2020 Post-Fire Watershed Restoration

Lessons Learned

TABLE OF CONTENTS

ABBREVIATIONS

BAER	Burn Area Emergency Response
BARC	Burned Area Reflectance Classification
BLM	Bureau of Land Management
BMP	Best Management Practice
BTWC	Big Thompson Watershed Coalition
CO	Colorado
coBAER	Collaborative Burned Area Emergency Response
CPF	Cameron Peak Fire
CPRW	Coalition for the Poudre River Watershed
CSCB	Colorado State Conservation Board
CSFS	Colorado State Forest Service
CSU	Colorado State University
CWCB	Colorado Water Conservation Board
DHSEM	Department of Homeland Security and Emergency Management
DSR	Damage Survey Report
ESA	Endangered Species Act
ESR	Emergency Stabilization and Rehabilitation
ETF	East Troublesome Fire
EVWC	Estes Valley Watershed Coalition
EWP	Emergency Watershed Protection
FEMA	Federal Emergency Management Agency
GAO	Government Accountability Office
GIA	Governmental Immunity Act
GIS	Geographic Information System
IGA	Intergovernmental Agreement
IMT	Incident Management Team
MAC	Local Emergency Planning Committee
MPCD	Middle Park Conservation District
NPS	National Park Service
NRCS	Natural Resources Conservation Service
OEM	Office of Emergency Management
SBS	Soil Burn Severity
SUP	Special Use Permit
TA	Technical Assistance
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
VAR	Value-At-Risk
WAVE	Watershed Assessment and Vulnerability Evaluation
WERT	Watershed Emergency Response Team
WRW	Wildfire Ready Watersheds
WWRPI	Wildfire Watershed Restoration Process Improvement

1.0 EXECUTIVE SUMMARY

In late summer and through the fall of 2020, the two largest wildfires in state history burned through Colorado. The Cameron Peak Fire (CPF) burned 208,913 acres in the Cache la Poudre River and Big Thompson Watersheds, critical source watersheds for over one million people, including the Cities of Fort Collins and Greeley. The East Troublesome Fire (ETF) burned 193,812 acres primarily in Grand County, but also spread to Larimer and Jackson Counties. The ETF burned a significant portion of the collection watersheds for the Colorado-Big Thompson and Windy Gap Projects, which supply supplemental water to over 1 million residents and over 600,000 irrigated acres of agricultural land in northeastern Colorado.

The Wildfire Watershed Restoration Process Improvement (WWRPI) Workgroup was formed following a series of meetings and tours of the Cameron Peak and East Troublesome Fires with Colorado state and federal delegations in May 2021. The Natural Resources Conservation Service (NRCS) reached out to interested stakeholders to convene a workgroup to provide recommendations for improvements to post-fire watershed restoration. In the summer of 2021, CPF and ETF watershed restoration partners met and identified 19 different areas for potential improvement in three general categories: Policy; Technical; and Collaboration, Outreach and Process. Focus groups were formed to discuss each category in more detail and develop recommendations for improvements.

The WWRPI was solely focused on watershed restoration and did not discuss or investigate in any way other aspects of post-fire watershed restoration, such as housing, businesses, or other socioeconomic factors related to post-disaster watershed restoration.

The Policy Focus Group discussed the following topics:

- Examine policy tools to build capacity, collaborative networks, and sustainable funding for post-fire watershed restoration;
- Make recommendations to address policy and programmatic roadblocks that prevent an integrated and collaborative approach to the implementation of watershed restoration projects.

The Process, Collaboration and Private Landowner Outreach Focus Group discussed the following topics:

- Post-fire Watershed Restoration Process:
    - Identify process inefficiencies and recommend ways to improve and streamline the watershed restoration process.
    - Determine how to organize stakeholders and develop a structure for the post-fire watershed restoration process that clearly identifies roles and responsibilities.
    - Examine need for guidance materials that should be developed to support local agencies.
- Collaboration:
    - Examine how to leverage existing post-fire watershed restoration resources.
    - Identify ways the State can provide support to local agencies throughout the post-fire watershed restoration process.
- Private Landowner Outreach:
    - Examine how to support local agencies with their private landowner engagement.
    - Make recommendations to navigate risks and liabilities associated with the post-fire watershed restoration projects for the sponsors.

The Technical Focus Group discussed the following topics:

- How to better coordinate data collection and assessments on lands owned by different state or federal agencies.
- Provide guidance to future watershed restoration sponsors on what data are available or needed, and the GIS capabilities required to work with these data and implement restoration projects.
- Coordination and standardization of data collection, watershed modeling and post-fire assessments.

Recommendations based on the above topics can be found in table 1.1 on the following page.

This report outlines many additions and changes that can be made to the watershed restoration process. However, this document is only as effective as the implementation of the recommendations made. The WWRPI workgroup is committed to facilitating this process but acknowledges that to ensure successful implementation, the workgroup will require support from the many local, state, and federal agencies and organizations that play a part in post-fire watershed restoration. Following the completion of this report, the workgroup will distribute it to the agencies and partners listed below and begin seeking opportunities for implementation.

1.1 Summary Table of Recommendations

Group	Issue Title	Recommendation
Policy	Liability associated with implementing watershed restoration projects	Congress could legislate that no indemnification to the NRCS is allowed in the EWP Program or when EWP dollars are used on USFS or BLM lands. Similarly, Congress could legislate that there is no liability by a sponsor to the United States in any fire watershed restoration programs unless the sponsor reaches a heightened level of tortious actions such as willful or wonton actions that harm federal assets.
		Congress could create an insurance pool for EWP sponsors to cover the obligations of a sponsor and that flow to private landowners when unintended harm occurs from the post-fire watershed restoration or remediation efforts.
		Perhaps the proposed Good Samaritan Law could serve a model to provide broad protection for the local sponsor that elects to take on the responsibility of implementing watershed restoration projects. An option could be to expand the scope of this proposed law to cover local entities that are eligible to act as EWP sponsors for post-disaster watershed restoration projects.
		When working on Federal Lands, given the variety of contracting instruments available, it would be desirable to establish a streamlined process allowing collaboration and reducing the risks to the local sponsors while providing consistency amongst Federal Agencies. It does not make sense to have a different contract instrument between agencies. A review of these contracting instruments would be beneficial with an eye on streamlining the process and examining liability and indemnity clauses so a determination can be made as to which type of agreement is preferable to minimize exposure to the local partner and allow the most flexibility to do the work across jurisdictional boundaries.
		The Colorado state approach provides a highly desirable template.
Policy	Making Better Use of the BAER Program	A review of the program and its associated policies with the respective agencies is needed. This could be accomplished through a set of roundtables with key stakeholders to evaluate the program and how it could be improved. The wildfire landscape has changed and is continuing to change and requires a look at the legislative tools that might be needed to supplement the program as well. Additional considerations could be made in the context of a roundtable discussion highlighted in the next cells.
		The one-year time limit imposed by the USFS policy needs to be removed and returned to the three-year original time limit.

