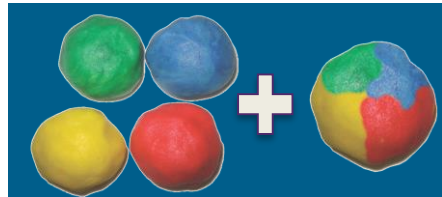
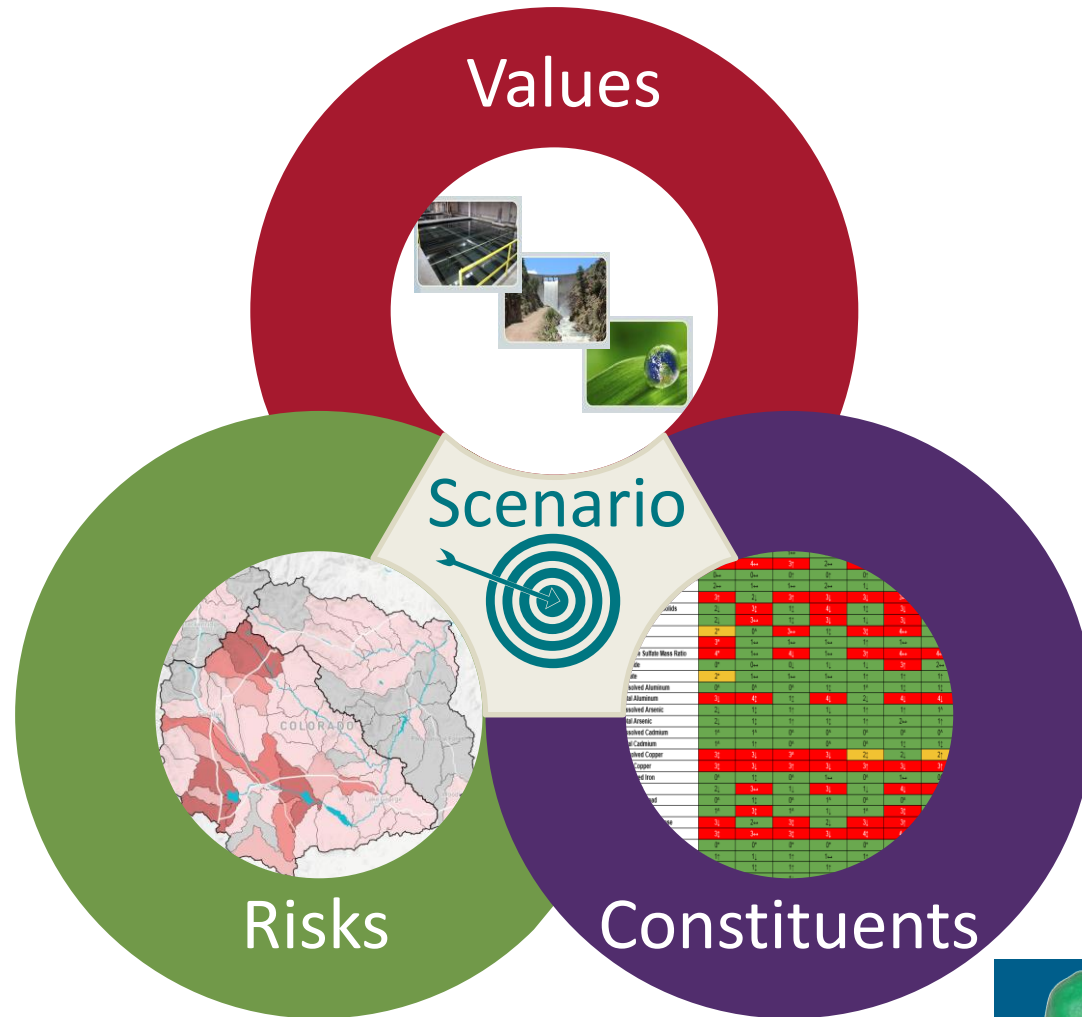
## DENVER WATER VALUE-BASED SPECIFIC PARAMETERS

