



Fires, flood risk, and water quality

Larimer County Water Education Series

August 21, 2023

Esther Vincent, P.E.



Northern Water Today



District population

1,021,000



Ownership

Ag: 29%

M&I: 71%



Deliveries (2020)

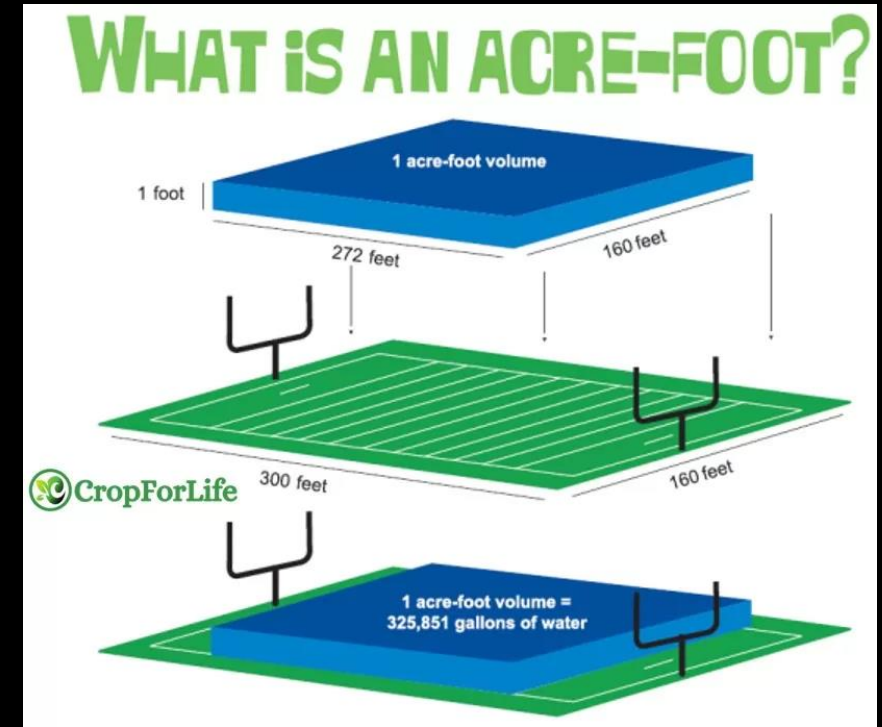
Ag: 40%

M&I: 60%



Raw Water Provider

210,000 acre-feet/year



CONSTRUCTED

1938-1957

The Colorado- Big Thompson Project location map



Northern Water
Northern Colorado Water Conservancy District
228 Water Ave. Berthoud, Colorado 80513
www.northernwater.org

US Index Map



Colorado Index Map



The background features a stylized, semi-transparent graphic. On the left, a globe shows the continents of North and South America. To the right of the globe is a vertical thermometer with a bulb at the bottom and a scale with horizontal tick marks. The entire graphic is rendered in shades of gray and blue against a black background.