Group	Issue Title	Recommendation
		It would be desirable for agencies to start the stakeholder engagement process early, when the fire is still burning so that a transition can be made smoothly over to the local community when the process must evolve from emergency response to watershed restoration and restoration.
		Include and address water quality and soil productivity in the values-at-risk that the agencies must protect on and downstream of NFS land.
		A post-fire interagency response team needs to be assembled promptly as the fire is still burning and should include key local stakeholders. The team would manage the post-fire watershed restoration process.
		Develop consistency in the management and implementation of the program across agencies. Identify points of contacts for each agency and designate a post-fire restoration coordinator from one of the agencies (presumably, one agency would act as the lead based on what lands were primarily impacted by the wildfire). The post-fire USFS Coordinator should be made a full-time, permanent job. The temp status and having people come and go per the job status is a real challenge to continuity and getting things done effectively.
		The USDA Forest Service must be prepared to manage disaster response and watershed restoration at the same scope and scale as wildfire suppression and landscape restoration when necessary.
Policy	Sustainably Funding Post-Fire Watershed Restoration	The EWP program should be part of the annual USDA, NRCS budget request and Congress should establish an annual appropriation to ensure funds are available upon an emergency basis. Waive the matching requirement when watershed restoration actions are occurring on federal lands.
		Annually appropriate funding for wildfire restoration at the state level.
		Establish an enterprise fund for post-fire watershed restoration at the state level.
Policy	Working Across Jurisdictional Boundaries	To alleviate limited federal agency capacity, make better use of the federal agencies ability to work across jurisdictions through a Participating Agreement under the Wyden Amendment. This legislation provides a flexible instrument that could be promising in its implementation if a framework could be developed to promote its use at the onset of the post-fire watershed restoration planning process and that would involve all federal agencies, local sponsors and adjacent landowners.
		Develop Participating Agreement templates that would work across federal agencies. When watershed restoration work includes private lands, consider how such agreements could be integrated with the EWP program and perhaps eliminate the need for using a Special Use permit. Include agreement language that provides authorization for work to be performed under the

Group	Issue Title	Recommendation
		Participating Agreement rather than a SUP, and documentation that the EWP will be a funding mechanism. Attach a financial plan to show how funding may be allocated to an entity (such as through EWP).
		Develop an IGA or other type of agreement to align sources of funding from the various funders (federal, state and local) so they can work together and be leveraged. For example, local match funding provided by the Colorado Water Conservation Board, as well as the sponsors in-kind contributions can serve to match both the EWP program and U.S.F.S or B.L.M funding under the Wyden Amendment. An option could be to expand the Colorado Shared Stewardship MOU to include post-fire watershed restoration (in its current state it is primarily focused on preventative forest health measures).
		Synthesize all post-fire watershed restoration federal programs into a document to identify their scope, offerings, implementation timelines and sideboards to allow a crosswalk assessment and identify areas of inconsistency and possible enhancements. This process would outline why the differences or programmatic sideboards impact the ability to work across jurisdictional boundaries.
Coordination	Outreach to Private Landowners	**Pre-Disaster Planning**
		County OEMs and Local Emergency Planning Committees (MAC) should work with local agencies, organizations, nonprofits, etc. to compile private landowner contact information databases. This information can then be handed off to local sponsors following a disaster.
		Compile a list of local agencies, organizations, nonprofits that may be involved in natural disaster watershed restoration and/or who may have contact information for landowners that may be affected by natural disasters.
		County offices of emergency management and/or local sponsors should identify a list of local watershed, natural resources, and agricultural organizations prior to event, or immediately after that can help guide landowner outreach.
		Maintain county parcel data to include contact information including email addresses and phone numbers. (a)It may be easiest to collect this additional information when landowners submit property tax information; however, this is a large ask and will most likely require state legislation. (b)Leverage online registration opportunities, such as registrations for Code Red alert system, to allow landowners to give permission to connect cell phone number and e-mail with assessor records to facilitate contacts for post-catastrophe watershed restoration non-emergency work (e.g., post-fire watershed restoration).

Group	Issue Title	Recommendation
		(c)Ensure contact lists for ditch companies and their owners are up to date. Ditch company contact information can be obtained at the Secretary of State & DWR offices. If a location does not have a formalized ditch company, ditch owner data should be available at the County Clerk level.
		Ensure County OEMs and/or potential local sponsors have GIS capabilities to readily and effectively identify and map parcels.
		During and Immediately After the Fire
		County OEM should set up a website or online map as early as possible (during fire) where landowners can submit contact information and values at risk. (a) Ensure the website/map is clear as to who is leading the watershed restoration efforts. (b) Create a "one stop shop" integrated registration where landowners can provide their contact information and check boxes to allow it to be used notifications about 1) re- entry, 2) watershed restoration activities, 3) various forms of assistance and watershed restoration programs, etc. 2) Local sponsor's GIS department should rapidly and effectively identify parcels within and downstream of burn areas via GIS during and immediately following the active fire.
		County OEMs and local sponsors should work with local agencies and organizations to help identify proper contact info (e.g., local conservation district, watershed associations, Colorado State Forest Service (CSFS), CSU Extension, County, Stockgrowers Associations, local interest groups, etc.)
		County OEMs should utilize an alert system such as Code Red (or other emergency notification systems) to notify landowners/request contact information ahead of watershed restoration work. The County OEMs typically have authority to send out emergency notifications during a disaster.
		Once a local sponsor is identified, County OEM and/or County Sheriff's office should share landowner contact information and GIS data that have been compiled through DHSEM damage assessments, evacuation centers, evacuee contact forms, and/or public meetings. (During the disaster, the state DHSEM damage assessment team typically compiles property damage surveys in conjunction with County OEM (i.e., which houses were damaged vs. destroyed). Damage surveys include parcel data and landowner contact information.). If a victims assistance center is set up either by the locals or state/federal agencies, gather contact information at this time.
Coordination	Engagement with Private Landowners	Develop templates of outreach materials that local watershed restoration partners can utilize when performing outreach to landowners. Public engagement software is available and could be deployed for watershed restoration purposes that allows for better engagement with private

Group	Issue Title	Recommendation
		landowners, such as connecting them to websites, resources, and webinars. This software could be supported and/or managed by a statewide watershed restoration team.
		County OEMs and MACs should communicate to landowners ahead of disasters that they should include a list of their "Values at Risk" (outbuildings, homes, well location, etc.) in their emergency kit.
		Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
Coordination	Need for Understanding of Agency and Stakeholder Roles in Post-fire Watershed restoration	Explore pre-disaster funding opportunities through CWCB's Wildfire Ready Watersheds initiative.
		Develop a "post-fire resource flowchart" or detailed list that describes the roles of watershed restoration partners and agencies, the resources they provide, what they can and cannot do, and when and how to engage them.
		Agency coordination during the watershed restoration process between state and federal agencies needs to be enhanced so the messaging to local impacted stakeholders and communities is consistent and digestible.
		Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
		Federal agencies such as USFS, BLM and the National Park Service (NPS) and the State have a shared responsibility to support the local watershed restoration agency.
		As the fire response ramps down, assign agency points of contact who are familiar with permitting processes to objectively analyze the needs of post-fire watershed restoration efforts.
Coordination	Resources and State Guidance for Recovering Communities	Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors & watershed restoration partners throughout short- and long-term watershed restoration.
		Develop a list, flow chart, or decision tree that can guide local sponsors and watershed restoration partners through available resources and what may still be needed.
		Develop a flow chart or decision tree to outline eligibility and timelines of available programs as well as the capacity needs from potential sponsoring agency. Many post-fire watershed restoration playbooks and guides are already available. Include a complete list and description of the many available post-fire watershed restoration playbooks within the flow chart and decision tree.

