



B T H A N N U A L POUDRE RIVER FORUM

Presented by the Poudre Runs Through It & The Cache la Poudre River National Heritage Area.









8am.....Registration Opens

9am.....Welcome & Overview

Keynote Address Becky Mitchell, Director CWCB Poudre Runs Through It Video Water & Affordable Housing 11:30am.....Lunch

Poudre Pioneer Award Presentation

Water & Agriculture

Watershed & River Recovery Update

3pm......Closing Reception with Beer & Live Music



QUESTIONS AND ANSWERS

Participating is Easy.

Go to: ahaslides.com/PRF to join

or, scan the QR code on your table.





Keynote Address

BECKY MITCHELL



DIRECTOR OF THE COLORADO WATER CONSERVATION BOARD (CWCB)

COLORADO COMMISSIONER TO THE UPPER COLORADO RIVER COMMISSION



COLORADO

Colorado Water Conservation Board

Department of Natural Resources

Rebecca Mitchell, Director, Colorado Water Conservation Board Colorado River Commissioner Rebecca.Mitchell@state.co.us

Who We Are

Mission:

To Conserve, Develop, Protect and Manage Colorado's Water for Present and Future Generations.

- · Board of Directors representing each Basin
- · Staff of nearly 60

What We Do

Operations / Programs:

- · Water Project Loan Program
- · Water Conservation and Drought Planning
- . Interstate Compact Protection
- Stream and Lake Protection
- Watershed & Flood Protection
- Decision Support Systems
- · Water Supply Planning

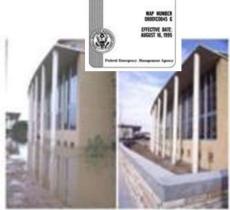


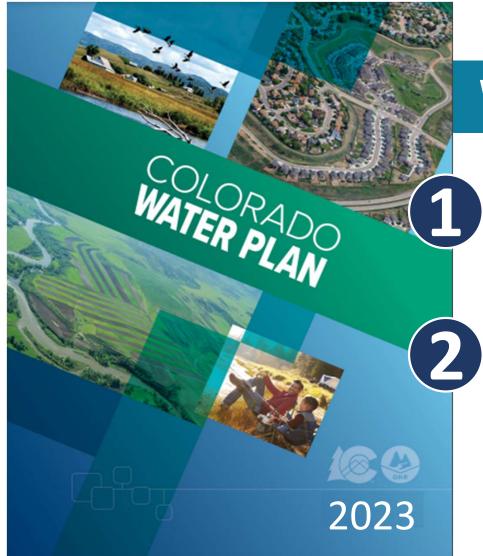












What is the Water Plan?

AN OPPORTUNITY TO PARTNER

Sets the stage for collaboration and mitigating risk

Shines a light on critical state water issues

A STRATEGY FOR CWCB

A CWCB planning document

Highlights agency opportunities for leadership

The 2023 Colorado Water Plan

INTEGRATED AREAS CATALYZE ACTION



VIBRANT COMMUNITIES municipalities, utilities, industry, cities, towns, and

small urban and rural communities



THRIVING WATERSHEDS

environment and recreation, river health, watershed health, forest health, aquatic species



ROBUST AGRICULTURE established cash crop farms, local food, orchards, ranching, Acequias, ditch companies



RESILIENT PLANNING climate adaptation, climate extremes, equity,

inclusivity, supportive government, education

The 2023 Colorado Water Plan

PARTNER ACTIONS

WHAT YOU CAN DO





CONSERVATION & LAND USE

WATERSHED HEALTH & RECREATION





WATER STORAGE & SUPPLY

AGRICULTURE



ENGAGEMENT & INNOVATION

A



AGENCY ACTIONS

Colorado River Updates



Law of the River & Current Operations

- 1922 Colorado River Compact
- 2007 Interim Guidelines
- 2019 Drought Contingency Plans
 - Drought Response Operations
 Agreement (DROA)
- 2023 SEIS Process

6-State Consensus-Based Modeling Approach

Upper Basin Components

- · Recognition of hydrologic shortages
- Additional voluntary conservation measures through System Conservation Pilot Program (SCPP)
- Consideration of additional releases from Upper Basin reservoirs, pursuant to all provisions of the Drought Response Operations Agreement
- Constrained release tiers (no balancing)
- Reduced releases to protect 3500'

Lower Basin Components

- Reductions in Lower Basin deliveries of 1.54 MAF/year to address evaporation and losses
- Additional Lower Basin reductions at Mead <1050' and <1030'
- Additional reductions as necessary to protect Mead elevation 1000'



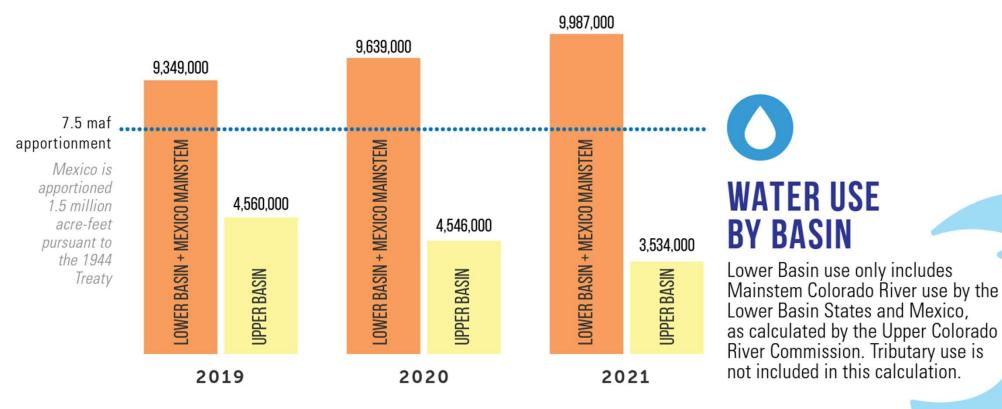
COLORADO Colorado Water Conservation Board Department of Natural Resources

Five Point Plan

- 1. Finding ways to voluntarily conserve water (including SCPP)
- 2. Continuing the Demand Management Feasibility Investigation
- 3. Collaborating with the other Upper Basin states on reservoir releases (DROA) to protect Lake Powell as needed
- 4. Getting better data to monitor and measure our water use
- Living within the means of what the river provides, through the application of strict administration according to priority.

COLORADO Colorado Water Conservation Board Department of Natural Resources

Consumptive Use by Basin, 2019-2021



Next Steps

- Ongoing implementation of Five-Point Plan, including System Conservation Pilot Program
- Continued discussions with Basin States, Tribal Nations, water users, and others
- Reclamation to analyze options in a Supplemental Environmental Impact Statement (Spring 2023)



COLORADO Colorado Water Conservation Board Department of Natural Resources

FUNDING PROGRAMS

GRANTS AND LOANS

- Loan Program
- Water Supply Reserve Fund Grants
- Water Plan Grants
- Colorado Watershed Restoration Grants
- Federal Technical Assistance Grants
- * CWCB Loan Program can be used as match for most grants
- * Applicants are encouraged to choose 1 CWCB grant program per project



COLORADO

Colorado Water Conservation Board Department of Natural Resources

Projects in Poudre - Cameron Peak Fire

- Recovery and resilience of Cache la Poudre River after wildfire fish kill (CSU)
- Cameron Peak Post-Fire EWP Measures (Larimer County)
- Landscape Scale Post-Fire Mitigation for the Cameron Peak Fire to Protect Critical Watershed Values - Phase 4 (City of Greeley, Water & Sewer Department)

Projects in Poudre - Watershed Health

- Poudre Headwaters Restoration Grand Ditch Barrier (Trout Unlimited)
- Campbell Creek Restoration (Wildlands Restoration Volunteers)
- Lower Cache la Poudre Priority Reach design Project and Fish Passage Design for Whitney and BH Eaton Reach, (Coalition for the Poudre River Watershed)
- Hall-133 Riparian Restoration (Poudre Learning Center Foundation)

Projects in Poudre - Education & Outreach

- Poudre Learning Center Water Education & Outreach in the South Platte River Basin (Poudre Learning Center Foundation)
- Water Legacy: Documenting Knowledge for Future Generations (Poudre Heritage Alliance)
- Engaging Stakeholders & Communities in the Poudre through Citizen Science, Collaboration & Outreach (Coalition for the Poudre River Watershed)

Collaboration



Photo: Amtec/flickr

THANK YOU

Rebecca Mitchell, Director, Colorado Water Conservation Board Colorado River Commissioner Rebecca.Mitchell@state.co.us



COLORADO Colorado Water Conservation Board Department of Natural Resources



With moderator Zac Thode WATER & AFFORDABLE HOUSING





Setting the Foundation: Land Use, Housing, Water

3.3.2023



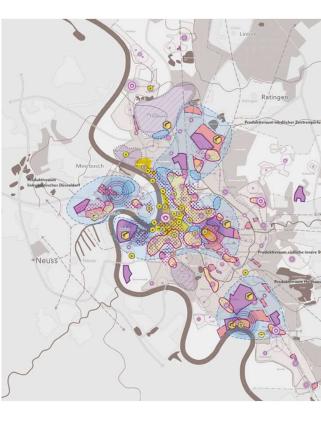
Why Land Use Planning?