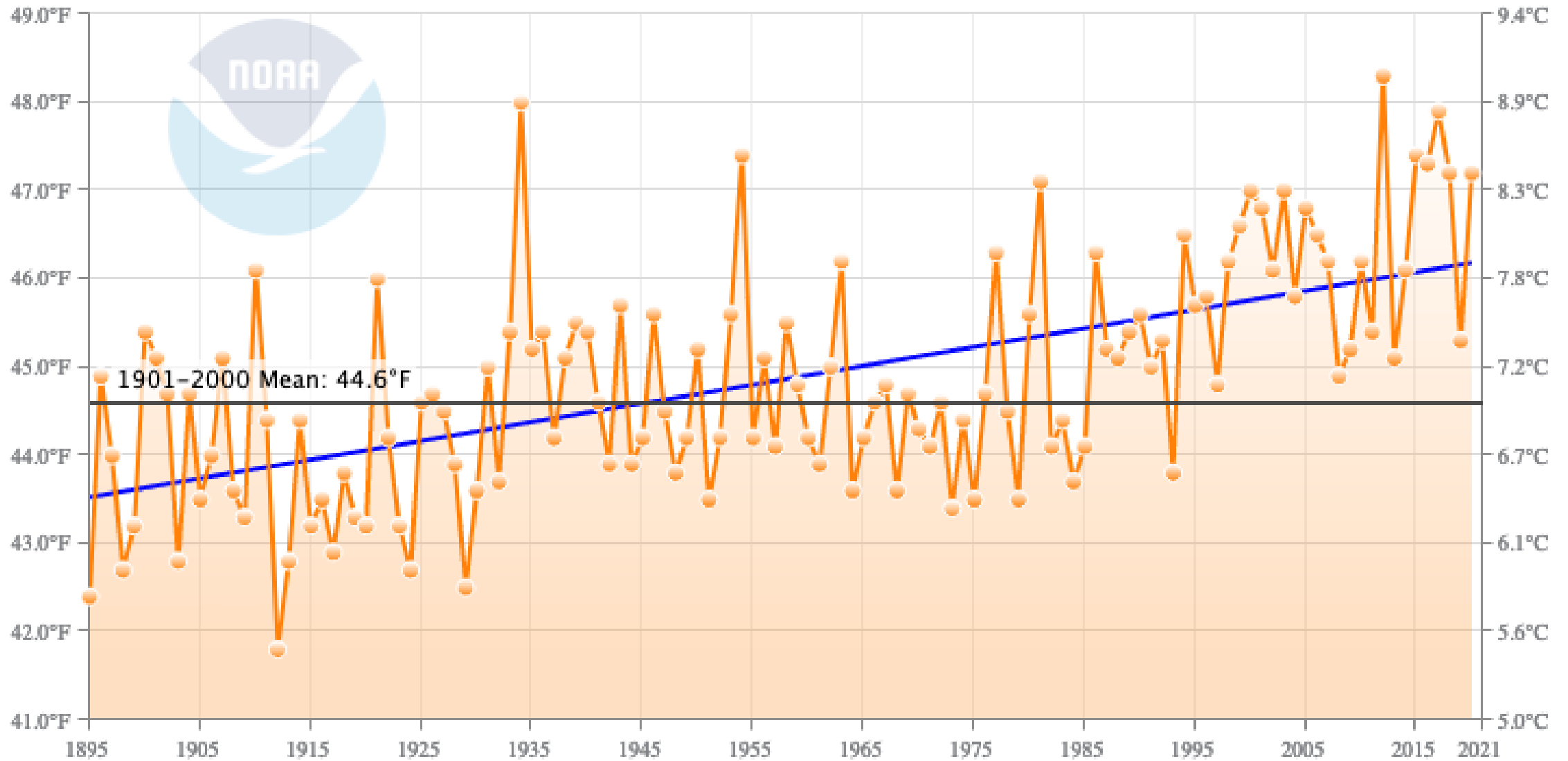
Context

Climate Change and Compromised Forest Health

Colorado Average Temperature

January-December

1895-2020 Trend
(+0.2°F/Decade)