Group	Issue Title	Recommendation
		Start high-level assessments (including Hydrology and Hydraulic Modeling earlier in the process (during fire) to help decision makers identify what the watershed restoration process might look like.
		Monitor the development and implementation of the state-led coBAER Program and advocate for specific additions when appropriate.
Coordination	Seamless Transition from Fire Suppression to Watershed restoration	Encourage County OEM and MAC to include watershed restoration as a focus and discussion at planning meetings. Ensure USFS, County OEM, and other partner agency contact information is shared during or immediately after the disaster.
		Hold onsite visit(s) in burn area between suppression and watershed restoration teams to ensure clearer understanding of on-the-ground conditions and transition between teams.
		Advocate for the State to implement a trained statewide watershed restoration team that can guide & mobilize local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
		Watershed restoration partners should establish communication channels for quick and frequent data sharing to flow from suppression Incident Management Teams to watershed restoration partners during an incident. This should include shared drives such as Microsoft OneDrive or Dropbox and regularly scheduled check-ins.
		Establish an online data-sharing site such as SharePoint, Google Drive, or Dropbox to create a centralized information hub, allow for file sharing and create a workspace for group collaboration.
		Monitor the development and implementation of the state-led coBAER Program and advocate for specific additions when appropriate.
Technical	Coordination of Assessments between Federal and Private Lands	When possible, one BAER team should perform the assessments of the entire fire, even if the fire burned on lands managed by multiple agencies.
		Advocate for the creation of one data collection and analysis team that can support various programs, at both the federal and state levels.
		Monitor the development of coBAER and advocate for specific additions when appropriate, in order to create a cross-jurisdictional, long-term data collection and analysis team.
		Similarly, monitor the development and implementation of the CWCB's Wildfire Ready Watersheds Initiative and advocate for specific additions when appropriate, in order to create a program that prepares local agencies (of any capacity) for the eventual wildfire.
Technical	Standardizing GIS-Based Technical Platforms and Creating Data Hubs	GIS tools used during watershed restoration must have the data and workforce required to support a multi-year watershed restoration and debris management program, including identifying, delineating, and monitoring post-fire treatments.

Group	Issue Title	Recommendation
		Agencies and organizations who may be affected by a wildfire should create a list of critical data layers and their locations so that data can be assembled as soon as a fire begins.
		Before the fire is contained, data sharing and communication between federal, state, and local leaders needs to increase.
		Watershed restoration modeling should begin before the emergency response is complete.
		Create a pre-incident GIS data hub to assist with GIS data distribution. In-field GPS data collection with offline capabilities and on-site GIS-based desktop mapping support is critical to post-fire watershed restoration.
Technical	Coordination and Standardization of Data Collection, Modeling and Assessments	Watershed restoration partners should establish communication channels for quick and frequent data sharing, such as Microsoft One Drive or Dropbox, and regularly-scheduled check-ins.
		Data need to be standardized only to the point at which best management practices are put in place. Beyond that, modeling needs to focus on efficiency rather than perfect accuracy.
		Analyses should be run from the top of the watershed all the way down to the lowest (reasonable) values at risk, not stopping at the fire perimeter.
		Units should be converted into the unit system most useful to the watershed restoration sponsor.
		Assessment teams and watershed restoration sponsors should focus on getting broad, comparative information at the start of the assessments to prioritize projects. Later, partners will further refine the models to determine exact engineering criteria.
		Non-Newtonian flow and continuous soil burn severity should be considered in the later stages of post-fire modeling.

2.0 INTRODUCTION AND PURPOSE

2.1 Background of East Troublesome and Cameron Peak Fires

In late summer and through the fall of 2020, the two largest wildfires in state history burned through Colorado. The Cameron Peak Fire (CPF) burned 208,913 acres in the Cache la Poudre River Watershed, a critical source watershed for over one million people on the Front Range, including the Cities of Fort Collins and Greeley. The East Troublesome Fire (ETF) burned 193,812 acres primarily in Grand County, but also spread to Larimer and Jackson Counties. The ETF burned a significant portion of the collection watersheds for the Colorado-Big Thompson and Windy Gap Projects, which supply supplemental water to over 1 million residents and over 600,000 irrigated acres of agricultural in northeastern Colorado.

2.2 Post-Fire Watershed Restoration Process

Post-Fire Watershed Restoration in this report refers to a broad range of short and long-term mitigation actions that are typically needed in the wake of a significant wildfire event. Initially, strategies are usually focused on stabilizing soils and stream banks to minimize erosion, debris flows, and flooding risks, and promote conditions that are favorable for revegetation both short (1-2 years post fire) and long term.

Many federal and state programs tend to focus on the "emergency" response phase of the watershed restoration. While this approach made sense in the past, it is no longer fitting in an era of megafires, which requires long-term and sustained investments, planning and collaboration. Transitioning from the initial phase to the long-term rehabilitation of the watershed is a critical part of the process and part of the scope of this assessment.

Flooding, debris flows, and sedimentation are of great concern following a fire and can severely impact downstream life and property, and essential infrastructure that communities rely upon. There is an emergency nature to the watershed restoration process that cannot be understated. Depending on site-specific conditions this state of emergency can persist for several years after the wildfire.

Longer-term restoration (beyond the first few years after a wildfire) eventually shifts to forest revegetation and ecosystem restoration to re-establish sustainable and desirable watershed functions.

Prior to the onset of the CPF and ETF, most of the watershed restoration partners, other than the land management agencies, had limited to no experience with post-fire watershed restoration. Greeley and Fort Collins, and organizations such as the Coalition for the Poudre River Watershed (CPRW), the Big Thompson Watershed Coalition (BTWC) and Estes Valley Watershed Coalition (EVWC), have post-fire watershed restoration experience with the High Park Fire, and Larimer County has previous experience with multiple fires throughout the county. Grand County and Northern Water engaged in the process for the first time after the ETF.

2.3 Formation of the Wildfire Watershed Restoration Process Improvement Workgroup (WWRPI)

The WWRPI workgroup was formed following a series of meetings and tours of the Cameron Peak and East Troublesome Fires with Colorado state and federal delegations in Spring 2021. The Natural Resources Conservation Service (NRCS) reached out to interested stakeholders to convene a workgroup to identify opportunities and provide recommendations for improvements to post-fire watershed restoration. In the summer of 2021, CPF and ETF watershed restoration partners met and identified 19 different areas for potential improvement. Issues were broken into three general categories: Policy; Technical; and Collaboration, Outreach

and Process. Focus groups were formed and convened in October 2021 to discuss each category in more detail and develop recommendations for solutions. More detailed descriptions and meeting summaries can be found in Section 3.

2.4 Workgroup Objectives

The WWRPI workgroup pursued the following objectives:

- Identify areas of improvement in the post-fire watershed restoration process in Colorado;
- Examine lessons learned during recent post-fire watershed restoration, from technical, funding, and organizational standpoints;
- Make recommendations for process improvements;
- Develop actionable strategies and identify proper channels to implement recommendations.

The WWRPI was solely focused on watershed restoration and did not discuss or investigate in any way other aspects of post-fire recovery, such as housing, businesses, or other socioeconomic factors related to post-disaster recovery.

The workgroup had initially intended to identify and assign leads for each implementation strategy and organize focus groups as needed to follow through with implementation strategies. It was found through this process that it was premature and overly ambitious in this initial assessment. However, for the recommendations of this report to become effective, both will need to be subsequently addressed.