The good







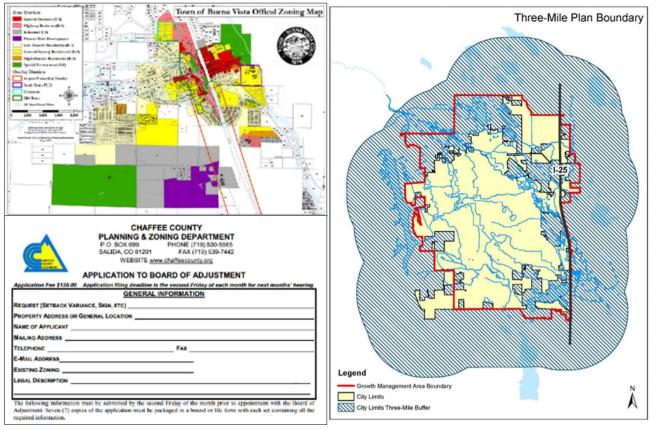


Colorado Land Use Planning

Long-range planning

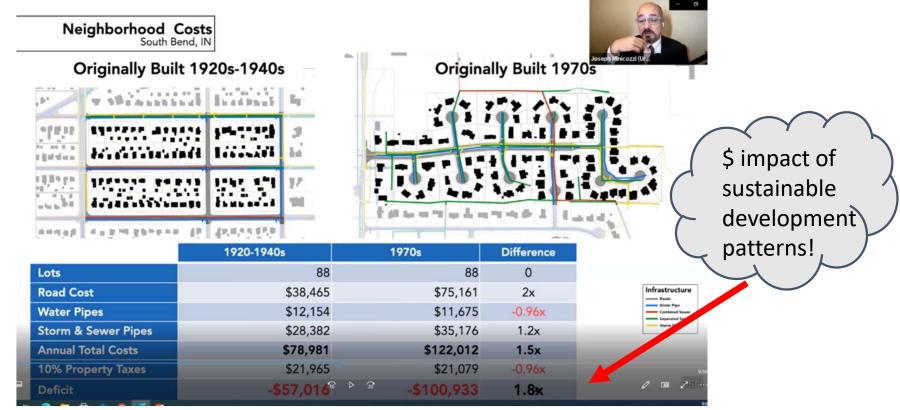
•

· Current planning





Land Use Planning and \$\$\$





Land Use Affects Water Use

Need more water-efficient land use patterns

Decreasing demand, using "alternative" supplies is best done at the planning stage

Need solutions so Colorado communities thrive despite water scarcity

•











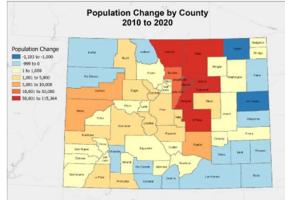
Also, We're in a Complex Crisis

Supply

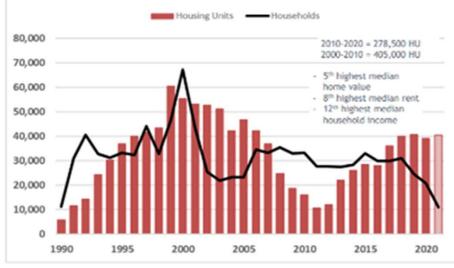
- Fewer units built
- Financing slow return after Great Recession
- Supply chain & tight labor
- Public will NIMBY, anti-growth/density

Demand

- Job growth = people
- Aging smaller household size but same house
- Millennials prime home buying & 2nd home buying
- Gen Z first time apartment and home buying
- More money didn't travel / weddings, stimulus
- Investors institutional and cannabis firms (often holding vacant)



Colorado Annual Housing Units and Household Growth

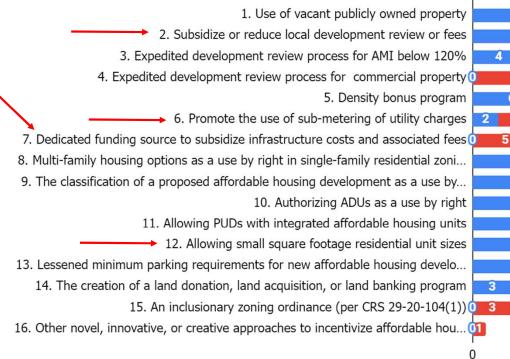


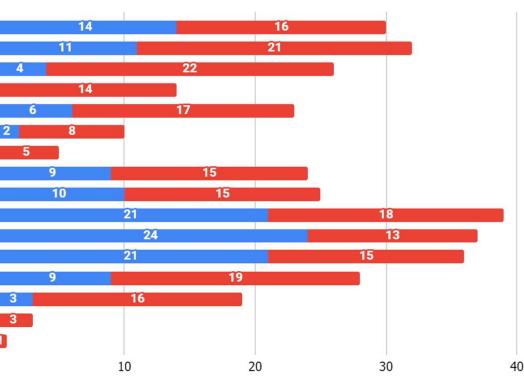


DOLA-Funded Local Work

IHOP Qualifying Strategy Implementation

Previously adopted (134 total)





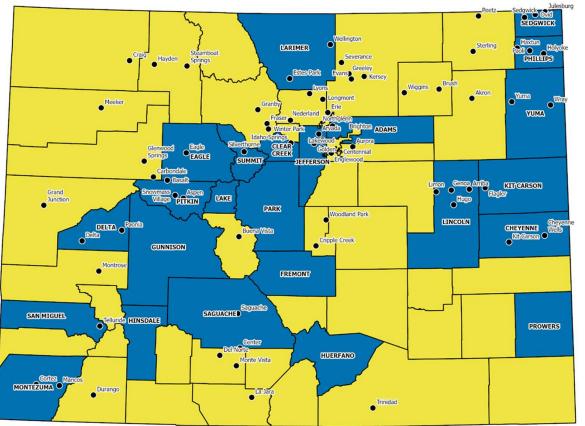
Listed to pursue (218 total)