Further change to come

Earlier springs

Earlier snowmelt and runoff

Hotter summers

More frequent and severe heat waves

Longer growing season

Greater evapotranspiration

Net water budget deficit

Longer fire season

Statewide Average Annual Temperature

+ 2 F over the past 30 years

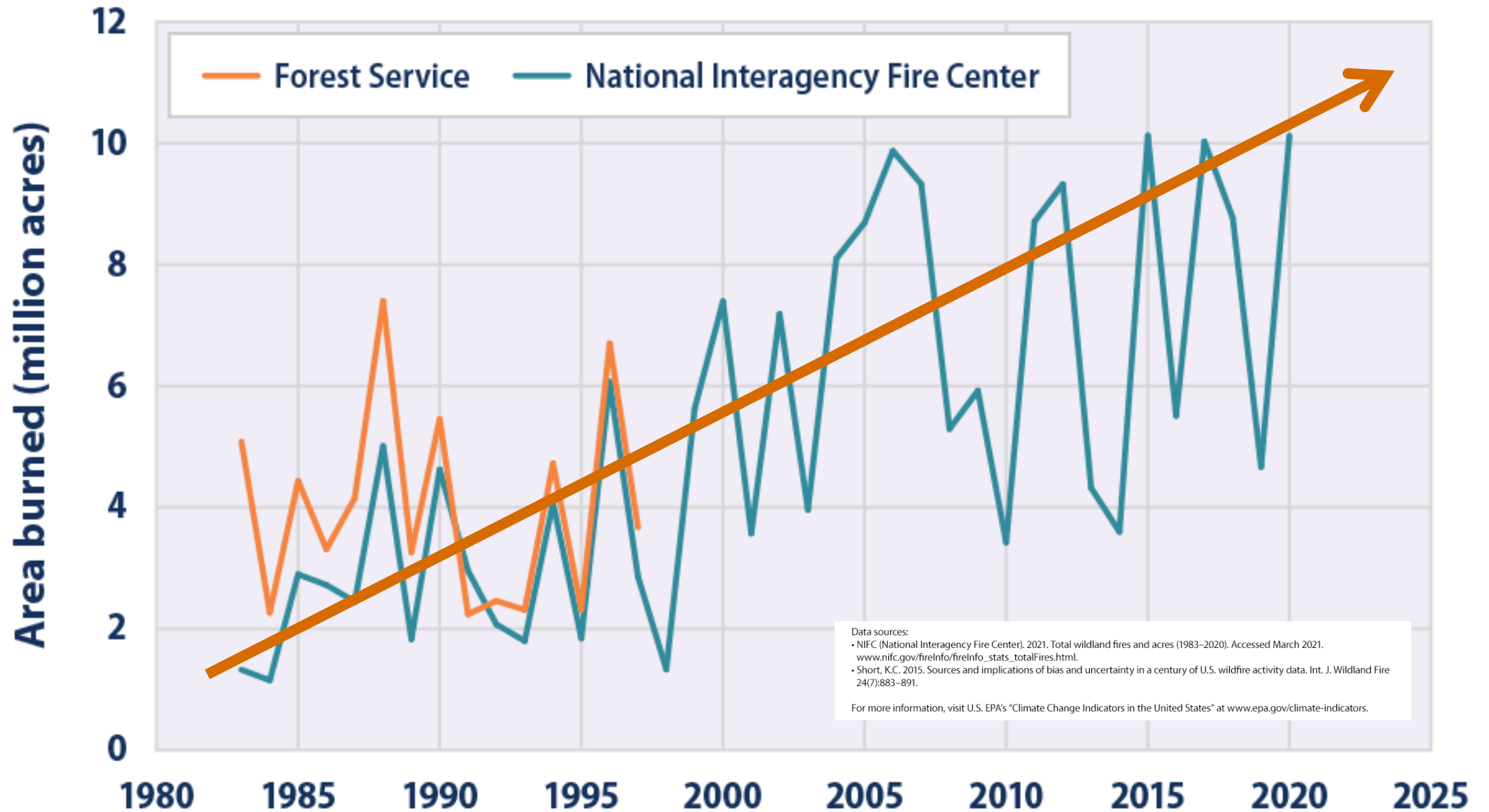
GCMs predict + 2.5 F – 6.5 F by 2050



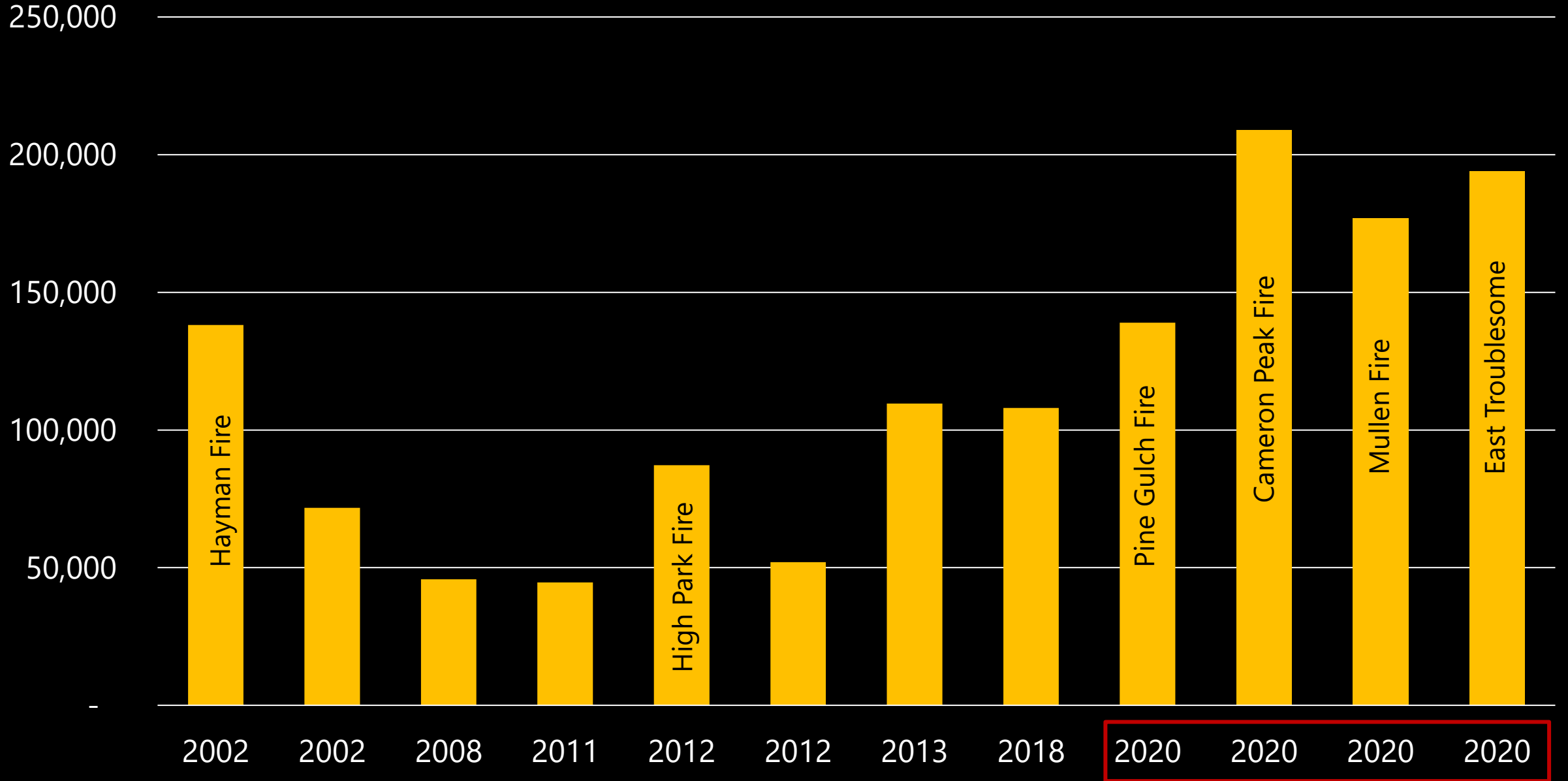


Extensive
Mountain Pine
Beetle Kill

Wildfire Extent in the United States, 1983–2020



Largest Wildfires in Colorado - Burn Area (acres)