2.5 Focus Group Scopes

This section describes the scope of each focus group. Three focus groups met between October 2021 and June 2022 to discuss their specific issues surrounding the post-fire watershed restoration progress and identify recommended solutions. A full list of WWRPI Workgroup participants and contact information for focus group leads can be found in Sections 6.2 and 6.3.

2.5.1 Policy Focus Group

The Policy Focus Group met seven times between October 2021 and June 2022.

Scope:

- Examine policy tools to build capacity, collaborative networks, and sustainable funding for post-fire watershed restoration.
- Make recommendations to address policy and programmatic roadblocks that prevent an integrated and collaborative approach to the implementation of watershed restoration projects.

2.5.2 Collaboration, Process, Landowner Engagement Focus Group

The Collaboration, Process and Landowner Engagement Focus Group met six times from October 2021 to April 2022.

Scope:

Watershed Restoration Process:

- Identify process inefficiencies and recommend ways to improve and streamline the post-fire watershed restoration process.
- Determine how to organize stakeholders and develop a structure for the post-fire watershed restoration process that clearly identifies roles and responsibilities.

- Examine need for guidance materials that should be developed to support local agencies.

Collaboration:
- Examine how to leverage existing post-fire watershed restoration funding and agency capacity.
- Identify ways the State can provide support to local agencies throughout the post-fire watershed restoration process.

Private Landowner Outreach:
- Examine how to support local agencies with their private landowner engagement.
- Make recommendations to navigate risks and liabilities associated with the post-fire watershed restoration projects for the sponsors.

2.5.3 Technical Focus Group

The Technical Focus met six times between October 2021 and May 2022.

Scope:
- Examine how to better coordinate data collection, assessments, and modeling between state and federal agencies, specifically relating to the transition between USFS Burned Area Emergency Response (BAER) assessments and the Emergency Watershed Protection (EWP) Damage Survey Reports (DSRs) to minimize or eliminate redundancy and inconsistency in the assessments and ensure no gaps are left in the process.
- Recommend the development of guidance for future watershed restoration sponsors[1] on what data are available, what data are needed when a fire breaks out, and the GIS capabilities required to work with these data and implement watershed restoration projects.
- Coordination and standardization of data collection, watershed modeling and post-fire assessments.
- Learn about other initiatives including coBAER, Wildfire-Ready Watersheds and WAVE.

(1) This term is used in a generic way in this instance. It is not specific to the NRCS EWP program. It is intended to reference any local stakeholder or collaborative of stakeholders at the local level that has the capacity to lead and coordinate the post-fire watershed restoration work.

3.0 DISCUSSION OF ISSUES & RECOMMENDATIONS

3.1 Policy Group

This section summarizes challenges that have come up in the wake of the 2020 Colorado wildfires when working to implement emergency watershed restoration to protect downstream life and property, as well as communities and infrastructure at risk from post-fire impacts.

3.1.1 Liability Associated with Implementing Watershed Restoration Projects

Problem Statement

The use of some Federal programs to implement post-wildfire watershed restoration presents liability challenges for the entities that elect to sponsor this type of work. The liability is broad, and the forms of agreements vary as demonstrated below. For ease of discussion the legal liability issues are organized as state and federal and separately discussed below.

NRCS Emergency Watershed Protection Program

Emergency Watershed Protection (EWP) assistance may be made available when sudden watershed impairment occurs that creates an imminent threat to life or property, as determined by the NRCS State Conservationist (STC). The EWP Program provides watershed restoration assistance consisting of emergency measures for repair and restoration of eligible sites.

The EWP Program helps landowners, operators, and individuals implement emergency watershed restoration measures to relieve imminent hazards to life or property created by a natural disaster that causes a sudden impairment of a watershed. Assistance must be through eligible project sponsors.

Project Sponsor Eligibility

1. A project sponsor is any legal subdivision of a State government or a State agency, including the following:
    a. Cities
    b. Counties or parishes
    c. Towns
    d. Municipal authorities
    e. Townships
    f. Soil and water conservation districts
    g. And when chartered under State laws, entities such as:
        i. levee districts
        ii. irrigation districts
        iii. drainage districts
2. Any Native American Tribe or Tribal organization as defined in section 4 of the Indian Self Determination and Education Assistance Act (25 U.S.C. Section 450b).
3. A project sponsor must:
    a. Have a legal interest in, or responsibility for, the areas threatened by a watershed emergency.
    b. Be capable of obtaining necessary land rights and required permits.
    c. Be capable of performing all required operation and maintenance (O&M) responsibilities.
    d. Administer contracting when part of a local agreement.

In the case of the NRCS Emergency Watershed Protection (EWP) Program, the sponsorship agreement with the NRCS requires the sponsor to agree to broad liability for damage to people and property and to be liable for and indemnify the United States Government. The pre-printed mandatory forms state as follows:

> "Sponsor must indemnify and hold NRCS harmless to the extent permitted by State law for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the Sponsor in connection with its acquisition and management of the Emergency Watershed Protection Program pursuant to this agreement. Further, the Sponsor agrees that NRCS will have no responsibility for acts and omissions of the Sponsor, its agents, successors, assigns, employees, contractors, or lessees in connection with the acquisition and management of the Emergency Watershed Protection Program pursuant to this agreement that result in violation of any laws and regulations that are now or that may in the future become applicable."

Both the liability and indemnity requirements of implementing emergency watershed protection projects on the sponsors are a barrier to acceptance of EWP funding. The legal risk can dissuade entities from becoming a sponsor and assuming such role, or at a minimum necessitates that the sponsor develops liability waivers to be signed by landowners whose property has been burned and may benefit from the EWP Program in order to mitigate and minimize the risk exposure.

Since the type of liability exposure varies with the type of project proposed, a series of liability waiver templates are needed. For example, placing flood barriers around homes or occupied businesses is different than mulching open unoccupied land. The process of drafting these waivers and customizing them to each type of mitigation is time-consuming and requires access to legal resources. It adds a cumbersome and costly step to a process that is intended to be expedient in response to an emergency. Alternatively, some sponsors may not easily have access to such resources and may elect to proceed with the work without waivers, thereby assuming full liability risk, or not to proceed at all.

Assuming liability waivers are drafted, an extensive outreach effort must ensue to introduce the waivers to landowners. In the case of the East Troublesome Fire over 300 landowners were contacted through the NRCS EWP program. A robust tracking mechanism had to be developed to monitor the status of the outreach and of the liability waivers. Finally, if a landowner elected not to sign the waiver, the project had to be abandoned.

The U.S Forest Service

Generally, the U.S. Forest Service requires Special Use permits to be signed prior to work on Forest Lands within the fire footprint. This administrative approach was initially considered as the fastest way to advance urgently needed watershed restoration work, and to allow local sponsors to implement post-fire mitigation projects that were beyond USFS capacity. While, the use of SUPs was effective in terms of timeliness, they pose challenges in terms of liability terms. In addition to the obligation agreed to in the language above with the NRCS, when EWP dollars are used on Forest Service lands, the sponsor had to agree to the liability and indemnity language above and to the liability language of the Special Use Permit as follows:

> F. DAMAGE TO UNITED STATES PROPERTY. The holder has an affirmative duty to protect from damage the land, property, and other interests of the United States. Damage includes but is not limited to fire suppression costs and damage to government-owned improvements covered by this permit.
>
> 1. The holder shall be liable for all injury, loss, or damage, including fire suppression, prevention, and control of the spread of invasive species, or other costs in connection with rehabilitation or restoration of natural resources resulting from the use or occupancy authorized by this

permit. Compensation shall include but not be limited to the value of resources damaged or destroyed, the costs of restoration, cleanup, or other mitigation, fire suppression or other types of abatement costs, and all administrative, legal (including attorney's fees), and other costs. Such costs may be deducted from a performance bond required under clause IV.J.