DOLA-Funded Local Work - IMPACTS

Planning Grant Program Update

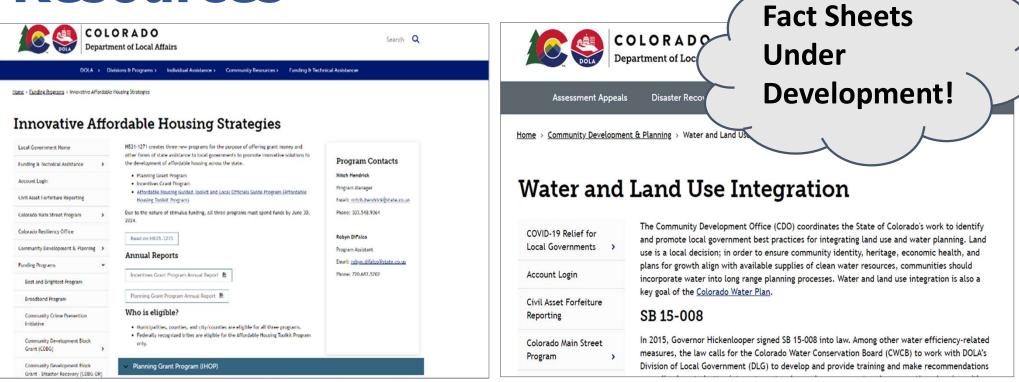
Round 1-7 Awards

- 62 Planning Grants
- \$5.4M Awarded
- 313 qualifying strategies pursued





Resources

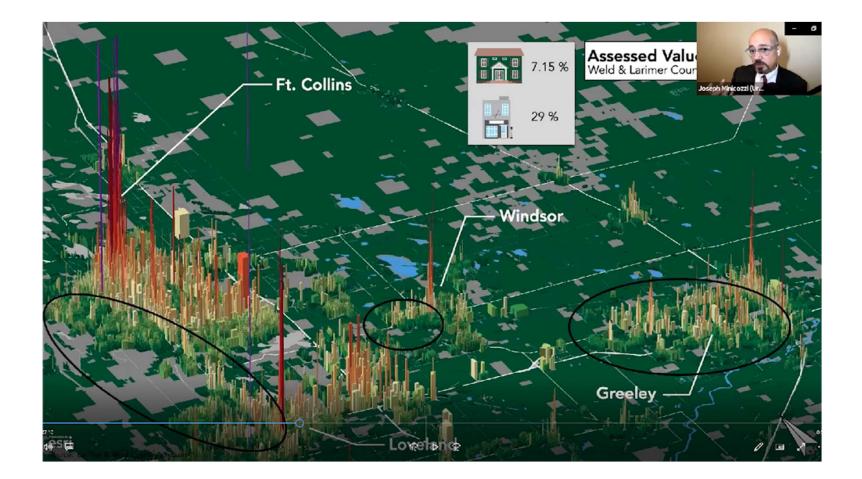


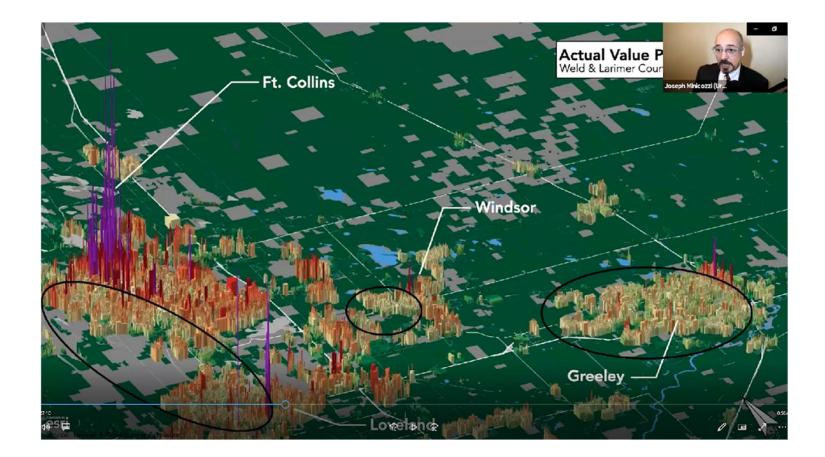
Note: Model Land Use Code update during 2023!









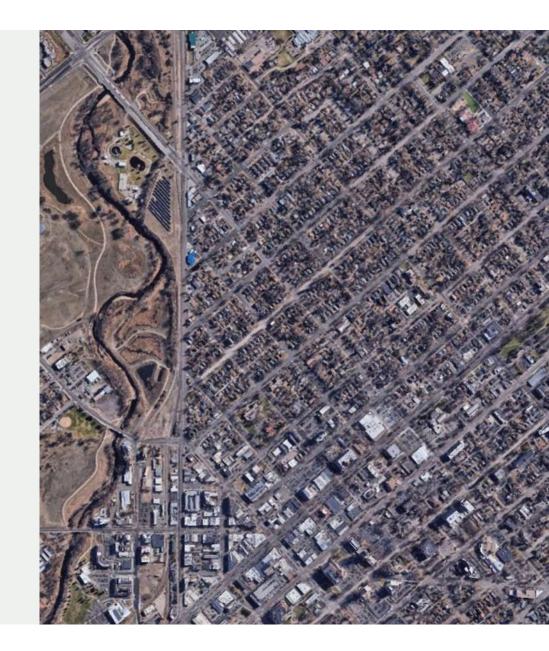


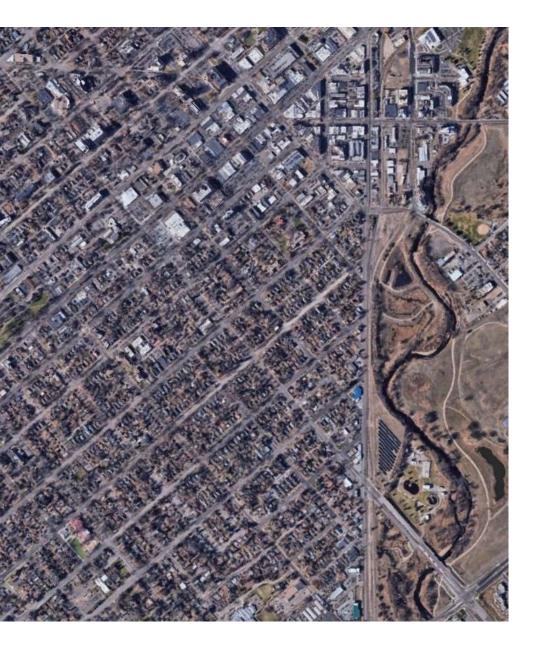
WATER & AFFORDABLE HOUSING



Erik Dial

Deputy Director of Utility Finance and Customer Service





WATER & AFFORDABLE HOUSING



Meagan Smith

Deputy Director of Public Works at Town of Wellington

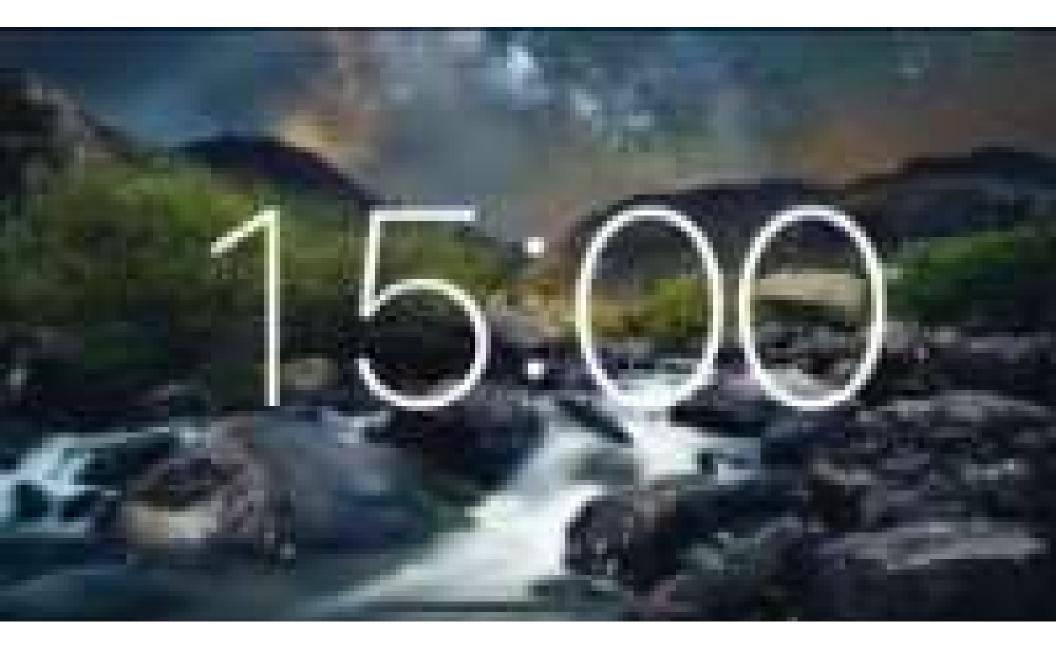
WATER & AFFORDABLE HOUSING

Patrick McMeekin

Hartford Homes, President of Land Development



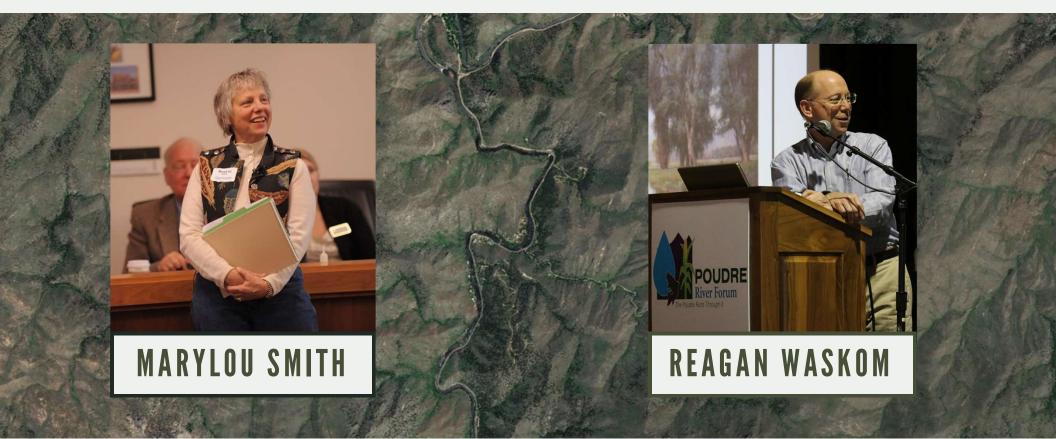






2023 Poudre Pioneer Award Winners

Cache la Poudre River National Heritage Area



Together, MaryLou and Reagan Founded not only the Poudre Runs Through it, but also Water Literate Leaders of Northern Colorado.