2020 Wildfires

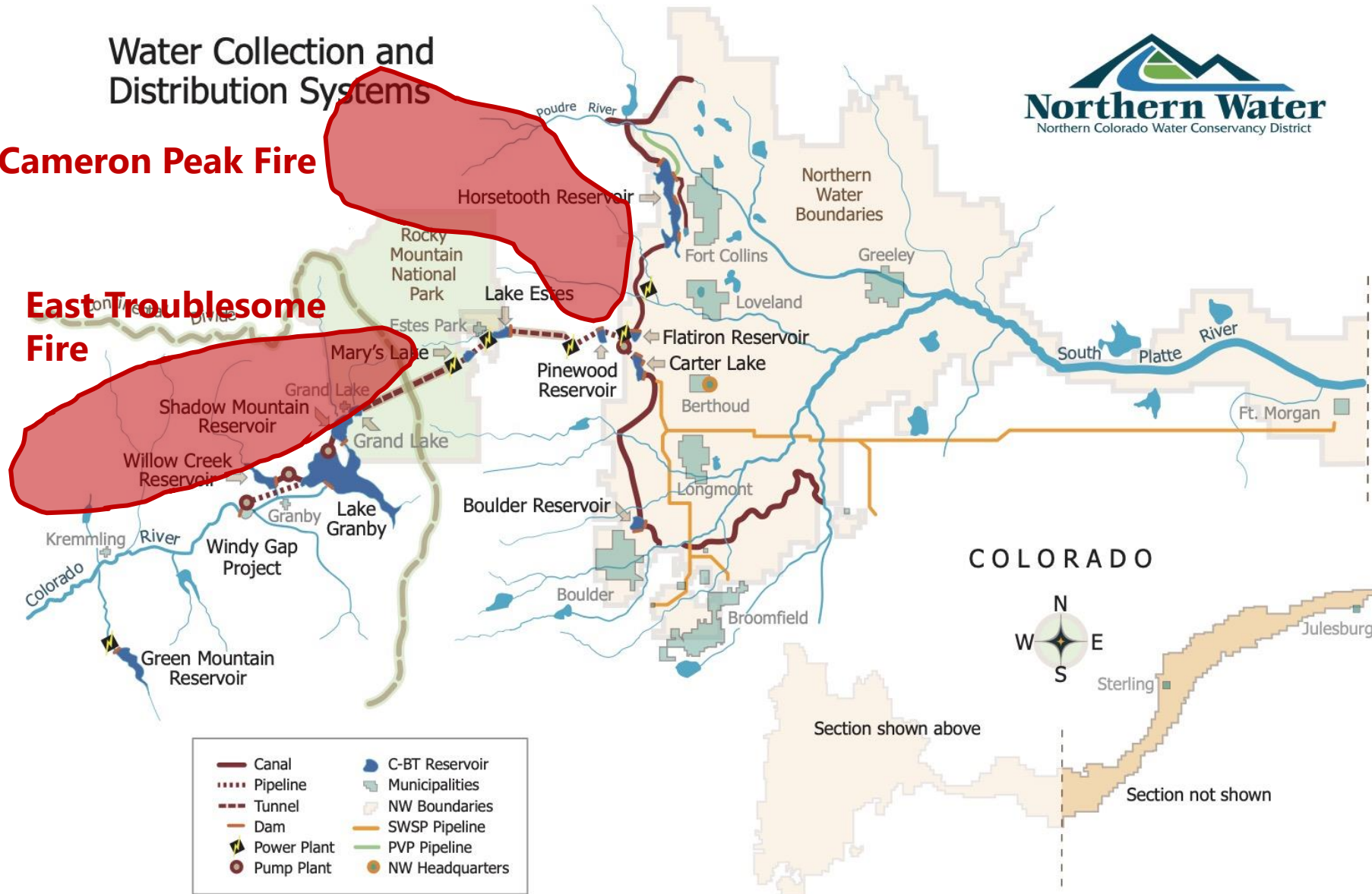


Water Collection and Distribution Systems



Cameron Peak Fire

East Troublesome Fire



- | | |
|-------------|-----------------|
| Canal | C-BT Reservoir |
| Pipeline | Municipalities |
| Tunnel | NW Boundaries |
| Dam | SWSP Pipeline |
| Power Plant | PVP Pipeline |
| Pump Plant | NW Headquarters |

COLORADO



Section shown above

Section not shown

Kawuneeche Valley (East Troublesome Fire)