2. The holder shall be liable for damage caused by use of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees to all roads and trails of the United States to the same extent as provided under clause IV.F.1, except that liability shall not include reasonable and ordinary wear and tear.

I. INDEMNIFICATION OF THE UNITED STATES. The holder shall indemnify, defend, and hold harmless the United States for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the holder in connection with the use or occupancy authorized by this permit. This indemnification provision includes but is not limited to acts and omissions of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees in connection with the use or occupancy authorized by this permit which result in (1) violations of any laws and regulations which are now or which may in the future become applicable; (2) judgments, claims, demands, penalties, or fees assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) the release or threatened release of any solid waste, hazardous waste, hazardous materials, pollutant, contaminant, oil in any form, or petroleum product into the environment. The authorized officer may prescribe terms that allow the holder to replace, repair, restore, or otherwise undertake necessary curative actions to mitigate damages in addition to or as an alternative to monetary indemnification.

Bureau of Land Management

The BLM agreement contains longer liability and indemnification requirements, which are similar but not identical to those above. The language has been shortened for purposes of this memo as follows:

- The BLM assumes no liability for any actions or activities conducted under this agreement except to the extent that recourse or remedies are provided by Congress.
- The recipient shall be required to (1) obtain liability insurance or (2) demonstrate present financial resources in an amount determined sufficient by the Government to cover claims brought by third parties.
- The federal government shall be named as an additional insured under the recipient's insurance policy.
- To indemnify the federal government, Bureau of Land Management (BLM), from any act or omission of the recipient, its officers, employees, or (members, participants, agents, representatives, agents as appropriate) (1) against third party claims for damages arising from one or more activities carried out in connection with this financial assistance agreement and (2) for damage or loss to government property resulting from such an activity, to the extent the laws of the State where the recipient is located permit. This obligation shall survive the termination of this agreement.
- To pay the United States the full value for all damage to the lands or other property of the United States caused by the recipient, its officers, employees, or (members, participants, agents, representatives, agents as appropriate).
- Flow-down: for the purposes of this clause, "recipient" includes such subrecipients, contractors, or subcontractors as, in the judgment of the recipient and subject to the Government's determination of sufficiency, have sufficient resources and/or maintain adequate and appropriate insurance to achieve the purposes of this clause.

In the event of a collaboration with a Federal Agency such as the U.S. Forest Service or the Bureau of Land Management, various types of agreements can be considered and utilized to allow a local Sponsor to perform

watershed restoration work on Federal land. With the scale, frequency and severity of wildfires increasing exponentially, it is unrealistic to expect that Federal Agencies alone will be able to tackle the full scope of post-wildfire watershed restoration that will be needed. It is likely that multilateral partnerships are going to be critical now and, in the future, to implement post-fire mitigation on Federal land. Each type of agreement carries varying degrees of liability for the cooperating local partner. [2]Other options for collaboration include a Participating Agreement under the Wyden Amendment or a Cooperative Agreement, when multiple funding sources, including federal, state and other, are used to advance the work. It is challenging and cumbersome to navigate these various contract instruments and their respective liabilities. The form of Participating Agreement under the Wyden Amendment is more favorable to a local sponsor as it has no indemnification requirement. The three forms of agreements above essentially, through different language, put all the responsibility for any legal claims on the shoulders of the local sponsor for unlimited scope and unlimited time.

To perform the watershed work at the levels needed Northern Water sought to purchase an insurance policy on the open market to specifically cover the post-fire work. The concern was that the fire watershed restoration work was so high in dollar value, if a claim occurred, it could potentially exhaust the full 10 million dollars in annual insurance coverage carried by Northern Water. Northern Water explained to carriers that, as a local government it has governmental immunity as set out under state law for certain activities and that we were working together with these federal agencies to do the post-fire work. Northern Water provided a forthright explanation of the contract obligations set out above and was unsuccessful in finding a carrier who would insure such a risk.

State Program CWCB Obligations

Colorado allocated matching dollars for post-fire watershed restoration work through the Colorado Water Conservation Board (CWCB). The Grant award documents recognize that Northern Water has governmental immunity and does have the following insurance provision:

> INSURANCE: Grantee shall maintain at all times during the term of this Grant such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the Colorado Governmental Immunity Act, §24-10-101, *et seq.*, C.R.S. (the "GIA"). Grantee shall ensure that any Subcontractors maintain all insurance customary for the completion of the Work done by that Subcontractor and as required by the State or the GIA.

Federal Recommendations

- Consider a legislative fix to the EWP liability and indemnification issue.
- Congress could legislate that no indemnification to the NRCS is allowed in the EWP Program or when EWP dollars are used on USFS or BLM lands. Similarly, Congress could legislate that there is no liability by a sponsor to the United States in any fire watershed restoration programs unless the sponsor reaches a heightened level of tortious actions such as willful or wonton actions that harm federal assets.
- Congress could create an insurance pool for EWP sponsors to cover the obligations of a sponsor and that flow to private landowners when unintended harm occurs from the post-fire watershed restoration or remediation efforts.
- Perhaps the proposed Good Samaritan Law could serve a model to provide broad protection for the local sponsor that elects to take on the responsibility of implementing watershed restoration projects.

[(2)] In January 2022, the USFS released its strategic road map to confronting the wildfire crisis with a 10-year Implementation Plan (https://www.fs.usda.gov/managing-land/wildfire-crisis). Findings from the roundtables that led to the formulation of this plan are strikingly consistent with the experiences described in this report and the recommendations proposed.

An option could be to expand the scope of this proposed law to cover local entities that are eligible to act as EWP sponsors for post-disaster watershed restoration projects.
- When working on Federal Lands, given the variety of contracting instruments available, it would be desirable to establish a streamlined process allowing collaboration and reducing the risks to the local sponsors while providing consistency amongst Federal Agencies. It does not make sense to have a different contract instrument between agencies. A review of these contracting instruments would be beneficial with an eye on streamlining the process and examining liability and indemnity clauses so a determination can be made as to which type of agreement is preferable to minimize exposure to the local partner and allow the most flexibility to do the work across jurisdictional boundaries.
- The Colorado state approach provides a highly desirable template.

3.1.2 Making Better Use of the BAER Program

The primary objective of the USFS BAER program is to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System lands and take immediate actions, as appropriate, to manage unacceptable risks.

Information about burned watershed conditions is collected by USFS BAER teams and shared with other Federal agencies, Tribal Governments and State and local agencies so they can provide assistance to communities and private landowners who may also be affected by potential post-fire damage.

The WWRPI Workgroup identified the following issues with the BAER program.

Problem Statement

- Implementation of the program lacks in effectiveness and scope and leaves a gap in terms of coordination, planning and funding of post-fire emergency watershed restoration.
- Agencies should be responsible for the impact of runoff from their land on downstream users, land and infrastructure.
- Each Federal agency that operates under the BAER program has its own policies and guidelines to operate the program and it is funded programmatically through each agency. This poses structural challenges that hinder interagency coordination and an integrated approach to the program.

Post-fire evaluations are rapid assessments that typically take place over a 10-14 day period with a dispatch of experts that come from various parts of the agencies. They often operate with limited resources that restrict opportunities for interagency collaboration.