# Translating Watershed Risks & Vulnerabilities → HUC12 Indicator “Heat Maps”



CONSISTENT WITH  
EPA WATERSHED INDEX ONLINE

# Putting it All Together → Denver Water Watershed Risk Tool





Values

- Treatment
- Infrastructure
- Environment

Risks

- Mining
- Wildfire
- Transportation
- WWTPs
- OWTS
- Agriculture
- Recreation
- Oil and Gas
- Development
- Natural
- Forest Health

Constituents

HUC-12 Risk Indicator

None

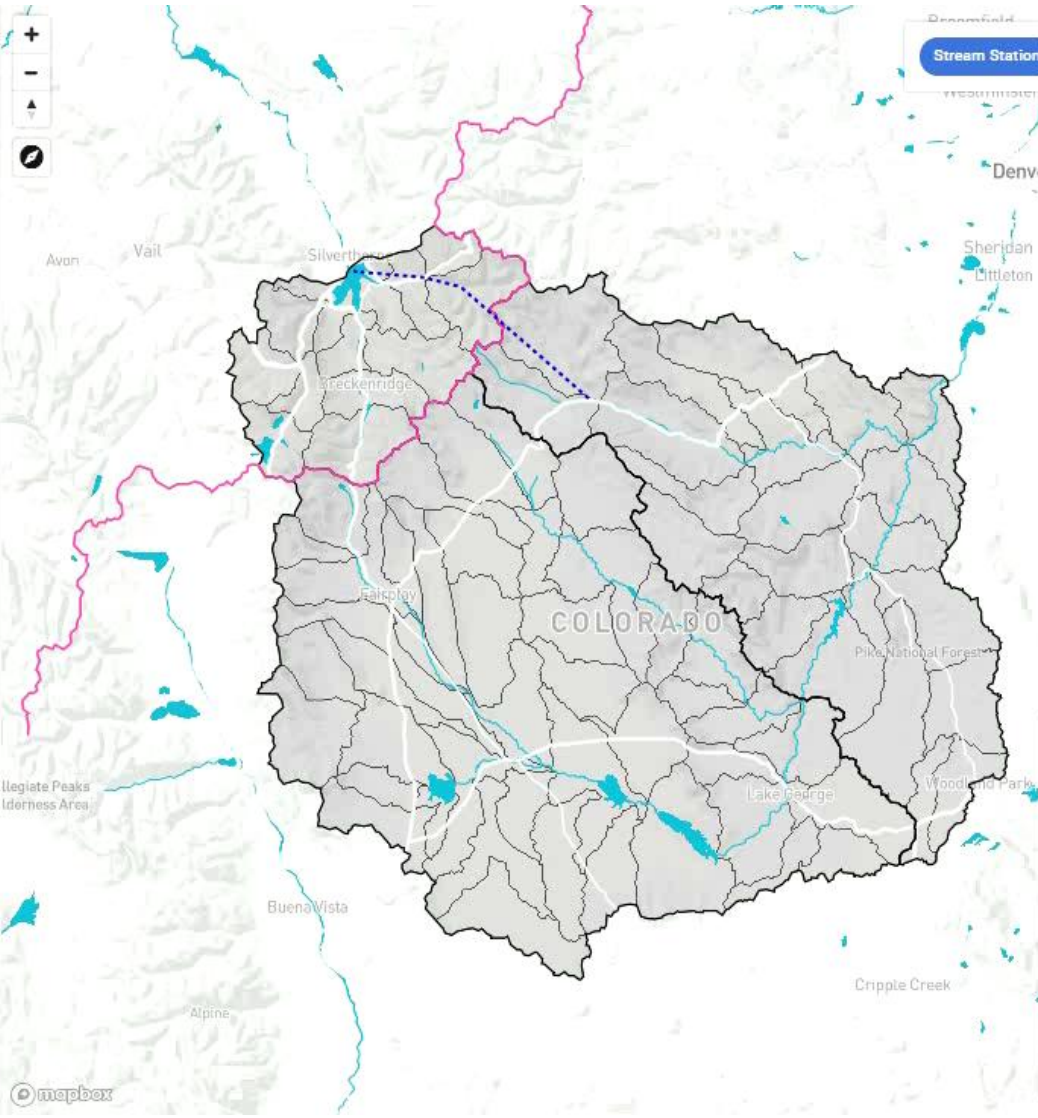
HUC-12 Sub-Basins

Upper Blue, South Platte Mainstem,...

HIDE FILTERS

Nearby Locations