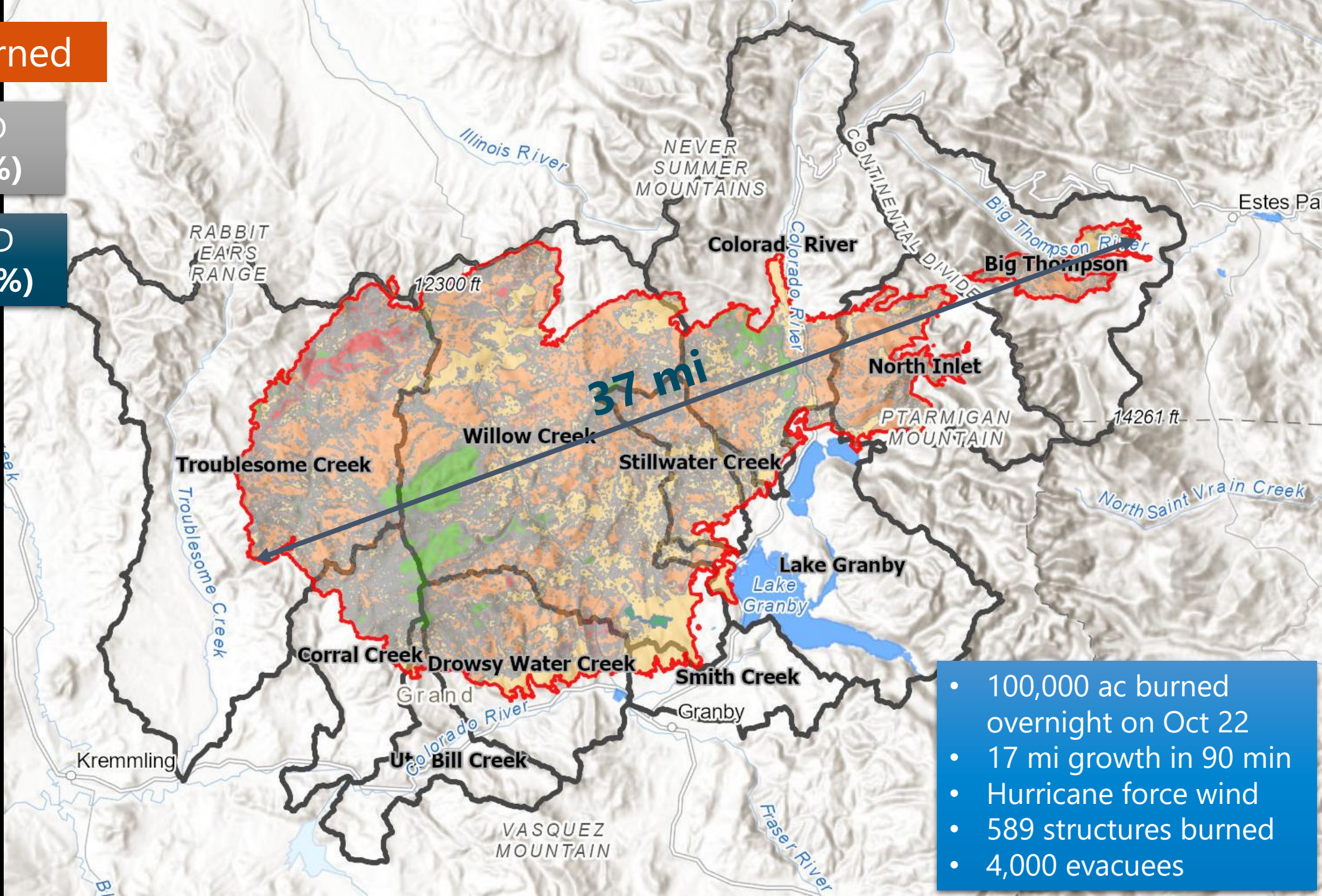
193,559 ac Burned

PRIVATE LAND
19,757 ac (10%)

FEDERAL LAND
168,908 ac (90%)

