

Collaborating & Coordinating with Public Water Systems for Wildfire Planning and Response

2024 After the Flames Conference; Resilient Watersheds

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COLORADO
Department of Public
Health & Environment



Discussion of how to collaborate and coordinate with Public Water Systems for various aspects of wildfire planning and response
And provide perspective on how utilities perceive wildfire.

several coauthors

Overview of Presentation

- **Goal:** *How & Where to Engage Public Water Systems for Wildfire Topics*
 - Prefire Planning, Risk Assessment and Mitigation, Incident Response, Recovery
 - Cultivating Partnerships & Collaboration
- **Format:** Quick Presentation, Slides Built to Share
 - Lots of information and links, detailed notes.
 - Available for sharing/download



overview

The Goal of this presentation is to discuss various ways to engage PWS's. Where they fit and what data they could provide to Risk Assessments, or susceptibility work, incident response, and postfire recovery.

numerous links to additional information and data sources

Agenda

1. Identifying locations of PWS's & water infrastructure (not straight-forward)
2. Pre-fire Planning Opportunities to Engage PWS's
3. PWS Infrastructure and Operational Systems susceptible to Wildfire
 - Some major takeaways from recent WUI fires in CO and the US
4. GIS Data & Data Collection Programs Available to guide planning, risk assessment, response, etc
5. Other Additional Resources



lumped everything into 5 buckets.

First off, how do you even know who your public water systems partners are, and where might their critical infrastructure be located?
This is surprisingly not straight forward.

Number 2. Various ways to simply and meaningfully engage PWS's for prefire planning opportunities.

Number 3, I want to talk about the infrastructure and operational systems susceptible to wildfire, especially WUI fires, with a few key takeaways

Number 4, what kind of data is available to use in risk assessments, planning, response, etc
Well also discuss our Free GIS Data Collection Program specifically for wildfire available to PWS's

Lastly, Ill provide a list of additional links if you want to go deeper on some of these topics.

1. Identifying Locations of PWS's & Water Infrastructure



Challenges

- No national / state dataset of complete infrastructure
- Boundaries are hard to define, often not mapped, do not always correlate with municipal or special district boundaries
- Infrastructure is considered critical and protected, cannot be released publicly.
 - Data can be shared with State and County governments through a state approved data sharing process.
- Data Release Policy [DW-Policy 14](#)

****These challenges are best addressed at the local level.**

knowing who your public water systems are is not straight forward.

There's no state or national datasets like there are for power utilities or other infrastructure types.

The boundaries, or where a system gets their water, and the corresponding infrastructure for diverting and conveying raw water, is very complicated.

Also the service area boundary, where the water gets delivered after treatment, also not easy to infer and rarely available.

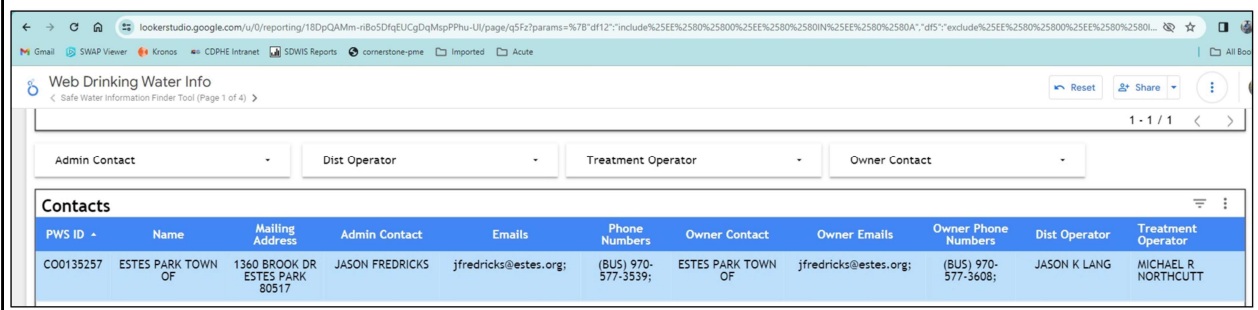
So, all that being said, the state does have some of the most critical infrastructure mapped for all our PWS's, but because it's protected data, we cannot release it without permission from the PWS to non-government entity's.