Zoom in or pan the map to view a list of monitoring locations visible within the current map extent.



- Stream Station
- Reservoir
- Mine Discharge
- Effluent

**Legend**

**Monitoring Points**

- 0 - Constituent not detected
- 1 - Below benchmark
- 2 - Approaching benchmark
- 3 - Above benchmark
- 4 - Above secondary benchmark

**HUC-12 Risk Indicators**

No HUC-12 Risk Indicator currently selected.



**DENVER WATER** ⚙️

Values

Treatment **Infrastructure** Environment

Risks

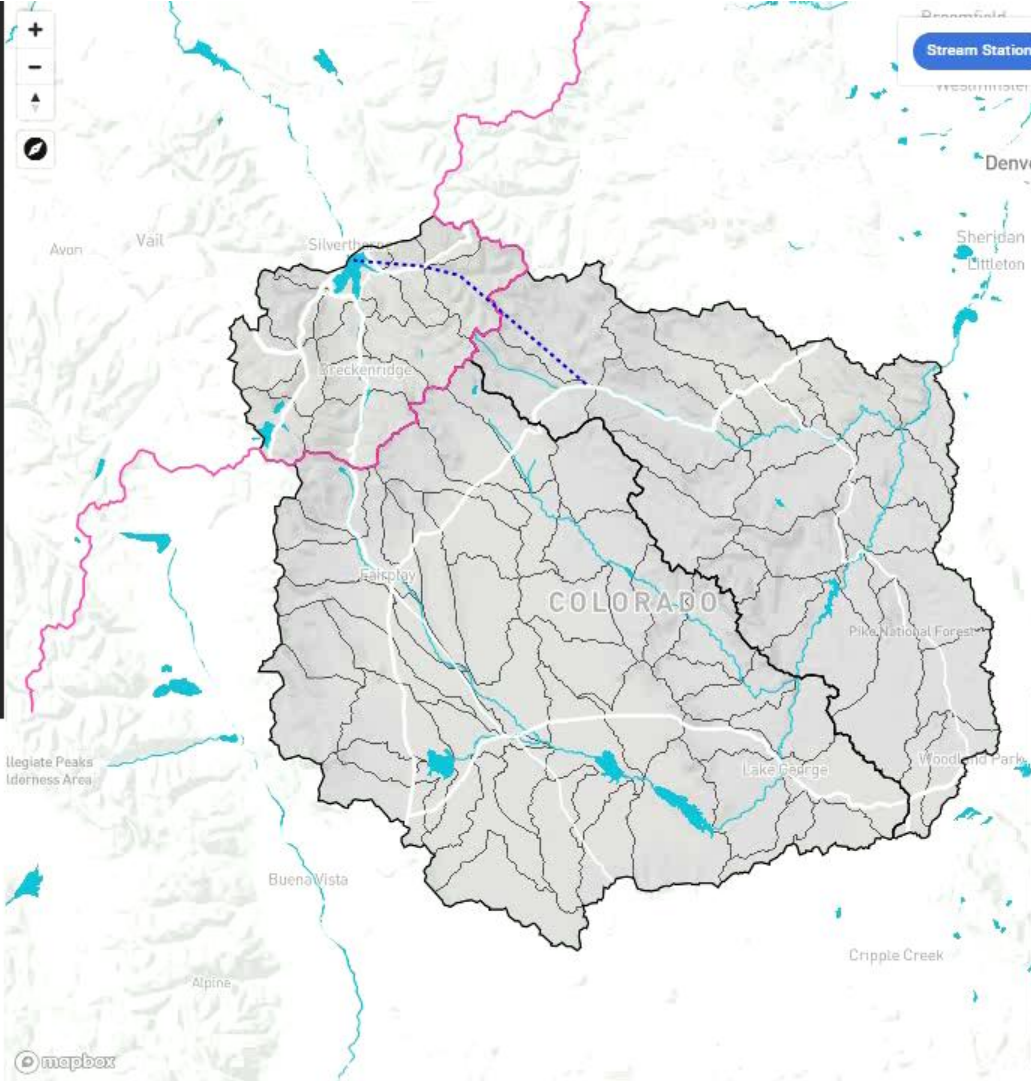
Mining Wildfire **Transportation** WWTPs