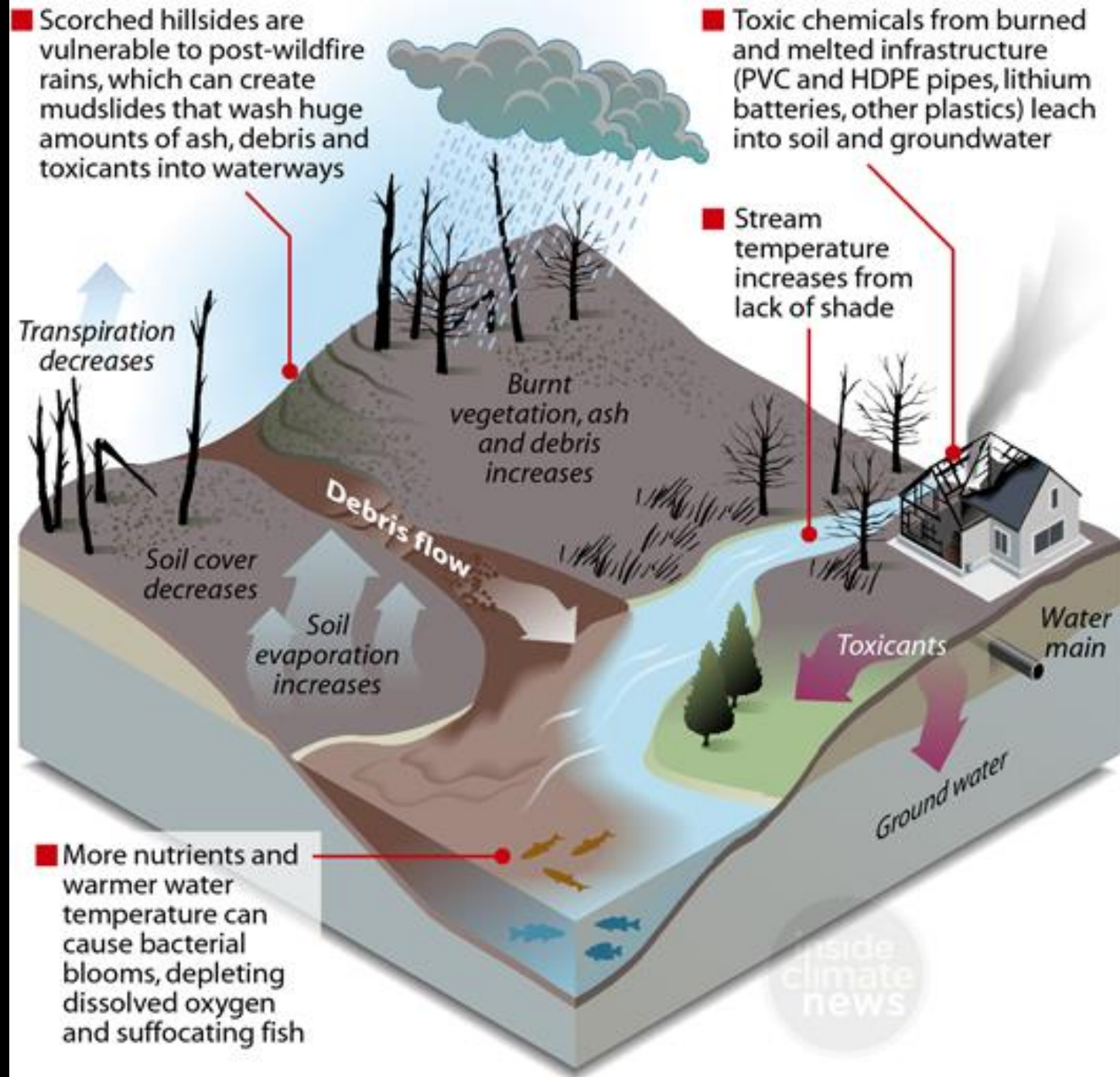
Soil Burn Severity

- High
- Moderate
- Low
- Unburned/Very Low
- Burn Area

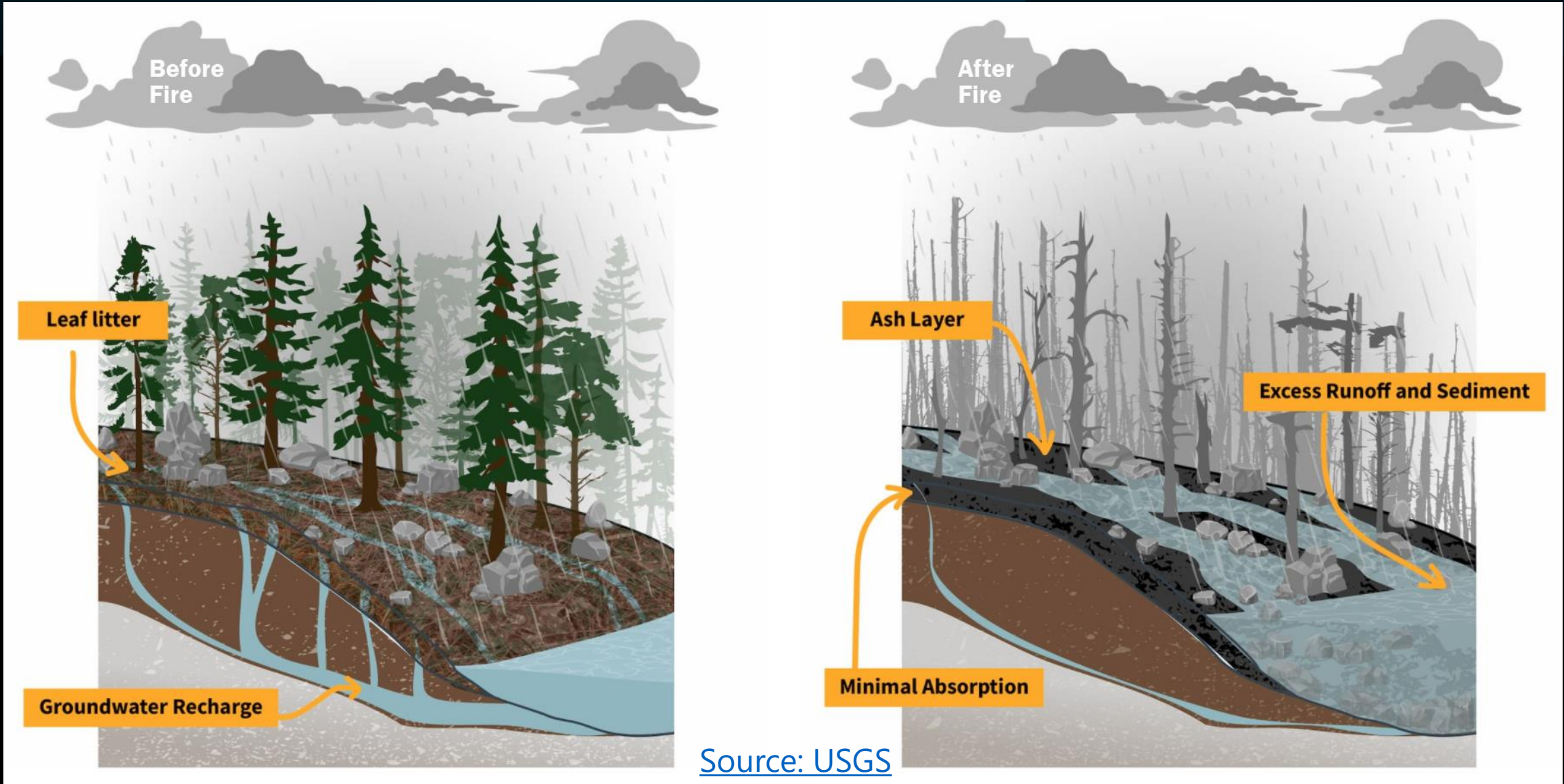


- 100,000 ac burned overnight on Oct 22
- 17 mi growth in 90 min
- Hurricane force wind
- 589 structures burned
- 4,000 evacuees

Water Quality Impacts



Flood After Fire





Wildfire Aftermath

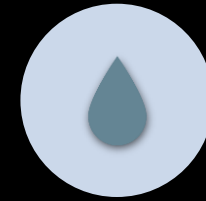
OBSERVED IMPACTS



Debris flows



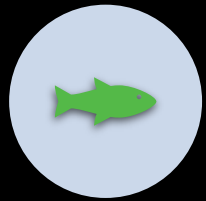
Flooding



Water
Treatment
Intakes Shut Off



Loss of storage
capacity



Harmful algae
blooms



Property loss



Frequent Road
Closures

July 20, 2021



North Forty NEWS
flow scene weekly
Click below to view our current edition.