Coordinating permissions to share the data takes relationship building and stakeholder engagement at the local level.

1. Identifying Locations of PWS's & Water Infrastructure

Screening-Level Solutions : Identifying PWS's

- Online PWS look up tool – [SWIFT](#) (Safe Water Information Finder Tool) [SWIFT GUIDE](#)
 - Sort by County to get list of all PWS's
 - Contact Information for Owners, Administrators, & Operators in Responsible Charge (ORC's)



The screenshot shows the SWIFT tool interface. At the top, there are dropdown menus for 'Admin Contact', 'Dist Operator', 'Treatment Operator', and 'Owner Contact'. Below these is a table titled 'Contacts' with the following data:

PWS ID	Name	Mailing Address	Admin Contact	Emails	Phone Numbers	Owner Contact	Owner Emails	Owner Phone Numbers	Dist Operator	Treatment Operator
CO0135257	ESTES PARK TOWN OF	1360 BROOK DR ESTES PARK 80517	JASON FREDRICKS	jfredricks@estes.org;	(BUS) 970-577-3539;	ESTES PARK TOWN OF	jfredricks@estes.org;	(BUS) 970-577-3608;	JASON K LANG	MICHAEL R NORTHGUTT

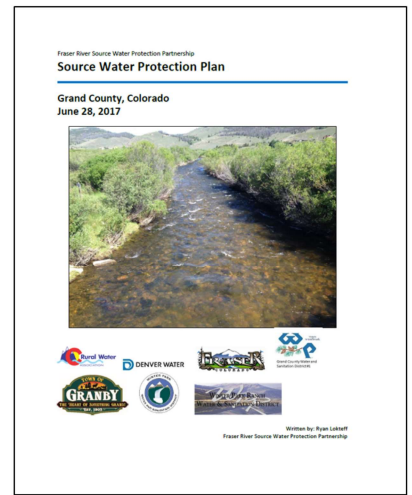
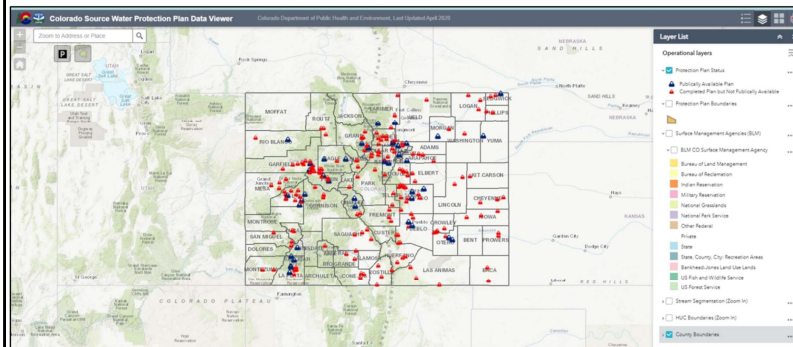
That being said, there are some public resources to identify the approximate location of Public Water Systems by County.

On our WQCD Website, we have a tool called SWIFT. You can sort by county and get a complete list of all PWS's along with their Owner/Operator/Administrative contact information.

1. Identifying Locations of PWS's & Water Infrastructure

Screening-Level Solutions : Identifying PWS's Infrastructure

- Check out the **WQCD Source Water Protection Data Viewer** [HERE](#)
 - Shows PWS's with COMPLETED Source Water Protection Plans
 - Incomplete list, but many medium-large providers have active plans in place



Another Screening-Level tool on our website, is this source water protection plan map. Showing Communities with completed SWPP's These plans are great resources for planning and other partners to better understand water operations.