OWTS Agriculture Recreation Oil and Gas

Cl  
 CSMR  
 SO4  
 TSS

Upper Blue, South Platte Mainstem, ...

**HIDE FILTERS**



**Legend**

**Monitoring Points**

- 0 - Constituent not detected
- 1 - Below benchmark
- 2 - Approaching benchmark
- 3 - Above benchmark
- 4 - Above secondary benchmark

**HUC-12 Risk Indicators**

No HUC-12 Risk Indicator currently selected.

© Mapbox © OpenStreetMap Improve this map

**Nearby Locations**

Zoom in or pan the map to view a list of monitoring locations visible within the current map extent.



Values

- Treatment
- Infrastructure
- Environment

Risks

- Mining
- Wildfire
- Transportation
- WWTPs
- OWTS
- Agriculture
- Recreation
- Oil and Gas
- Development
- Natural
- Forest Health

Constituents

HUC-12 Risk Indicator

None

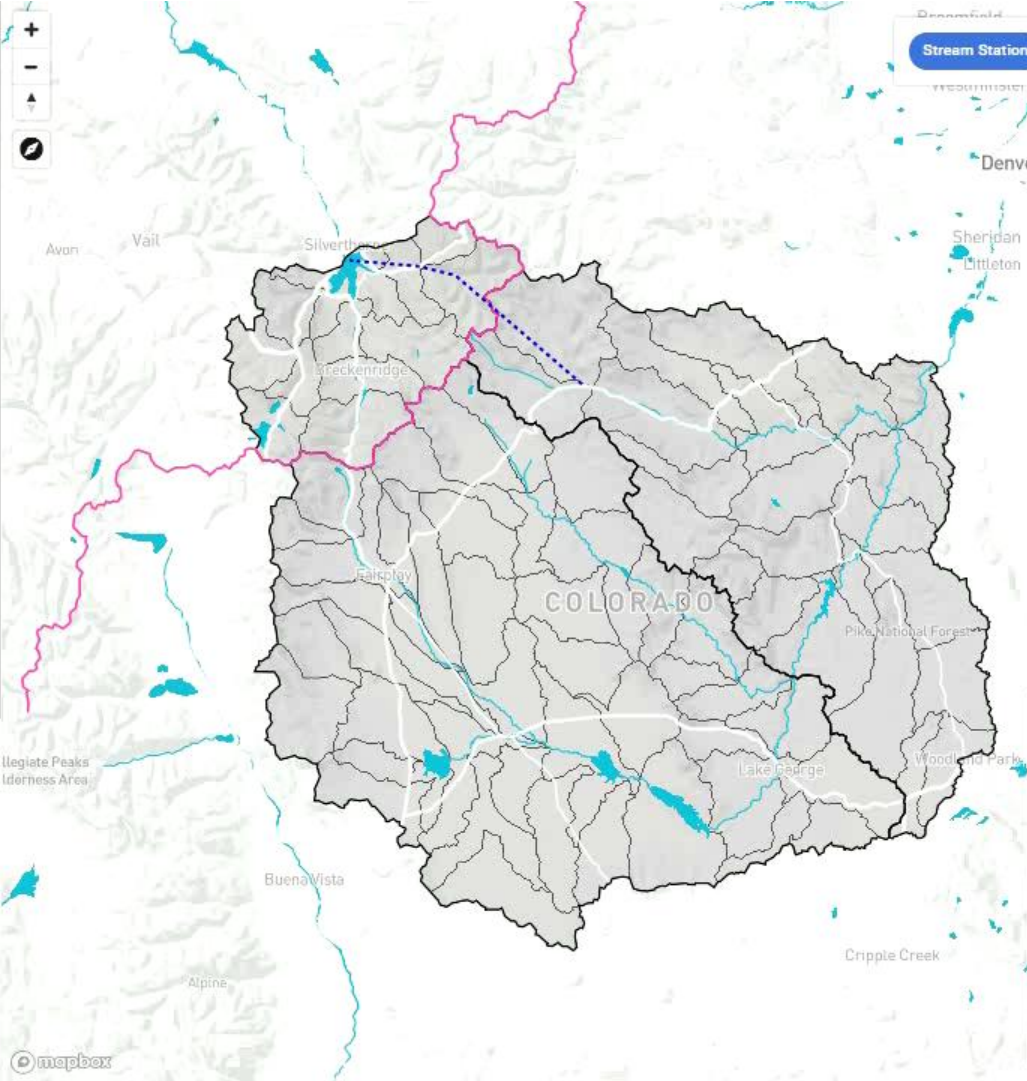
HUC-12 Sub-Basins

Upper Blue, South Platte Mainstem,...

HIDE FILTERS

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Legend

- Monitoring Points**
- 0 - Constituent not detected
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  - 2 - Approaching benchmark
  - 3 - Above benchmark
  - 4 - Above secondary benchmark

**HUC-12 Risk Indicators**

No HUC-12 Risk Indicator currently selected.