- For some agencies, actions undertaken under the BAER program are limited in time to a year post containment of the fire and for others the program can address mitigation project up to five years after the fire. For large scale events, which are becoming the norm in the Western United States, the one-year timeline is largely insufficient to address the post-fire restoration needs that span several years after the event.

An interagency approach is needed for implementation of the BAER program that should also include input from critical stakeholders.

The initial East Troublesome Fire BAER reports (from USFS and NPS) were released without input by concerned stakeholders, recognized the significant risk of post-fire impacts on downstream water quality and water supplies and the need for watershed restoration. The USFS BAER report concluded that it was simply not

doable to mitigate these impacts due to the scale of the issue. This is not an acceptable conclusion for a process that should identify tangible, targeted and exigent actions that must be taken to protect the water supply of over one million people. Similar conclusions were reached the USFS in the BAER report for the Cameron Peak Fire.

The BAER process heavily relies on Burn Area Reflectance Classification (BARC) mapping, field validation and Soil Burn Severity mapping. These assessments provide inputs to the debris flow modeling performed by the U.S. Geologic Survey and other ad-hoc modeling that takes place. BARC mapping was coordinated between the USFS and NPS for the East Troublesome Fire, but subsequent modeling and technical analyses were not. As stated earlier in this document, it is unrealistic to expect that federal agencies alone will be able to tackle the watershed restoration work in response to increasingly frequent and devastating wildfires. It highlights the critical importance of watershed coalitions, which are typically organized as non-profit entities. These types of organizations often struggle for funding to sustain their operational costs and their long-term viability is frequently at issue.

BAER was initially created to be a rapid response program to an emergency created by a wildfire during a time that large wildfires were measured in the thousands of acres not the hundreds of thousands of acres as they are today. The current program is inadequate for multi-jurisdictional mega-fires and a more comprehensive risk evaluation is needed.

Anything that is not an agency value-at-risk cannot be addressed and protected through BAER. NRCS was designated as the agency with the authority to provide post-fire watershed funding for treatments on National Forest System Lands that would impact non-federal values-at-risk. This has precluded the USFS from taking on a more proactive role on its own land to protect values outside its boundaries. After the U.S. Government Accountability Office (GAO) audit performed in 2012, the separation of responsibilities between USFS and NRCS has adversely impacted the effectiveness of the program.

Further, water quality does not appear to be a recognized value that treatments need to protect.

The original time limit for BAER, prior to the GAO audit, stemmed from two assumptions: 1) a watershed emergency still exists pending the first post-event storm/precipitation;, the land is no longer stable and funding should be available accordingly to stabilize the soil; 2) if a storm has occurred and the hillslope has already been eroded, treatment is no longer of value or effective, but it may not happen in the first year after a fire depending on post-event weather patterns. Therefore, the timeline was previously limited to three years post-event. Under this framework, it made sense then to front load watershed restoration treatments. In contrast, the current program is restricted to an arbitrary one-year post-fire event.

Additionally, the scale and timing (more frequently late season) of the fires we now encounter makes mapping much more difficult and understanding the scope and nature of potential post-fire impacts does not necessarily happen within the one-year limit.

It should be noted that in October 2021, the GAO performed an audit of the EWP program which found the need to clarify the relationship between NRCS and USFS as it pertains to post-fire watershed restoration on NFS. The recommendations in this report are aligned with the GAO's audit.[3]

Recommendations

- As a result of the frequent occurrence of megafires and in its reconfigured state (post-GAO audit), the BAER program is not functioning effectively to mitigate watershed emergencies associated with the larger modern fires. A review of the program and its associated policies with the respective agencies is needed. This could be accomplished through a set of roundtables with key stakeholders to evaluate the program and how it could be improved. The wildfire landscape has changed and is continuing to change and requires a look at the legislative tools that might be needed to supplement the program as well.
- Additional considerations could be made in the context of a roundtable discussion:
    - The one-year time limit imposed by the USFS policy needs to be removed and returned to the three-year original time limit.
    - It would be desirable for agencies to start the stakeholder engagement process early, when the fire is still burning so that a transition can be made smoothly over to the local community when the process must evolve from emergency response to watershed restoration and restoration.
    - Include and address water quality and soil productivity in the values-at-risk that the agencies must protect on and downstream of NFS land.
    - A post-fire interagency response team needs to be assembled promptly as the fire is still burning and should include key local stakeholders. The team would manage the post-fire watershed restoration process.
    - Develop consistency in the management and implementation of the program across agencies.
    - Identify points of contacts for each agency and designate a post-fire restoration coordinator from one of the agencies (presumably, one agency would act as the lead based on what lands were primarily impacted by the wildfire). The post-fire USFS Coordinator should be made a full-time, permanent job. The temp status and having people come and go per the job status is a real challenge to continuity and getting things done effectively.
    - The USDA Forest Service must be prepared to manage disaster response and watershed restoration at the same scope and scale as wildfire suppression and landscape restoration when necessary.

(3) The GAO performed an audit of the EWP program in October 2021, which recommend the following: 1) NRCS should assess the time limits for the EWP projects; 2) the Secretary of Agriculture, in consultation with the Chiefs of NRCS and the Forest Service, should determine whether the department needs to seek another funding approach, including potentially changing how it requests funds from Congress, to minimize delays in getting EWP funds to sponsors; 3) the Secretary of Agriculture, in consultation with the Chiefs of NRCS and the Forest Service, should develop an MOU or guidance clarifying roles and responsibilities for how and when EWP projects can be done on National Forest System lands; 4) The Chief of NRCS should ensure, as the agency continues working on developing a sponsor guide for the EWP program, that the guide clarifies areas of limited guidance identified by stakeholders. In particular, the Chief should incorporate information regarding how and when EWP projects can be done on National Forest System and other federal lands into the guide.

3.1.3 Sustainably Funding Post-Fire Watershed Restoration

Problem Statement

The NRCS EWP program is not annually appropriated. As a result, it is funded on an "as-needed" basis in response to disasters that have already occurred. Funding is typically attached to a larger funding vehicle such as an Infrastructure or Supplemental Appropriation Bill. This process is reactive, takes months or years to get through and is ill-suited to provide timely funding needed to implement urgent and expedient post-fire watershed restoration. In the case of the 2020 East Troublesome, Cameron Peak and Grizzly Peak fires, the EWP program had most recently been funded several years prior, and had run through its cycle, leaving the fund almost completely depleted while the aftermath of these fires called for a funding need in the tens to hundreds of millions of dollars, far exceeding available resources.

The NRCS actively reached out to all existing EWP sponsors that had open agreements with unspent funds from prior disaster watershed restoration efforts and pursued the release of these funds so they could be made available, which took several months to accomplish.

Additionally, the EWP program requires local match of 25 percent. When watershed restoration needs are spelled out in tens of millions of dollars, it leaves unmanageable costs to be borne by the local communities attempting to sponsor the work. The sponsors had to turn to the State of Colorado to seek funding to match the NRCS EWP allocation. This process also took many months to go through and three iterations to incrementally add to the available funding. It was again time consuming and distracting resources in the midst of efforts to plan work.