Black Hollow Flood is Declared a Local Disaster Emergency

August 3, 2021 Annie Lindgren News Comments Off




Photo taken on July 26, 2021, less than a week after Black Hollow Flood in Poudre Canyon. Photo Credit Annie Lindgren

Want our news in your inbox? [CLICK HERE](#)

Coloradoan.

Massive search for last Black Hollow flood victim to take place Saturday in Poudre Canyon

Miles Blumhardt
Fort Collins Coloradoan

Published 1:34 p.m. MT Sept. 17, 2021 | Updated 7:05 a.m. MT Sept. 18, 2021

[View Comments](#)



BLACK HOLLOW ROAD

Loss of Life and Property



**CR 219 (Drowsy Water by Hwy 40
West of Hwy 125) August 20, 2022**



Source: grand County Sheriff

August 11,
2023



August 26,
2022



Stillwater Creek Road Crossing



Highway 125 Grand County
(Willow Creek watershed)



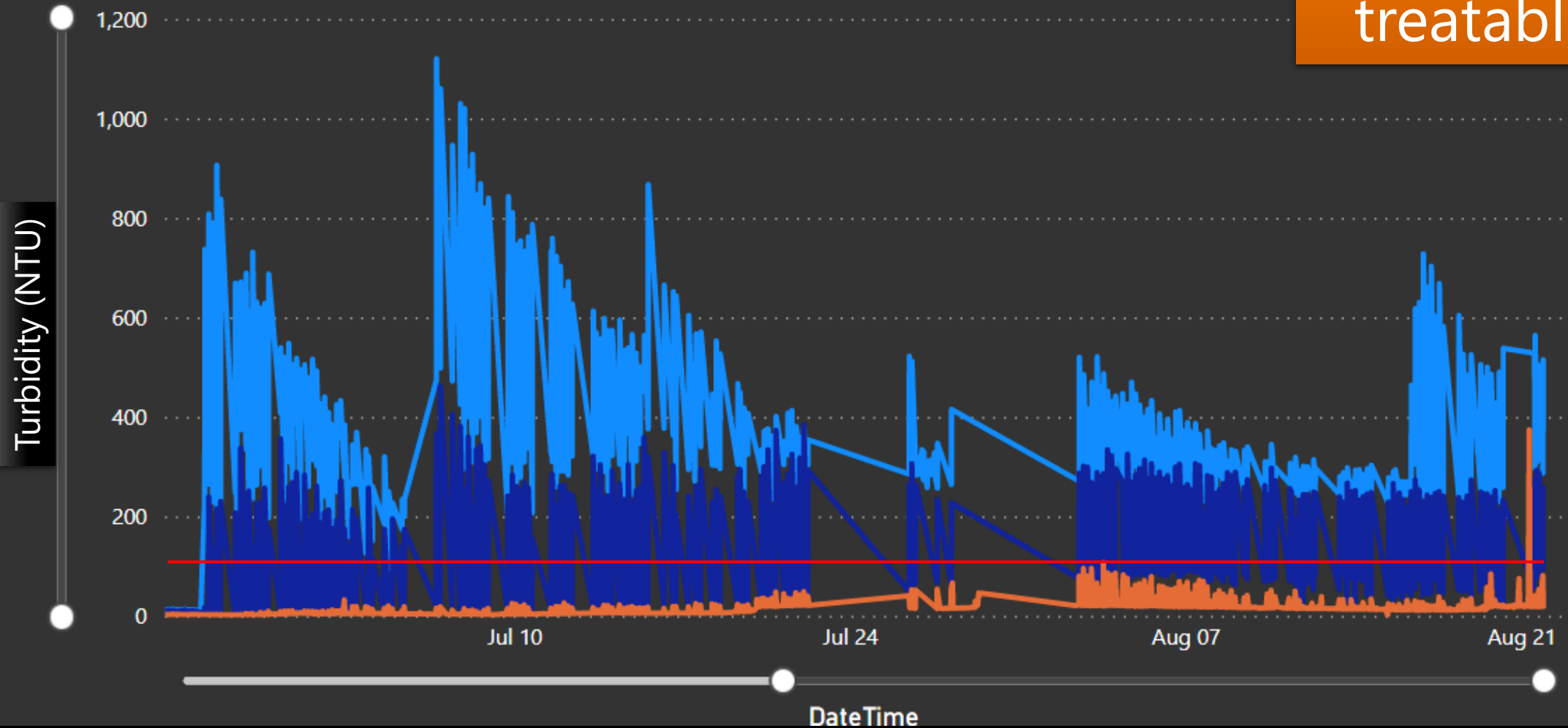
Degraded Water Quality Spring Runoff (2022)



Willow Creek Reservoir Turbidity (NTU)

> 100 not treatable

Depth Classification ● Bottom (15-22m) ● Middle (5-15m) ● Top (0-5m)