# Priorities



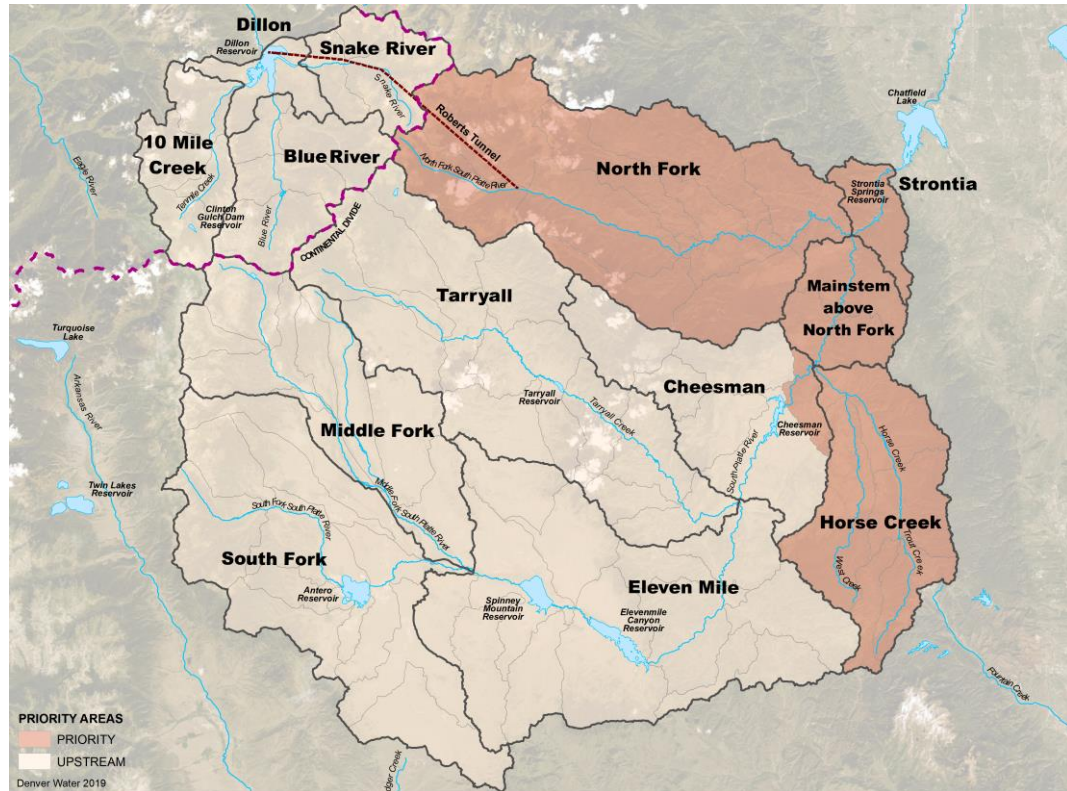
Wildfire Risk  
Reduction



Sediment to  
Strontia  
Springs



Abandoned  
Mine  
Discharge