If a community doesn't have a plan yet, or it's outdated, that's a great opportunity for that community to undertake the planning process

1. Identifying Locations of PWS's & Water Infrastructure



Solutions – Identifying PWS's or Infrastructure

➤ ***Reach out to me;*** Robert.Murphy@state.co.us

- Provide me a shapefile, I can provide a list of systems with infrastructure or critical watersheds in your Project Area or Area of Interest.
- We can then work toward engaging those systems and facilitating data sharing permissions or detailed GIS data collection actions (Discussed in detail later in slides).

And last option, you can reach out to me. If you're a watershed group, place-based organization, I can get you a list of the PWS's in your area of interest, and help facilitate data sharing and engaging those systems.

2. Pre-fire Planning Opportunities to Engage PWS's



- Source Water Protection Planning
- Community Wildfire Protection Plans
- County Emergency Response Plans
- Local Emergency Planning Commissions
- Watershed Plans
- Wildfire Ready Watersheds – Wildfire Ready Action Plans

*PWS can be a stakeholder, contributing member, direct partner, funding partner

Topic 2, Engagement and Planning Opportunities

Once you have a handle on who your public water systems are, how do you engage them?

This list of planning exercises; PWS's can be an important stakeholder in any of these plans.

The role, and the amount of input needed from a PWS might vary situationally, but some basic level of awareness of public water supplies or critical infrastructure or emergency contacts would add value to all these plans.

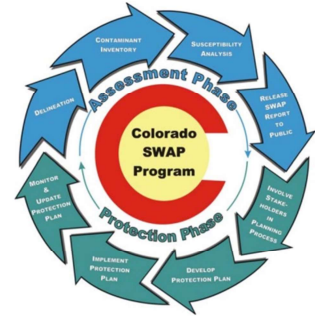
2. Pre-fire Planning Opportunities to Engage PWS's



• Source Water Protection Planning, and Plan Updates

- Community Wildfire Protection Plans
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The Source Water Protection Plans are the one item on this list that is driven by the PWS.

The WQCD and CRWA work closely to guide PWS's through developing these plans. We do our best to include emergency managers, and land managers, and watershed groups, and any other stakeholder in that planning process.

If you get an email about participating as a stakeholder in these plans, it could be a great opportunity for collaboration.

And understanding what infrastructure up in the watershed, or the floodplain, or other hazard areas,

What's susceptible to impacts that could be preemptively mitigated or require specific protection or focus during recovery.

And from the watershed mgmt. perspective, when doing restoration work, or proactive fuels mitigation projects, it's always a challenge trying to understand where on the landscape those efforts can be best employed.

Lot of schemes out there trying to prioritize limited resources.

Ill give a recent example from the Town of Crested Butte. All their intakes feed into a single above ground pipe, that then traverses a major drainage, suspended 6 feet above a creek. The drainage, very steep, historically high fuel loads, textbook scenario for debris flows risk postfire. If that pipe is compromised, there is no alternative, the entire raw water collection system is compromised Due to topography and elevations needed to move water to their treatment plant.

Great example of identifying a really important subwatershed to invest in management actions. Also a great opportunity to go to town council or whoever and present that vulnerability, and talk about ways to engineer redundancy or resiliency into their collection systems Or build flexibility into their water sources, or build more storage capacity of raw or finished water. Lots of ways to mitigate risk once the risk is identified.

2. Pre-fire Planning Opportunities to Engage PWS's



- Source Water Protection Planning, and Plan Updates
- **Community Wildfire Protection Plans**
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Burned Water Treatment Plant, NM

Marshall Fire. Louisville CO



CWPP; Model WUI Fire Codes:

"...adequate water supply for flow and firefighting..."

***This is much more complicated than pipe diameters or hydrant access;
Fire Compromised structures actively depressurize water distribution systems.*

Moving on to CWPP's.

PWS's should always be a stakeholder in CWPP's, to provide input on the fire response aspects of the plan.

I think this is more important now after the Marshall Fire, and there's likely lessons from that incident that could change how PWS's get utilized in the CWPP's.