For Over 10 years these two lead the CSU Water Center.

Their water legacy will be felt for many years to come.

With moderator Brian Foss **WATER & AGRICULTURE**

Adam Jokerst



Rob Johnson

Reid Maynard

Robert Graves



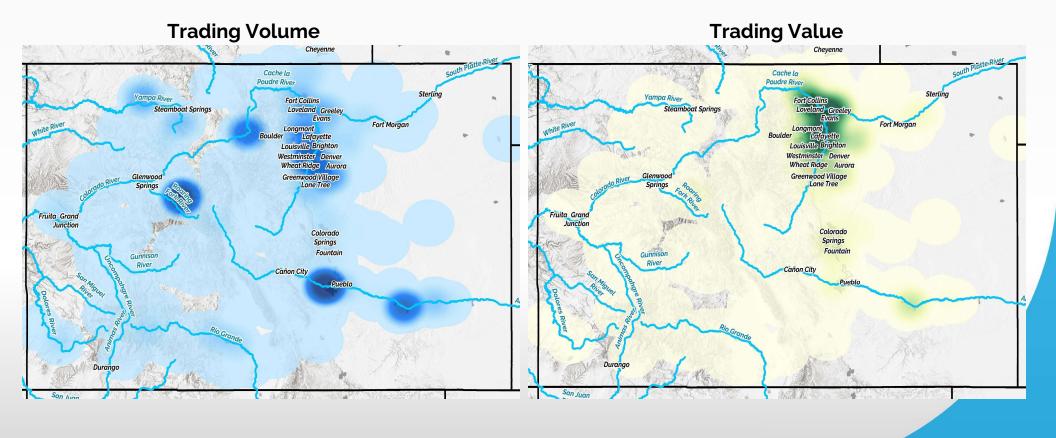


Colorado Water Market

2023 Poudre River Forum

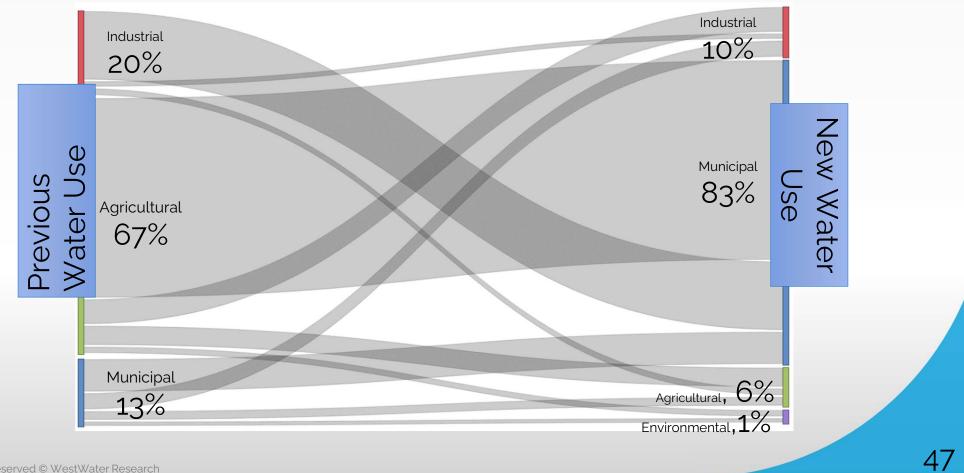


Water Market Overview



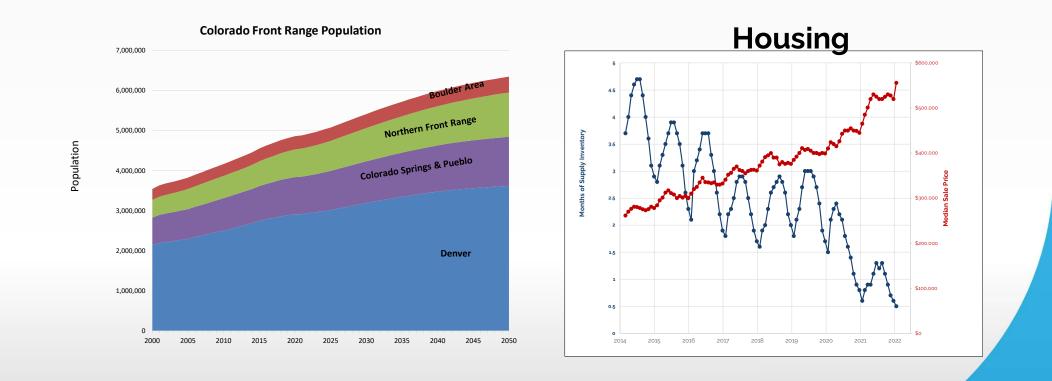
All Rights Reserved © WestWater Research