# THANK YOU!

# QUESTIONS?

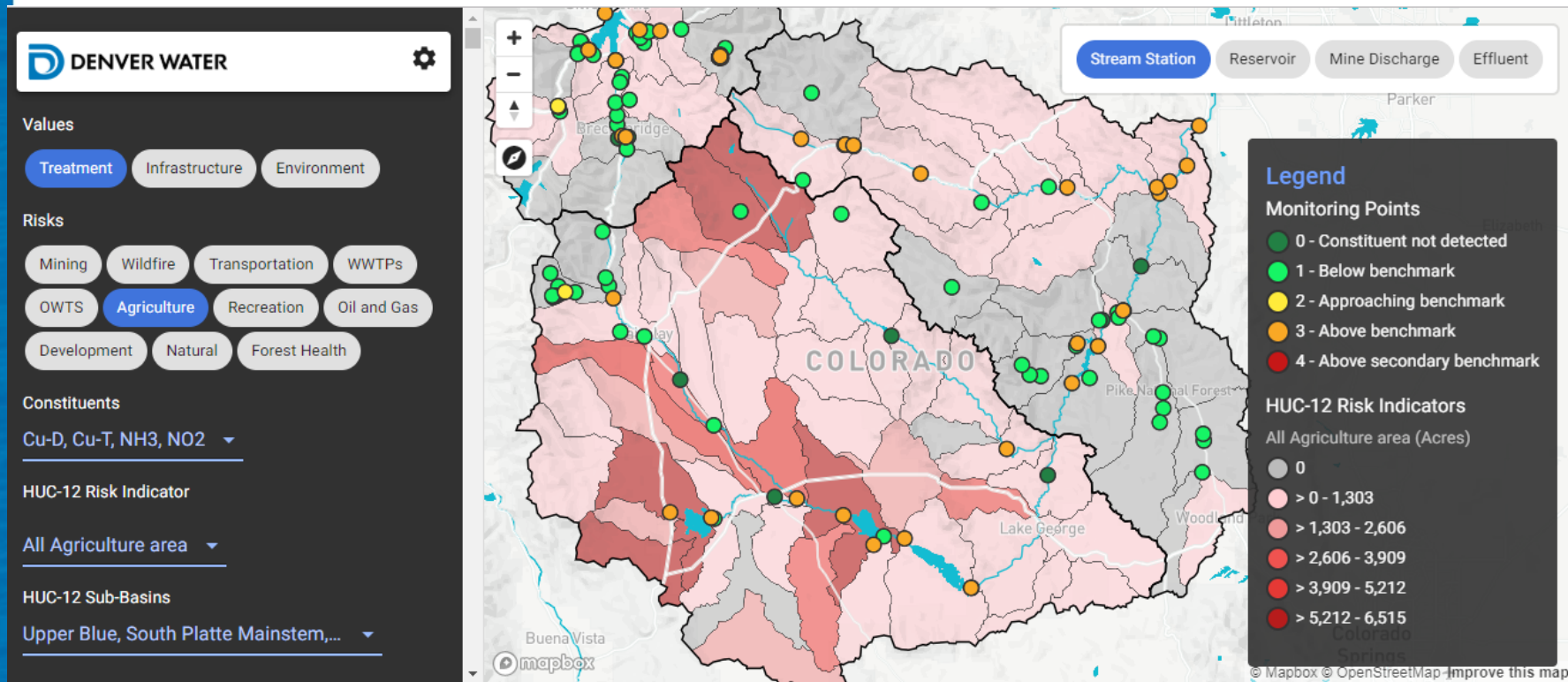
*[alison.witheridge@denverwater.org](mailto:alison.witheridge@denverwater.org)*