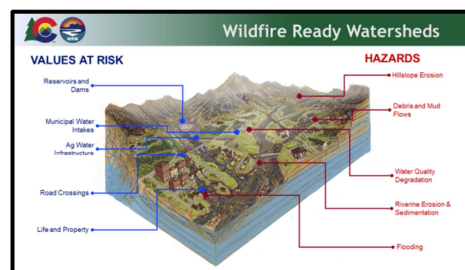
I'm going to talk about big takeaways from WUI fires in a bit more detail in a couple slides,

but the point is you can't fight WUI fires without water, and maintaining water pressure during WUI fires has proved to be a major challenge.

2. Pre-fire Planning Opportunities to Engage PWS's



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- **Wildfire Ready Watersheds – Wildfire Ready Action Plans**



There's also County Emergency Response Planning, LEPCs, I won't get into detail on those.

Jumping to the end of the list, before we move on, I'll just plug the new CWCB WRW Program and the Wildfire Ready Action Plans taking off across the state. Absolutely perfect opportunity to identify, reach out, and engage your PWS's. Get their data into the susceptibility analysis, start building those relationships.

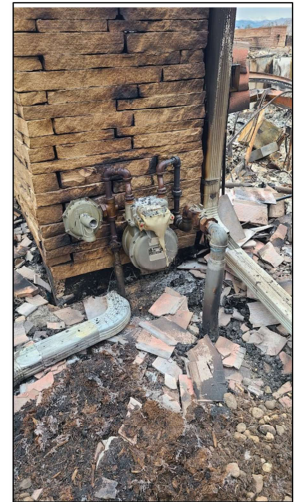
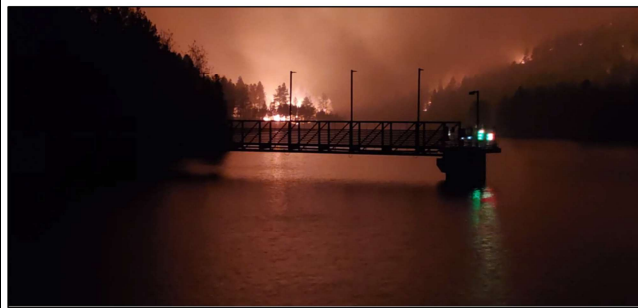
The WRAPs so far have been very successful in engaging our group at WQCD to identify their Community Water System's Conduct Outreach, communicate why this matters, And get the PWS's to participate and share their data for the analysis.

3. PWS Infrastructure and Operational Systems Susceptible to Wildfire

➤ Water Quality Challenges – not addressed here

➤ **Direct & Indirect Loss of Water System Infrastructure**

➤ Intakes, Diversion Points, Conveyance Infrastructure, Well Houses, Pump Stations, Control Rooms, Storage Tanks, Meters, Water Treatment Plants, Emergency Generators, Telemetry Equipment, Communications.



Moving on to Topic 3, the PWS infrastructure and water operational systems, and the associated risks that incident responders and planners should be aware of. I think the post fire water quality issues are somewhat common knowledge, I'm not going to spend any time on that here.

But I do have a list of PWS Infrastructure that's worth considering. Things melt, they burn, vulnerable to power and communication outages.

But Every water system is different in this regard. Each has different vulnerabilities, bottlenecks, redundancies, capacities, supply constraints, access considerations, staffing challenges. A lot of system specific details that only water operators can really convey, which is why they need to be involved in planning and response.

3. PWS Infrastructure and Operational Systems Susceptible to Wildfire



- Water Quality Challenges – not addressed here
- Direct & Indirect Loss of Water System Infrastructure
 - Intakes, Diversion Points, Conveyance Infrastructure, Well Houses, Pump Stations, Control Rooms, Storage Tanks, Meters, Water Treatment Plants, Emergency Generators, telemetry equipment, communications.
- WUI Fires & Compromised Distribution Systems
 - Water Production Rate < Water Loss Rate = Pressure Loss
 - Pressure Loss in Distribution System = No water to fight fires

Circling back around to the WUI fire considerations, Applicable to CWPP's and other planning exercises

What we consistently see, from the PWS perspective in these major WUI fires in CO, CA, OR, Hawaii, Is fighting depressurization of the water distribution system. When many houses are on fire simultaneously, the water distribution system depressurizes. No water in the distribution system, no water in hydrants to fight the fire.