All Rights Reserved © WestWater Research

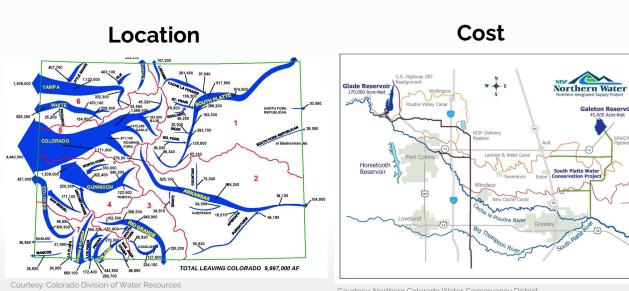
Water Market Drivers



All Rights Reserved © WestWater Research

48

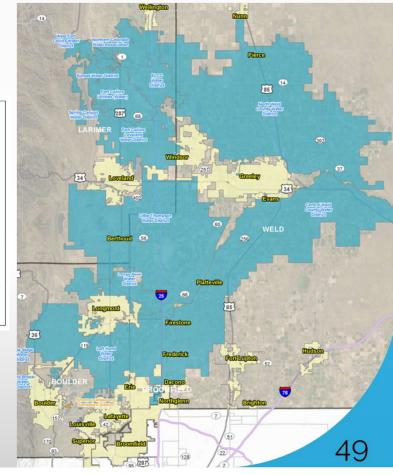
Water Market Drivers



Courtesy: Northern Colorado Water Conservancy District

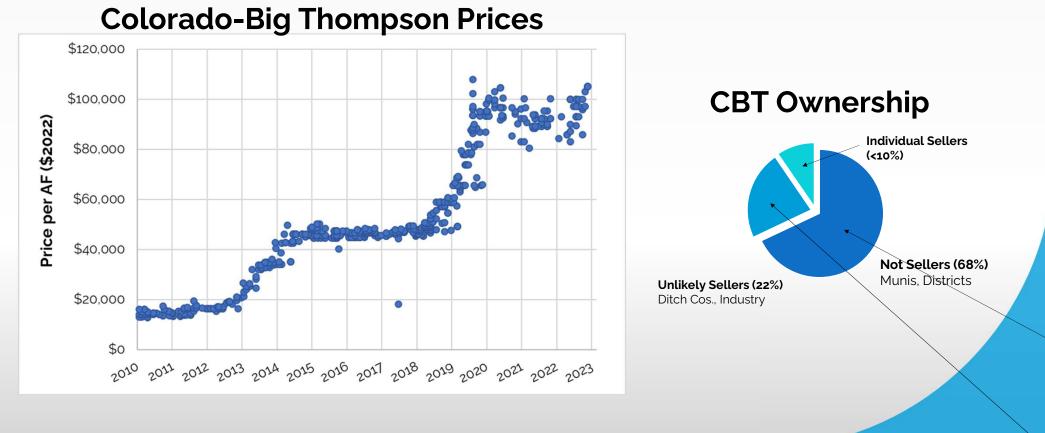
aleton Reservoi



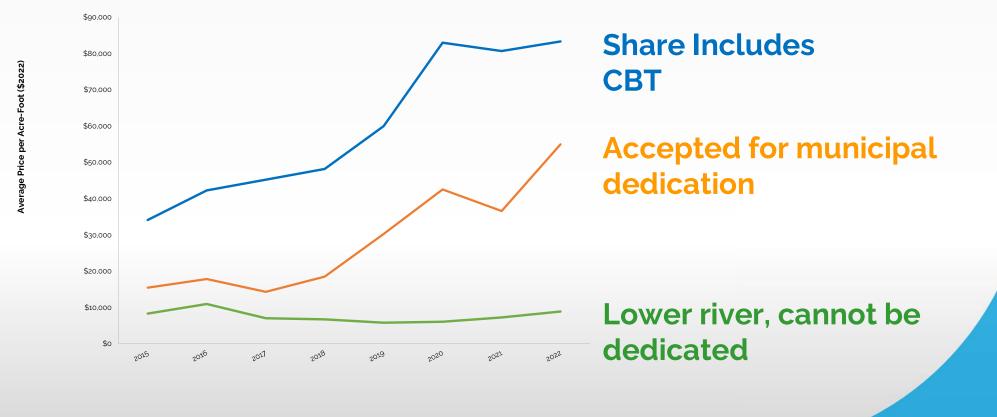


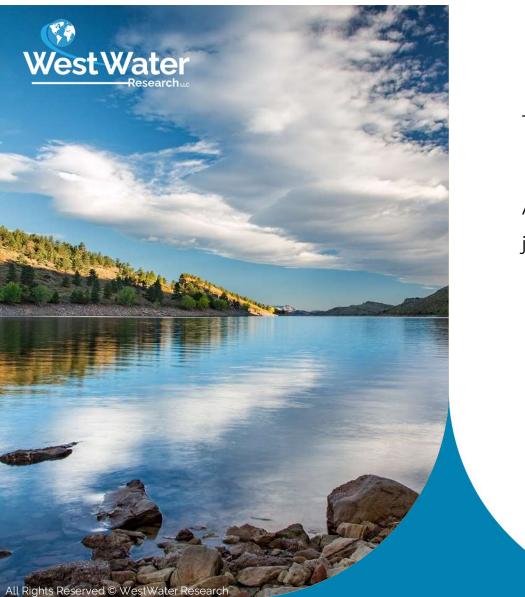
All Rights Reserved © WestWater Research





Pricing Trends – Poudre River Ditches





Thank You

Adam Jokerst jokerst@waterexchange.com

52

WATER & AGRICULTURE



Robert Graves Owner



129 years of Dairy Farming in the Poudre Valley







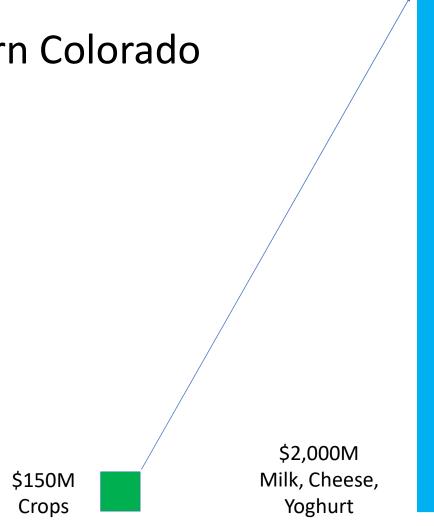




Ag is working in Northern Colorado



70,000 Dairy Cows 90,000 Irrigated Acres 140,000 af.





WATER & AGRICULTURE

a. bruce

JOHNSON & ASSOCIATES

LAND RESOURCE SPECIALISTS



Rob Johnson Owner

Vertical Farming: The Basics, Water Savings, And Energy Tradeoffs

Reid Maynard Agriculture and Water Panel Poudre River Forum March 3, 2023





Interdisciplinary Training, Education & Research in Food-Energy-Water Systems



This material is based upon work supported by the National Science Foundation under Grant No. 1828902.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation



Overview

What is Vertical Farming?
Vertical Farming and Water
Energy and Pollution Tradeoffs



Vertical Farming: A Quick Overview

Facilities, Equipment, and Crops



Typical Facilities for Vertical Farms

Usually, vertical farms are indoors

"Plant Factory"

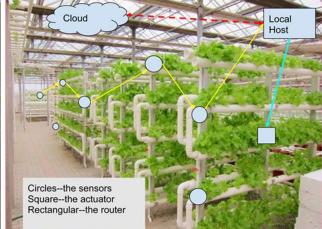


From Kosai et al. (2020).



From Liebman-Pelages et al. (2021).

Greenhouses



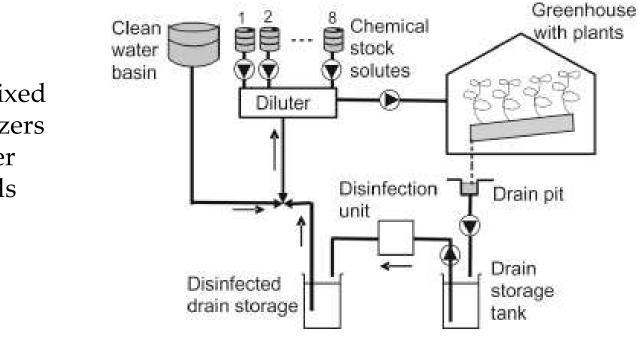
This Photo by Unknown Author is licensed under <u>CC BY-NC</u>



Vertical Farming is Soilless Agriculture

Usually, vertical farms are hydroponic

Water is mixed with fertilizers and other chemicals

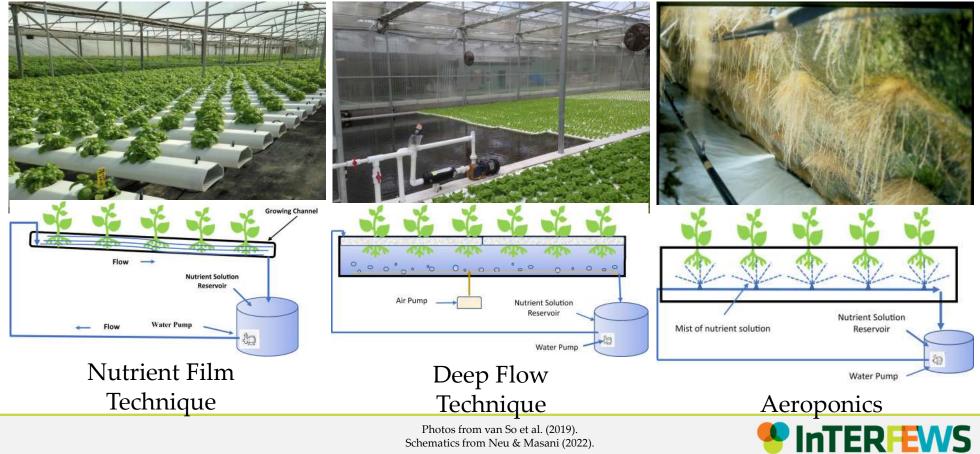


From van So et al. (2019).

Solution contacts with plant roots for irrigation and fertilization



Soilless Agriculture Types



NRT Program I Colorado State University

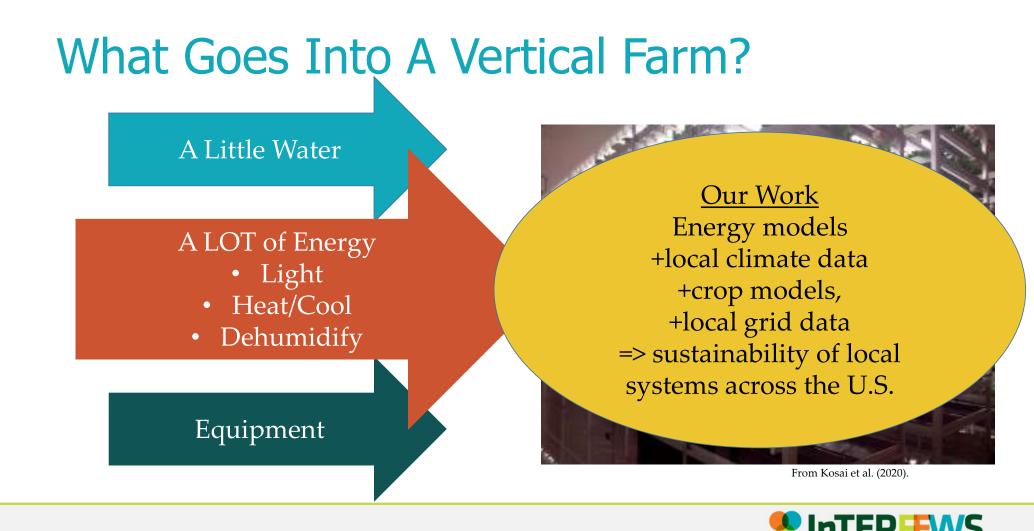
Crop Types

- Typically, dense-growing, fast-growing, prolific crops
- Lettuce, herbs, leafy greens are common
- Some vegetables: Tomatoes, peppers, cucumbers
- Strawberries, blueberries
- Mushrooms