303-628-6168

*[carolyn.nobel@lrewater.com](mailto:carolyn.nobel@lrewater.com)*

303-455-9589

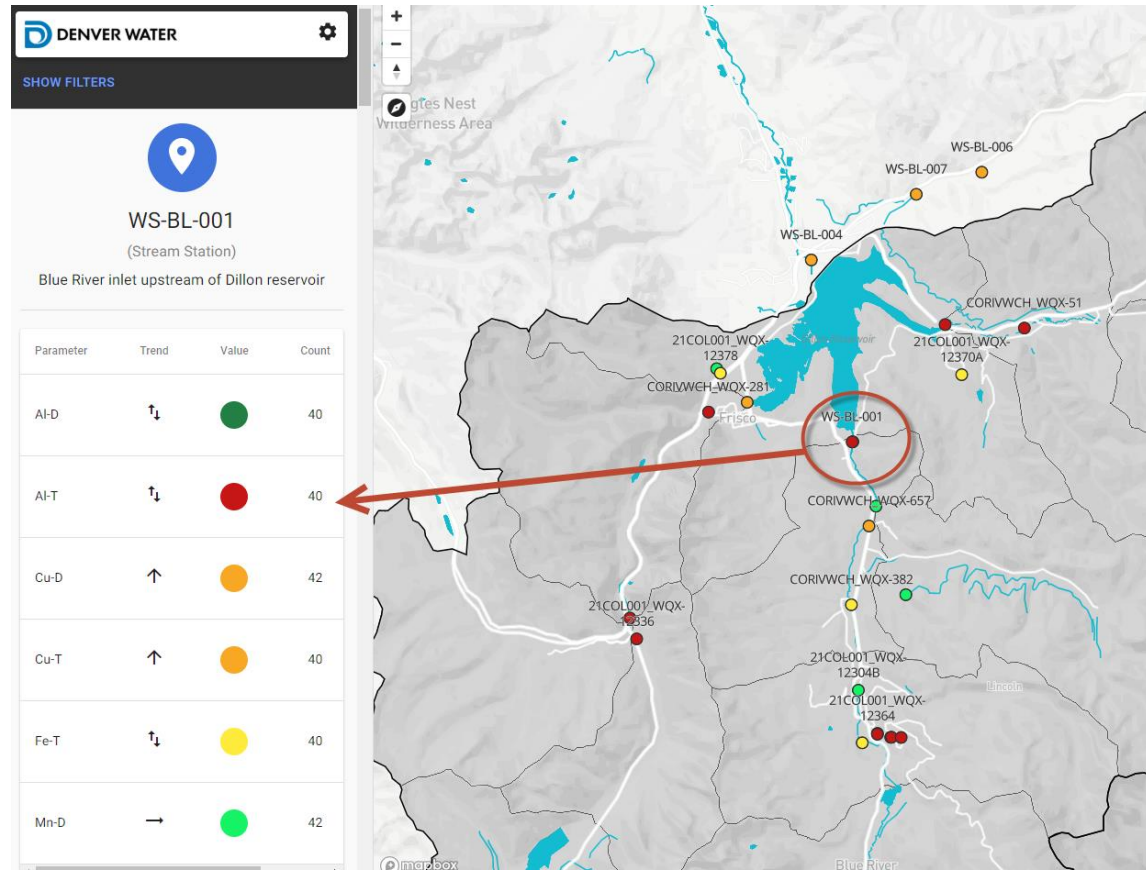
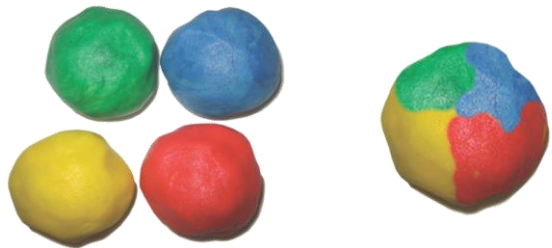
# Watershed Risk Decision Support Tool