3. PWS Infrastructure and Operational Systems Susceptible to Wildfire

➤ WUI Fires & Compromised Distribution Systems

- Fire damaged homes lead to significant water loss
- Simultaneous increased demand due to firefighting activities
- Electrical outages at treatment plants and pump stations (can occur without direct fire damage)
- Temporary Loss of access to critical infrastructure due to unsafe conditions
- Back-up system failures (generators compromised, insufficient fuel storage for emergency power)



So structure loss is leading to water loss,
Houses burn, things melt, there's water spraying uncontrolled inside these compromised structures,
While there's simultaneously an increased demand on the system due to firefighting activities.

Marshall Fire examples will start creeping in here, but for some context on water loss rates,
During the MF at various times, Louisville estimated that between 50 and 90% of the water they were producing was being lost through compromised structures.
That's not operationally sustainable.

Back to the list here,
Other considerations that can be addressed through planning and mitigation, Things Like Electrical outages, and the need for back up power systems

Loss of access due to unsafe conditions –
having the option to operate infrastructure remotely is a major advantage if conditions are unsafe for staff

--again, important during the marshall fire when the treatment plant itself was threatened,
They were able to operate the plant remotely for a time, they actually had damage to their emergency generators from fire.

Which brings up things like adapting to failures in back up systems. Louisville, they had to drive tanker trucks behind the fire lines to keep emergency generators running, To keep the water treatment plants operational.

3. PWS Infrastructure and Operational Systems Susceptible to Wildfire

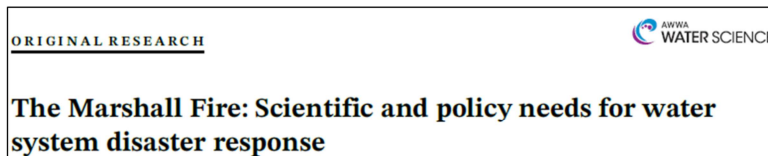


WUI Fire Case Study: Marshall Fire

Key Takeaways for Managing Water System Operations During WUI Fires

1. You will experience and need to manage pressure loss
2. You will require back-up power and communication systems
3. Water System Personnel need PPE and training specifically for fire-impacted environments.

**More Recommendations and Detailed references linked at end of slides, including the following Journal Article:*



I don't have enough time to talk in detail on the PWS perspective of the Marshall Fire But I have several useful links at the end of the slides that I highly recommend

And here Ill give 3 key takeaways that I think are applicable to this audience

1. If you have numerous structures or neighborhoods on fire, Your community will experience and need to respond to and mangle water system pressure loss.

Across the board, every big WUI fire in the west, there's pressure losses.

During the MF, in order to maintain pressure in the DS, the water system had it's staff driving around and shutting off curbstops to individual houses and streets and neighborhoods that were presently on fire Because they need to do this to keep pressures up.

At one point, they had to bypass their treatment system and gravity feed water from Marshall Lake (their raw water source up-gradient of the treatment plant) directly into the distribution system, because they couldn't treat the water fast enough to maintain pressure.

Number 2. You will require back up Power and Communications. Generators to keep

important systems and infrastructure functioning. Fuel supplies measured in days, not hours. Communication that are Battery powered and possibly even satellite based.

And 3. The water system employees need more fire-specific PPE and training to safely operate in fire impacted environments. Respirators, clothing, understanding communications and chain of command, practicing responding to these types of events.

Another honorable mention is things like increased shutoff valving and backflow preventers. Types of Engineering and design controls that help isolate parts of the Distribution system, allow flexibility in water management, and protect the below-ground infrastructure from fire-related contamination. These things can be added to CWPPs and building codes without much additional expense and add significant resiliency to the system.