This Photo by Unknown Author is licensed under CC BY





NRT Program | Colorado State University

Vertical Farming and Water

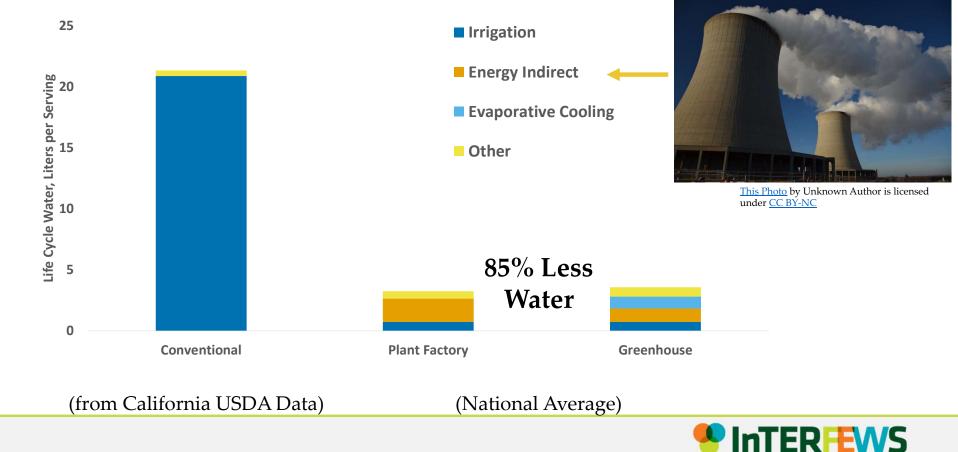
This Photo by Unknown Author is licensed under CC BY-SA-NO

Vertical Farms Use Less Irrigation Water

For a 100 gram (~2 cups) serving: 25 Most indoor growers report use 90-95% less 20 Water Consumption, Liters 01 c1 water than conventional methods For direct water consumption (including evaporative cooling), our 91% Less model agrees 5 Water 0 Conventional Greenhouse (from California USDA Data) (National Average)

NRT Program | Colorado State University



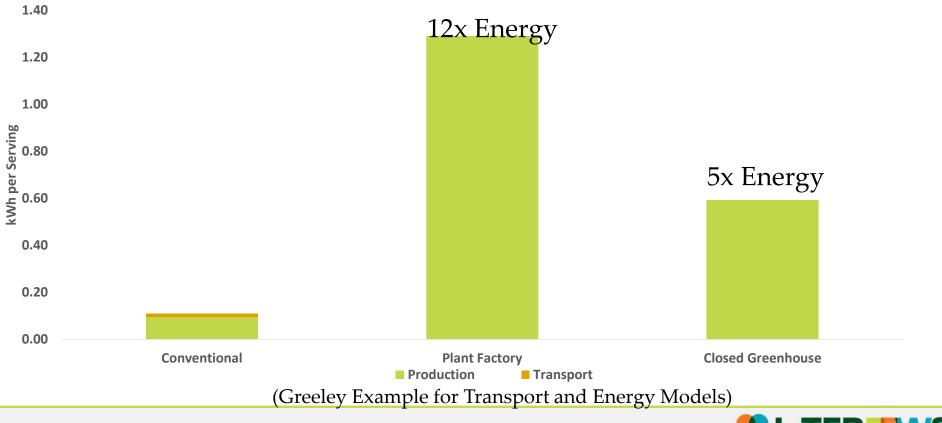


NRT Program | Colorado State University

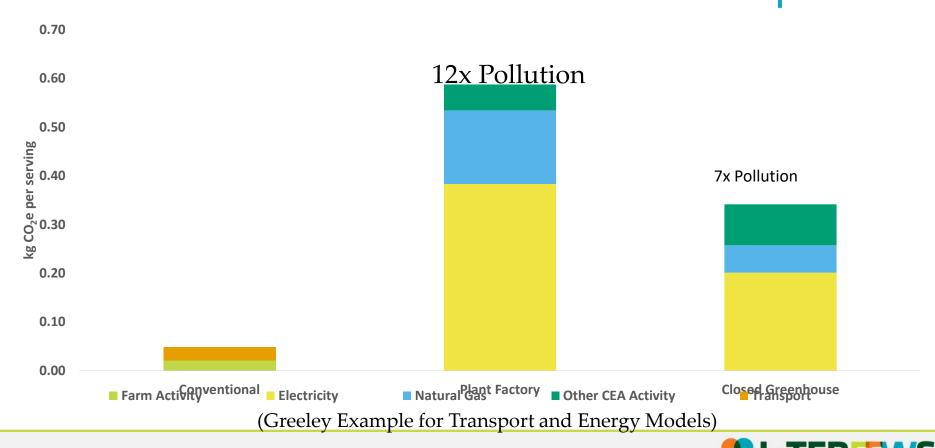
Vertical Farming: Considering Energy and Pollution

by Unknown Author is licensed under CC BY-

Vertical Farms Use Much More Energy







Vertical Farms Have Greater Climate Impact

NRT Program I Colorado State University

Decisions in the Future of Vertical Farming





Resources/Further Reading

- Kosai, T., Neu, G., & Takasaki, M. (Eds.). (2020). Plant Factory An Indoor Vertical Farming System for Efficient Quality Food Production (2nd ed.). Elsevier. https://doi.org/10.1016/C2018-0-00969-X
- Liebman-Pelages, M., Congolese, J., Morford, L. K., & Reinhart, C. (2021). Validation of a building energy model of a hydroponic container farm and its application in urban design. *Energy and Buildings*, 250, 111192. <u>https://doi.org/10.1016/j.enbuild.2021.111192</u>
- Neu, G., & Masani, J. (2022). Hydroponics. In *Plant Factory Basics, Applications and Advances* (pp. 153–166). Elsevier. <u>https://doi.org/10.1016/B978-0-323-85152-7.00023-9</u>
- Stossel, F., Jurak, R., Pfister, S., & Hellweg, S. (2012). Life Cycle Inventory and Carbon and Water Food Print of Fruits and Vegetables: Application to a Swiss Retailer. *Environmental Science & Technology*, *46*(6), Article 6. <u>https://doi.org/10.1021/es2030577</u>
- van So, E. A., Girling, Th. H., & Lieth, J. H. (2019). Technical Equipment in Soilless Production Systems. In *Soilless Culture* (pp. 587–635). Elsevier. <u>https://doi.org/10.1016/B978-0-444-63696-6.00013-X</u>



Watershed & River Recovery Update

2023 Poudre River Forum March 3, 2023









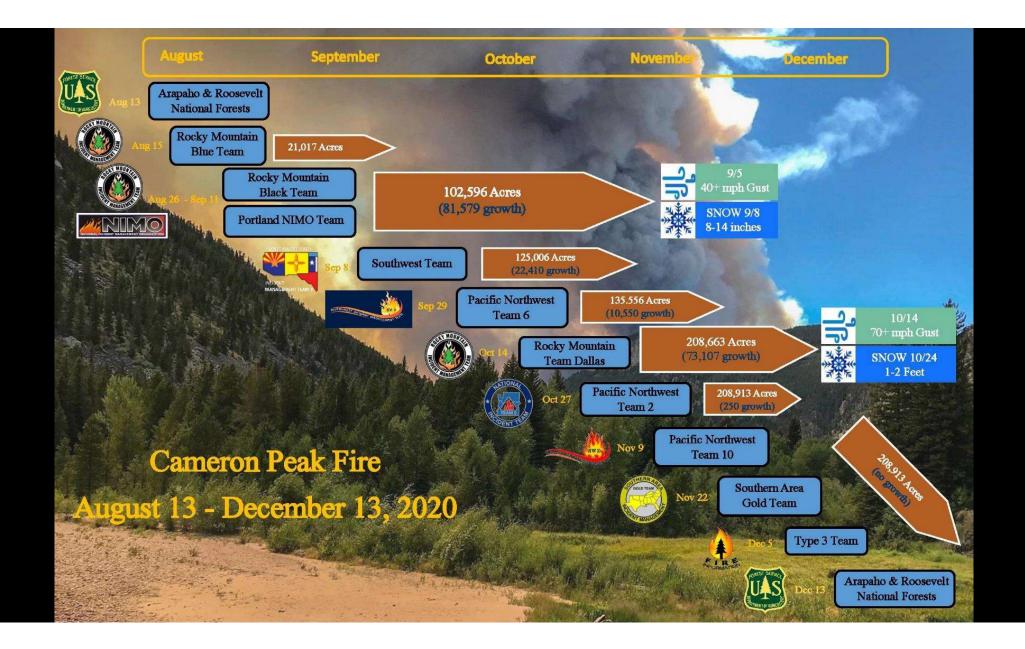
Cameron Peak Fire

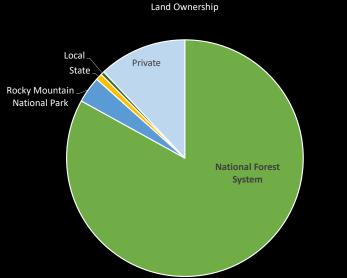
Sarah Beck

Arapaho and Roosevelt National Forests and Pawnee National Grassland

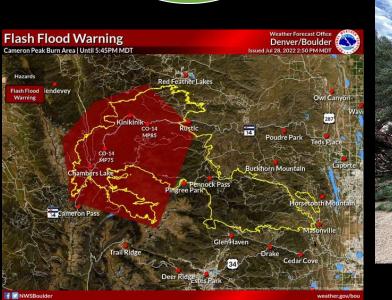


















Immediate Recovery Actions



Mid to Long Term Recovery Actions









Other Actions

- Revegetation and reforestation
- Replacing and improving burned recreation infrastructure
- Assessment of trails use in and outside of burn scars
- Replacing burned range allotment fences
- Fixing damaged roads, bridges, and culverts
- Improving wildlife habitat
- Providing for aquatic organism passage at failing stream crossings
- Learning what recovery actions are working and which could be improved