2022

Black water events



North Inlet
Aug 3, 2021



North Inlet Samples,
Aug 4, 2021



Aug 4, 2021
Grand Lake Beach



**Willow Creek Reservoir
July 27, 2021
Harmful Algae Bloom**

An aerial photograph of Willow Creek Reservoir. The water is a murky, brownish-grey color, showing some darker, swirling patterns. In the foreground, a yellow boom or barrier is visible along the shoreline. The surrounding land is a mix of green vegetation and rocky terrain. A circular white overlay with a black border is positioned in the upper left quadrant, containing the text:

**Willow
Creek
Reservoir
August
22, 2022**

Willow Creek Reservoir
August 9, 2021



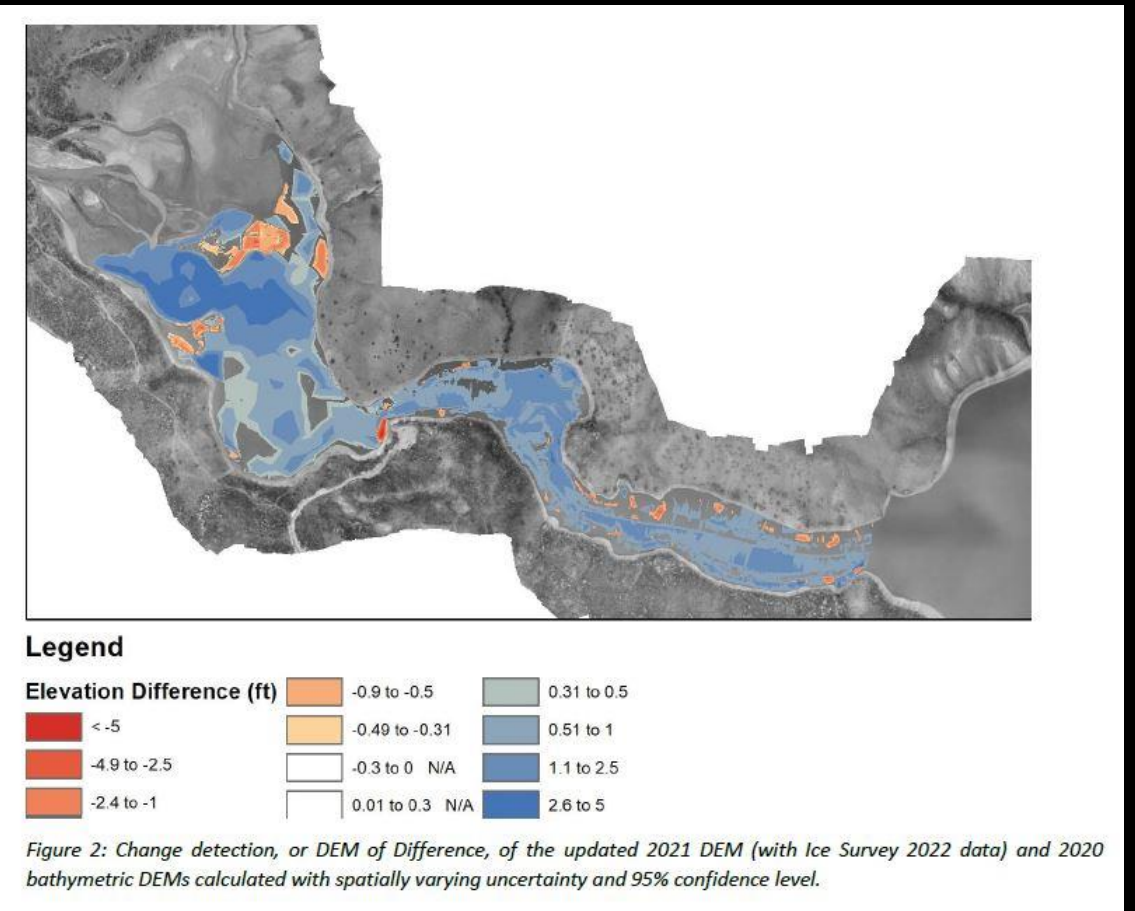


WILLOW CREEK RESERVOIR DELTA – SEPTEMBER 2022

Loss of Storage

Timeframe	Annual Volume Lost (af)
1969 - 2020 Annual Average	14.8
2020 - 2021 Combined Survey	51.1
2021-2022 Survey	50.5

3.45 x baseline (2021)
1% active storage annually



Active Storage (as built)
5,439 af
Pre-fire (2020)
4,241 af

The background of the slide is a dark, monochromatic landscape. It features rolling hills and a valley, with a silhouette of a helicopter flying in the upper left portion of the sky. The overall tone is somber and professional.

Restoration & Protection

Watershed Restoration & Infrastructure Protection Projects



Self-Service Stations



Hillslope Stabilization



Debris Booms

AERIAL MULCHING



12,520 ACRES



980+ SEMI
LOADS



87 DAYS



\$26.5 MILLION



19,000+
DROPS



**Preparing
for the
Future:
Strategies**

Landscape scale
forest health
management

Social
infrastructure
development

Relationship
Building

Funding and
Capacity

Preparing for
scarcity

Water supply
storage and
portfolio
diversification

Getting really good
at post-fire
restoration



Questions & Comments

Esther Vincent, P.E.

970-622-2356

evincent@northernwater.org