4. PWS GIS Data and Data Collection Programs



Available GIS Data for Every PWS in CO – Source Water Dataset

- Contains Infrastructure, but incomplete in the context of fire risk.
- Regulations require PWS's to provide the State certain Infrastructure locations for inclusion in the Safe Drinking Water Information System.
- Data can be shared with permission

To address gaps in GIS infrastructure data, the WQCD in partnership with CRWA, CUSP, and COCO, created the ***PWS Values At Risk Program*** (formerly *WFDSS program*).

Circling back to infrastructure and GIS data. Need to know where it is, what it is, how important it is to the functioning of the water system.

So What data is available? Well, the State maintains a database of *SOME* critical infrastructure provided by PWS's due to regulatory requirements.

But, there's a lot of infrastructure and other important information and spatial data that isn't captured in this dataset.


So, this is where our PWS Values-At-Risk Program comes in to fill this gap.

Some of you may have heard of it before, we used to call it our WFDSS Program, but it was a confusing name for the feds who operate WFDSS, and a bit narrow for the scope, so we're rebranding.

4. PWS GIS Data and Data Collection Programs



PWS Values-At-Risk Program – Informational Flyer



Public Water System Values-At-Risk Program

What is This Program?
Critical Infrastructure Data Collection for Wildland Fires. PWS critical infrastructure is a Value-At-Risk during wildland fire incidents. This program collects GIS data used by wildland fire incident managers, and to implement strategies to assist in protecting values-at-risk.
CRWA offers this data collection program as a **FREE SERVICE** to all Public Water Systems in Colorado.

Use This Opportunity To:

- **Generate Critical GIS data** for your PWS's internal use and knowledge.
- **Have Data Ready and Available** to share during emergencies, communicate risks, or to apply for funding opportunities.
- **Incorporate Your Values-At-Risk** into Federal Incident Response Tools, such as WFDSS (*Wildland Fire Decision Support System*).

Data Security is a Top Priority

- Data will not be shared, released, or displayed publicly.
- Only the USFS & the CDPHE-WQCD will store and use the data for emergencies.
- Data is protected by Colorado DW-Policy 14, contracts with CRWA, and a USFS-WQCD MOU.

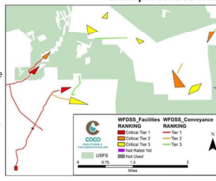
Colorado Rural Water

Strategies for Practitioners

- Identify Values-At-Risk
- Evaluate Susceptibility
- Mitigate Risks
- Communicate
- Respond
- Plan

How is Data Used?
Data is integrated into WFDSS. USFS Regional Office and the CDPHE-WQCD also maintain a copy of the data. The information is only utilized during emergencies, and never shared publicly.

Example WFDSS Map



What is WFDSS?
WFDSS is the Wildland Fire Decision Support System, used by Federal Fire Incident Managers during major incidents. This tool allows incident managers to identify values-at-risk and direct resources for protection.

WFDSS INTEGRATION IS A FREE SERVICE THAT CRWA OFFERS ALL PUBLIC WATER SYSTEMS IN COLORADO

Qualifying PWS Critical Infrastructure

- wells
- diversions
- intakes
- pump houses
- treatment buildings
- storage tanks
- electrical supply
- access routes

The Colorado WQCD and the U.S. Forest Service collaborate through a Memorandum of Understanding to utilize PWS GIS data during their general planning and wildfire response operations. This PWS GIS data is incorporated into WFDSS, and made available during major incidents to support the protection of PWS infrastructure. Data is never shared or displayed publicly, and protected from CORA and FOIA by the MOU and Colorado Drinking Water Policy 14.

Source Water Specialties

Interested in participating in this free service and integrating your water system data into WFDSS?

CONTACT US AT
719-545-6748
www.crwa.net

This activity is provided in partnership with the Colorado Department of Public Health & Environment, Colorado State University, the USFS, and the US Forest Service. CRWA receives funding for the facilitation of this project from CDPHE.