Sarah Beck Post-fire Recovery Coordinator Arapaho and Roosevelt National Forests <u>sarah.beck@usda.gov</u>



Cameron Peak Fire Watershed Post-Fire Mitigation & Restoration Updates

Hally Strevey, Executive Director Coalition for the Poudre River Watershed













Source: United Way of Larimer County

CPF RESTORATION PROGRAM



Aerial Mulching



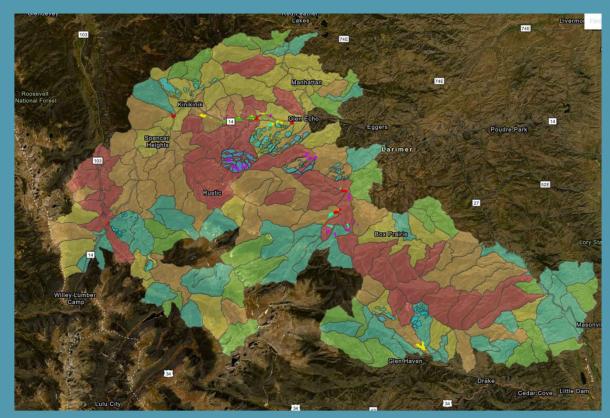
Point Mitigation



Reforestation



CPF POST-FIRE PROJECTS



Online interactive project map

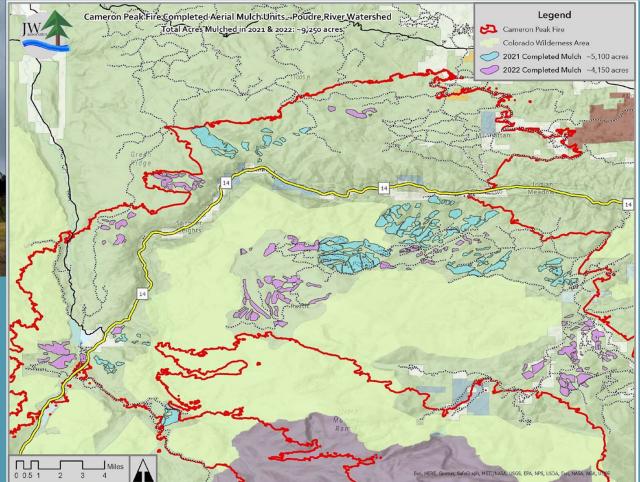


AERIAL MULCH OVERVIEW

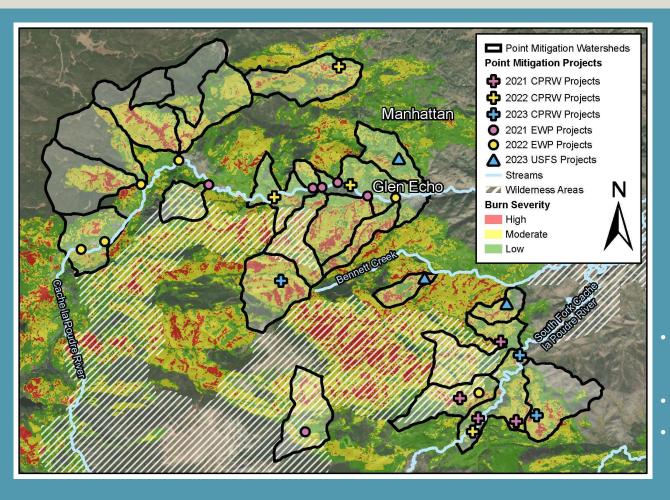


2021-2022 Overview

- 2021 5,000+ acres mulched
- 2022 4,100+ acres mulched
- Predominantly on USFS lands, with some state and private



POINT MITIGATION





2022-2022 Overview

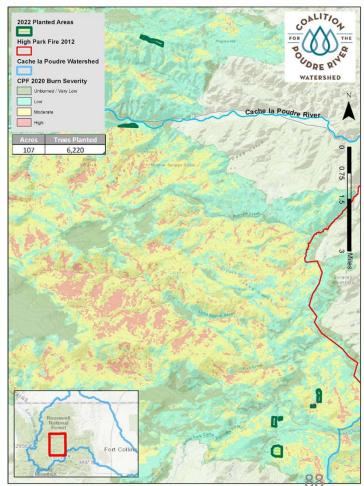
Over 300 features installed in 17 priority watersheds 67 structures protected 30,000 upstream acres benefitted

REFORESTATION



2022 Season Overview

- 6200+ ponderosa pines planted
- 650+ volunteer hours
- 100+ acres



NEXT STEPS

- Planning efforts underway for additional point mitigation projects to be constructed in 2023
- Continued collaborative reforestation efforts
- Updates planned to Upper Poudre Resiliency Watershed Plan
- Continued focus on pre-fire mitigation for watershed areas not burned