The lack of funding and subsequent need to advocate for it while attempting to plan work, procure contracts to do the work, and timely implement projects is very problematic. Sponsors are faced with planning work without knowing how much funding they will have to work with, nor when it will be available, while dealing with tight implementation timelines driven by seasonal weather cycles and expected summer rains that trigger post-fire impacts. Further, the most effective projects need to be implemented immediately after the fire is out. For example, mulching immediately after the fire is out in the first year is more effective and preferable than having to wait to get funding and mulching in subsequent years. By that time, there are areas that have experienced a lot of erosion and loss of soil that mulching aims to protect. The discontinuity of the funding stream also causes significant inefficiencies with contractors having to demobilize, only to remobilize a few weeks or months later, adding cost and wasted time to the process.

Recommendations

- The EWP program should be part of the annual USDA, NRCS budget request and Congress should establish an annual appropriation to ensure funds are available upon an emergency basis.
- Waive the matching requirement when watershed restoration actions are occurring on federal lands.
- Annually appropriate funding for wildfire restoration at the state level.
- Establish an enterprise fund for post-fire watershed restoration at the state level.

3.1.4 Working Across Jurisdictional Boundaries

Problem Statement

Significant gaps result from the post-fire watershed restoration process as it stands. The geographic focus of the watershed restoration projects is dictated by the availability of funding and its sources, which prevents a holistic, watershed-scale and cross-jurisdictional approach to planning of the mitigation projects.

EWP funding is exclusively directed towards private lands while BAER only addresses federal agencies values-at-risk and does not address the downstream impacts of post-fire runoff on life, property, and infrastructure. BLM has a robust watershed restoration program that is not well known or advertised and consists of the Emergency Stabilization and Rehabilitation (ESR). USFS has developed a similar program called the Burn Area Rehabilitation, which recently got funded through the Infrastructure Investments and Jobs Act. This program is new, and its implementation has not yet been tested. The ESR program is implemented to lessen post-fire effects such as erosion and to restore affected habitats and provides funding for post-fire mitigation within the first year after the fire. It works concurrent with the BAER program, which allocates resources within the first five years after the fire. Mitigation often includes aerial seeding and hazardous tree removal. The BLM BAER program differs from the USFS BAER program which is better funded.

Recommendations

- To alleviate limited federal agency capacity, make better use of the federal agencies ability to work across jurisdictions through a Participating Agreement under the Wyden Amendment. This legislation provides a flexible instrument that could be promising in its implementation if a framework could be developed to promote its use at the onset of the post-fire watershed restoration planning process and that would involve all federal agencies, local sponsors and adjacent landowners.
- Develop Participating Agreement templates that would work across federal agencies. When watershed restoration work includes private lands, consider how such agreements could be integrated with the EWP program and perhaps eliminate the need for using a Special Use permit. Include agreement language that provides authorization for work to be performed under the Participating Agreement rather than a SUP, and documentation that the EWP will be a funding mechanism. Attach a financial plan to show how funding may be allocated to an entity (such as through EWP).
- Develop an IGA or other type of agreement to align sources of funding from the various funders (federal, state and local) so they can work together and be leveraged. For example, local match funding provided by the Colorado Water Conservation Board, as well as the sponsors in-kind contributions can serve to match both the EWP program and U.S.F.S or B.L.M funding under the Wyden Amendment. An option could be to expand the Colorado Shared Stewardship MOU to include post-fire watershed restoration (in its current state it is primarily focused on preventative forest health measures).
- Synthesize all post-fire watershed restoration federal programs into a document to identify their scope, offerings, implementation timelines and sideboards to allow a crosswalk assessment and identify areas of inconsistency and possible enhancements. This process would outline why the differences or programmatic sideboards impact the ability to work across jurisdictional boundaries.

3.2 Collaboration Group

3.2.1 Outreach to Private Landowners

Problem Statement

Outreach with hundreds of private landowners can be cumbersome and difficult, and obtaining correct property owner contact information slows down the post-fire watershed restoration process.

The NRCS EWP Program is intended to mitigate risks to life and property following a sudden watershed impairment. Projects are typically focused on private lands. In the case of the ETF, sponsoring agencies Northern Water and Grand County outreached to over 500 landowners in affected areas within and downstream of the burn scar to obtain access to private lands for post-fire assessments, and project design

and implementation. This effort was undertaken by contract employees hired specifically for post-fire work in conjunction with external partnering organizations and additional internal staff.

Obtaining correct contact information for private landowners can prove to be difficult for several reasons. Publicly available landowner information, such as that on county assessors' websites, is only comprised of mailing addresses. This is a slow and expensive way of getting in touch with a landowner. Finding phone numbers and/or email addresses takes additional time and cost. Additionally, capacity and capabilities needed to perform the necessary GIS exercises may be limited by sponsoring agencies, and parcel data can be skewed or outdated.

Recommendations

- Pre-Disaster Planning:
    - County OEMs and Local Emergency Planning Committees (MAC) should work with local agencies, organizations, nonprofits, etc. to compile private landowner contact information databases. This information can then be handed off to local sponsors following a disaster.
        - Compile a list of local agencies, organizations, nonprofits that may be involved in natural disaster watershed restoration and/or who may have contact information for landowners that may be affected by natural disasters.
        - County offices of emergency management and/or local sponsors should identify a list of local watershed, natural resources, and agricultural organizations prior to event, or immediately after that can help guide landowner outreach.
        - Maintain county parcel data to include contact information including email addresses and phone numbers.
            - It may be easiest to collect this additional information when landowners submit property tax information; however, this is a large ask and will most likely require state legislation.
        - Leverage online registration opportunities, such as registrations for Code Red alert system, to allow landowners to give permission to connect cell phone number and e-mail with assessor records to facilitate contacts for post-catastrophe watershed restoration non-emergency work (e.g., post-fire watershed restoration).
        - Ensure contact lists for ditch companies and their owners are up to date. Ditch company contact information can be obtained at the Secretary of State and DWR offices. If a location does not have a formalized ditch company, ditch owner data should be available at the County Clerk level.
    - Ensure County OEMs and/or potential local sponsors have GIS capabilities to readily and effectively identify and map parcels.
- During and Immediately After the Fire:
    - County OEM should set up a website or online map as early as possible (during fire) where landowners can submit contact information and values at risk.
        - Ensure the website/map is clear as to who is leading the watershed restoration efforts.
        - Create a "one stop shop" integrated registration where landowners can provide their contact information and check boxes to allow it to be used notifications about 1) re-entry, 2) watershed restoration activities, 3) various forms of assistance and watershed restoration programs, etc.
    - Local sponsor's GIS department should rapidly and effectively identify parcels within and downstream of burn areas via GIS during and immediately following the active fire.

- County OEMs and local sponsors should work with local agencies and organizations to help identify proper contact info (e.g., local conservation district, watershed associations, Colorado State Forest Service (CSFS), CSU Extension, County, Stockgrowers Associations, local interest groups, etc.)
- County OEMs should utilize an alert system such as Code Red (or other emergency notification systems) to notify landowners/request contact information ahead of watershed restoration work.
    - The County OEMs typically have authority to send out emergency notifications during a disaster.
- Once a local sponsor is identified, County OEM and/or County Sheriff's office should share landowner contact information and GIS data that have been compiled through DHSEM damage assessments, evacuation centers, evacuee contact forms, and/or public meetings. (During the disaster, the state DHSEM damage assessment team typically compiles property damage surveys in conjunction with County OEM (i.e., which houses were damaged vs. destroyed). Damage surveys include parcel data and landowner contact information.)
    - If a victims assistance center is set up either by the locals or state/federal agencies, gather contact information at this time.