- Integrates values, risks & constituents
- Provides efficient access to results
- Combines constituents
- Displays relative risk

# Explore Water Quality Results Summary and Details

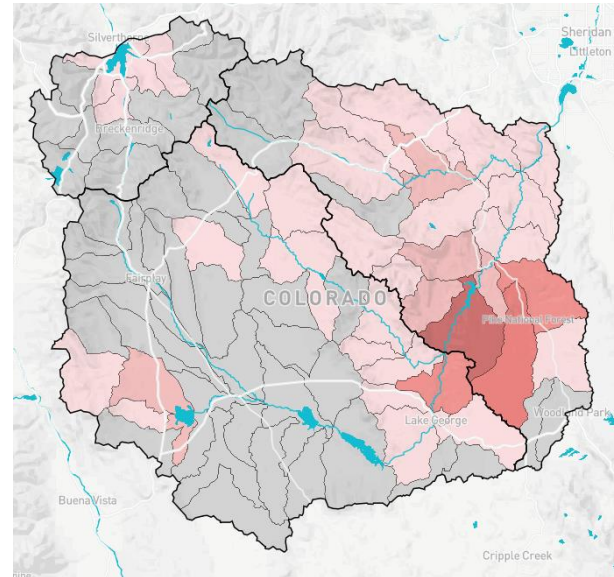
- View map of max benchmark values for selected constituents
- See details for selected location



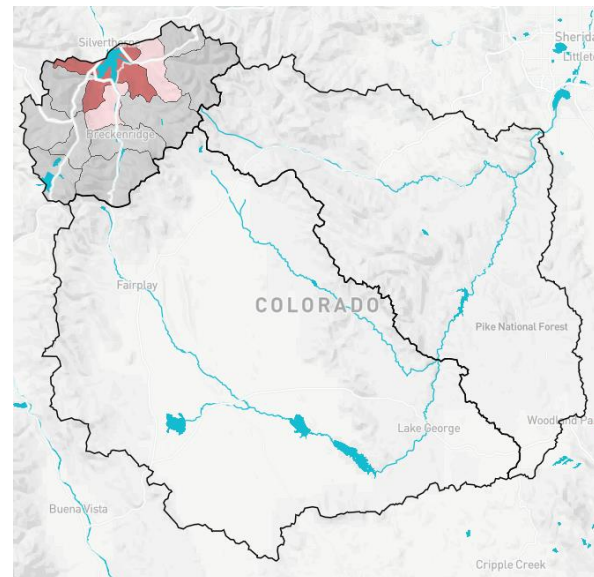
# Chapter 6: Priorities

## Risk Tool → Investigate Risk Indicators (§6.3.2)

- List of indicators filtered by scenario selections
- Relative risk values update based on selected area



Acres of wildfire in the collection system



Acres of wildfire in the Upper Blue