QUESTIONS? Learn more at www.poudrewatershed.org





POUDRE RIVER FISHERY UPDATE





OPausife River Forum – March 3rd, 2023

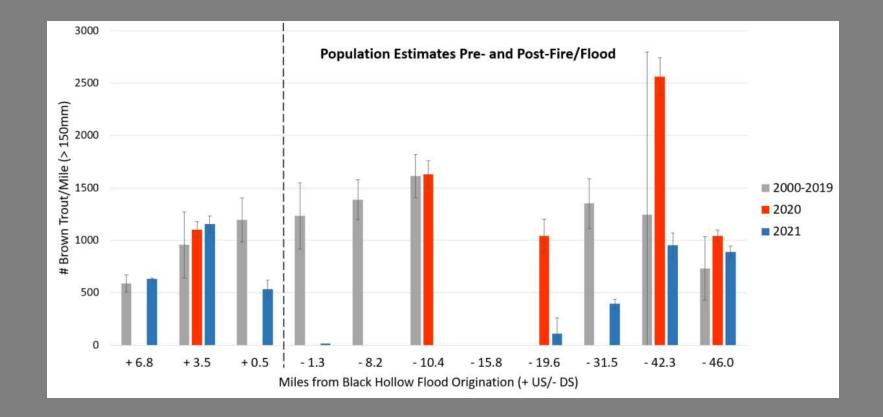
POUDRE RIVER FALL SAMPLING



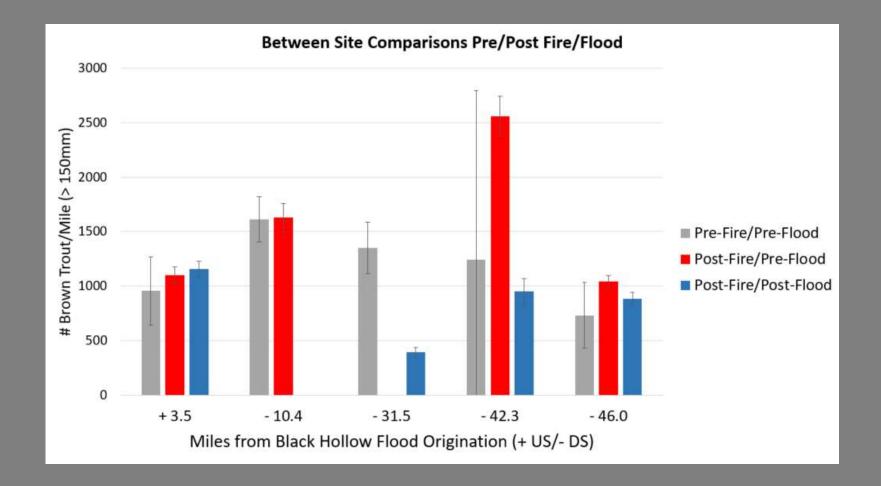


















Kyle Battige - Aquatic Biologist - kyle.battige@state.co.us - 970-217-9513

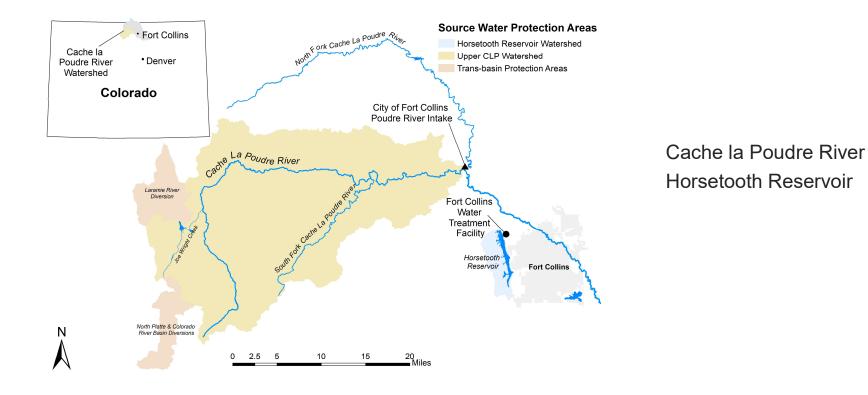


Post-Wildfire Impacts On Cache la Poudre River Water Quality

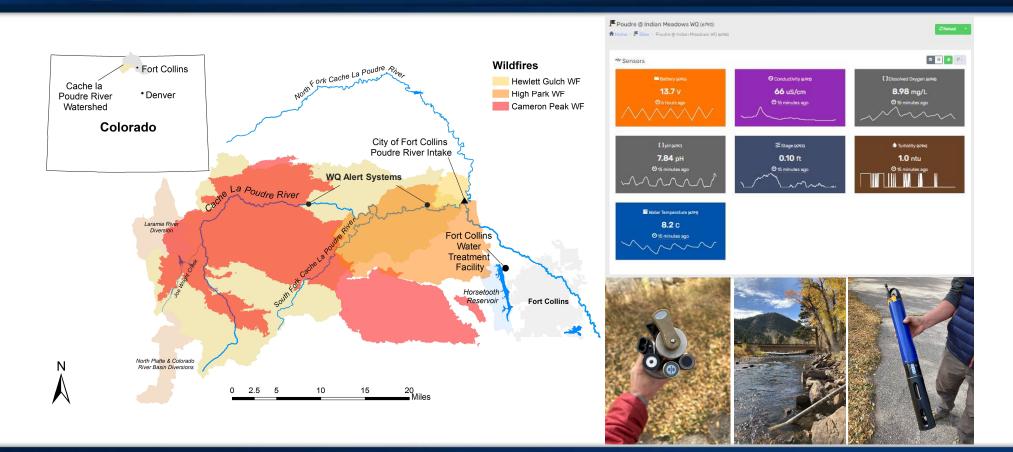
Jared Heath, Sr. Watershed Specialist City of Fort Collins Utilities Water Quality Services Division

> March 3, 2023 Poudre River Forum

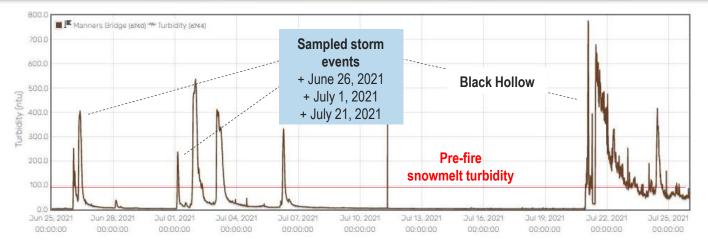




Fort Collins Water Quality Alert System

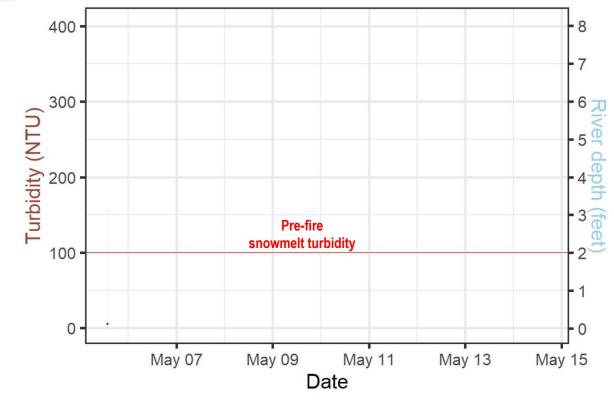








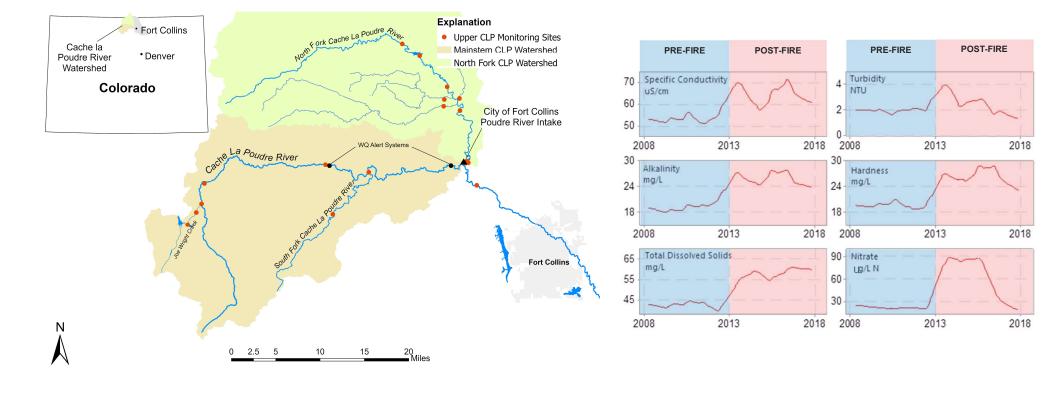
Elevated and abrupt changes in turbidity, suspended sediment, alkalinity, total organic carbon, nutrients, and metals during storm events. Fort Collins



Spring snowmelt runoff in 2022 posed additional water quality impacts to the Cache la Poudre River

Animation by Katie Willie/Open Eco Data Lab at Colorado State University







Alaguist ,720022



CAMERON PEAK 2020 2012 PRE-FIRE IMPACTS RECOVERY IMPACTS 0.2 NITRATE, mg/L 0.1 0.0 2008 2013 2018 2023

HIGH PARK

Photos by Evan Barrientos/FireForest www.fireforestphoto.com





Redundancy in water supply Mitigation, restoration & protection Infrastructure & Ops. improvements Water quality studies & research

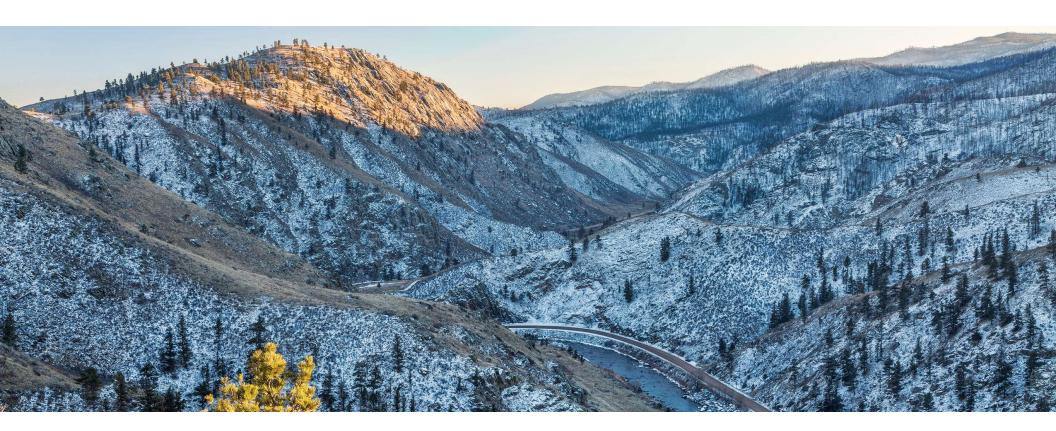




Thank you

Jared Heath Sr. Watershed Specialist 970-416-2287 *jheath@fcgov.com*

fcgov.com/source-water-monitoring



Thank you for Attending!



SEE YOU NEXT YEAR

March 1st, 2024

Cache la Poudre River National Heritage Area



Until 4:30pm CLOSING RECEPTION



Beer and wine provided by Odell Brewing

Live bluegrass trio, Ansel and the Brain Tattoos