COLORADO
Department of Public Health & Environment

flyer to support our rebranding

4. PWS GIS Data and Data Collection Programs



PWS Values-At-Risk Program

- CRWA offers *FREE* GIS Services to PWS's in CO
 - Contact Jackson Reagan for a consultation and more information: jreagan@craw.net
- Data is stored by CDPHE and provided to PWS
 - PWS can share with important partners
 - County Emergency Managers
 - Wildfire Ready Watershed Partners
- Data is Shared with USFS – Utilized through an MOU
 - Data added to WFDSS (Wildland Fire Decision Support System)
 - Data is available to Region 2 Headquarters for direct use during incidents, and in NEPA and other environmental scoping, permitting, and planning actions.

Nuts and bolts of the VAR Program:

GIS Data Collection is completely free of charge to Public Water Systems, just takes a little time.

We store the data at CDPHE and of course provide it to the PWS once it's processed. The PWS has the info on hand to provide during emergencies, or better yet, proactively with their partners for planning, risk assessment, and mitigation projects.

We also provide the data to the USFS under an MOU between Region 2 and the CDPHE WQCD.

This data is available to Region 8 for permitting and planning actions, and it also gets added to the federal WFDSS, The Wildland Fire Decision Support System, available to federal fire incident managers and decision makers.

We're exploring how to roll the data into more modern tools and programs for the USFS to utilize,
But that's going to take time.

5. Additional Resources



CDPHE WQCD Blog: Aqua Talk Articles (Highly Recommend)

<https://aquatalk-colorado.blogspot.com/2022/06/drinking-water-contamination-following.html>

<https://aquatalk-colorado.blogspot.com/2022/04/marshall-fire-response.html>

<https://aquatalk-colorado.blogspot.com/2021/12/wildfire-affects-from-recent-fires-and.html>

Journal Article;

The Marshall Fire: Scientific and policy needs for water system disaster response (Highly Recommend)

<https://awwa.onlinelibrary.wiley.com/doi/full/10.1002/aws2.1318>

Colorado Post-Fire Recovery Playbook (Highly Recommend)

<https://cdphe.colorado.gov/post-fire-playbook>

CoWARN: Colorado's Water/Wastewater Agency Response Network (specific to utilities)

<http://cowarn.org/>

Wildfire Conditions & Risk Map for Water Utilities -

<https://storymaps.arcgis.com/stories/54123fb6d09b49a49b91cbe4d64fdf66>

Here's some references and recommendations.

At WQCD, we have a blog, and we have 3 articles regarding wildfire. They are absolutely worth a read if you want to better understand the water utility perspective.

Also highly recommend the referenced AWWA Journal Article on the Marshall Fire. There's dozens of policy and equipment and communication recommendations regarding water utilities responding and preparedness for wildfires. It's a fantastic resources.

Also, the CO Post-wildfire recovery playbook – great reference worth knowing about.

Thank You

For More Information

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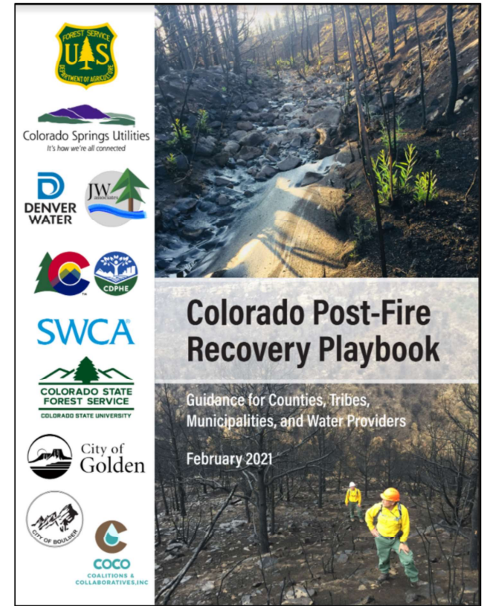
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Special Thanks to:

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Jonathan Bruno & Carol Ekarius @ COCO



please reach out