3.2.2 Engagement with Private Landowners

Problem Statement

Many post-fire watershed restoration projects occur on private lands. Successful watershed restoration on those lands is contingent upon the buy-in and support of the landowners and the broader community in general. Many sponsoring agencies lack the capacity to take on additional engagement and outreach efforts or have very little experience with public outreach, especially regarding watershed restoration from natural disasters. There is a need for guidance regarding watershed restoration sponsor engagement with private landowners early and throughout the watershed restoration process.

Recommendations

- Develop templates of outreach materials that local watershed restoration partners can utilize when performing outreach to landowners (templates may include emails, talking points, flyers, etc.)
- Public engagement software is available and could be deployed for watershed restoration purposes that allows for better engagement with private landowners, such as connecting them to websites, resources, and webinars.
    - This software could be supported and/or managed by a statewide watershed restoration team.
- County OEMs and MACs should communicate to landowners ahead of disasters that they should include a list of their "Values at Risk" (outbuildings, homes, well location, etc.) in their emergency kit.
    - Messaging to landowners should include information on what is considered a Value at Risk
- Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
    - This is a significant endeavor and will most likely require state legislation.

3.2.3 Need for Understanding of Agency and Stakeholder Roles in Post-Fire Watershed Restoration

Problem Statement

During and immediately following a fire, several federal and state agencies are involved with both the suppression and watershed restoration efforts as well as with watershed restoration. There is a lack of understanding about the roles that local, county, state, and federal agencies, and other stakeholders play when it comes to fire response and post-fire watershed restoration. This can slow down watershed restoration efforts by a local sponsor who may not be familiar with these roles as well as when and how to engage with the correct agency or stakeholder.

While some agencies and stakeholders may be interested in researching the impacts within and downstream of a burn area and treatment effectiveness, this should not hinder response and watershed restoration efforts.

Recommendations

- Pre-Disaster: Explore funding opportunities through CWCB's Wildfire Ready Watersheds initiative, explained in section 5.3.2.
- Develop a "post-fire resource flowchart" or detailed list that describes the roles of watershed restoration partners and agencies (e.g., DHSEM, NRCS, CWCB, etc.), the resources they provide, what they can and cannot do, and when and how to engage them.
- Agency coordination during the watershed restoration process between state and federal agencies needs to be enhanced so the messaging to local impacted stakeholders and communities is consistent and digestible.
- Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
    - This is a significant undertaking and will most likely require state legislation.
- Federal agencies such as USFS, BLM and the National Park Service (NPS) and the State have a shared responsibility to support the local watershed restoration agency. As the fire response ramps down, assign agency points of contact who are familiar with permitting processes to objectively analyze the needs of post-fire watershed restoration efforts.

3.2.4 Resources and State Guidance for Recovering Communities

Problem Statement

There is a lack of clarity on who to contact for state guidance and which playbooks and resources are most appropriate for the recovering communities.

Many guidebooks and resources have been created in the aftermath of wildfires throughout Colorado and the Western US. While not a comprehensive list, some examples of such resources can be found in Section 6.4. These playbooks include varying information on funding sources, the watershed restoration process, and descriptions of agency/stakeholder roles. There is so much breadth to the information that it can be hard to narrow in on which ones are the most useful for watershed restoration sponsors without prior experience with fire watershed restoration.

Additionally, many state agencies perform various roles in wildfire watershed restoration. For example, CWCB can assist with damage survey reports, sediment and debris flow modeling, and fluvial hazard mapping.

DHSEM can help to coordinate with CWCB but is typically more focused on economic and community watershed restoration, and FEMA programs that may be offered following a fire.

However, Colorado is a home-rule state, and municipalities can exercise local control of their individual governments. The implication is that State agencies follow along with fire watershed restoration but cannot guide or provide advice regarding watershed restoration efforts unless directly approached by the local governments. If a sponsor does not have prior experience with fire watershed restoration it can be difficult to parse out which agencies to lean on for guidance and at what stage in post-fire watershed restoration.

Recommendations

- Advocate for the State to implement a trained statewide watershed restoration team that can guide local sponsors & watershed restoration partners throughout short- and long-term watershed restoration.
    - This is a significant undertaking and will most likely require state legislation.
- Develop a list, flow chart, or decision tree that can guide local sponsors and watershed restoration partners through available resources and what may still be needed.
    - Develop a flow chart or decision tree to outline eligibility and timelines of available programs as well as the capacity needs from potential sponsoring agency.
    - Many post-fire watershed restoration playbooks and guides are already available. Include a complete list and description of these playbooks within the flow chart and decision tree.
        - Alternatively, CWCB's Wildfire Ready Watersheds may fulfill this recommendation, or the State should formally recognize the best resources that watershed restoration partners should utilize.
- Start high-level assessments (including Hydrology and Hydraulic Modeling earlier in the process (during fire) to help decision makers identify what the watershed restoration process might look like.
- Monitor the development and implementation of the state-led coBAER Program and advocate for specific additions when appropriate.
    - coBAER is discussed in more detail in Section 3.3.1

3.2.5 Seamless Transition from Fire Suppression to Watershed Restoration

Problem Statement

During an active wildfire event, Incident Management Teams (IMT) work to contain and control the progression of the fire. The IMT typically holds a daily cooperator meeting to give agencies and organizations an opportunity to learn more information about the event. As suppression efforts wind down, watershed restoration teams take over to perform suppression repair, emergency stabilization, and planning for long-term watershed restoration. Suppression repair and emergency stabilization work on federal lands is completed by BAER teams comprised of USFS or other federal agency personnel. In most cases, emergency stabilization work on private lands occurs via the NRCS EWP Program, which needs a local government to act as a sponsor of the program. Suppression repair and emergency stabilization efforts typically begin before or immediately after a fire is contained and the IMT is demobilized. Emergency stabilization work can occur up to one year following the event, but long-term watershed restoration typically takes multiple years post-fire.

Coordination between suppression and watershed restoration teams could be improved as it relates to data sharing regarding post-fire watershed conditions, assessments and planning for post-fire watershed restoration. However, one major roadblock is that it is not always clear which agency will lead long-term

watershed restoration efforts and some communities do not have an agency or organization with the capacity to take on and coordinate those efforts. This issue is discussed in more detail in other sections of this report.

Recommendations

- Pre-fire: Encourage County OEM and MAC to include watershed restoration as a focus and discussion at their meetings.
- Ensure USFS, County OEM, and other partner agency contact information is shared during or immediately after the disaster.
- Hold onsite visit(s) in burn area between suppression and watershed restoration teams to ensure clearer understanding of on-the-ground conditions and transition between teams.
- Advocate for the State to implement a trained statewide watershed restoration team that can guide & mobilize local sponsors and watershed restoration partners throughout short- and long-term watershed restoration.
    - This is a significant endeavor and will most likely require state legislation.
- Watershed restoration partners should establish communication channels for quick and frequent data sharing to flow from suppression Incident Management Teams to watershed restoration partners during an incident. This should include shared drives such as Microsoft OneDrive or Dropbox and regularly scheduled check-ins.
- Establish an online data-sharing site such as SharePoint, Google Drive, or Dropbox to create a centralized information hub, allow for file sharing and create a workspace for group collaboration.
- Monitor the development and implementation of the state-led coBAER Program and advocate for specific additions when appropriate.
    - coBAER is discussed in more detail in Section 3.3.1.

3.3 Technical Group

3.3.1 Coordination of Assessments between Federal and Private Lands

Problem Statement

Generally, there are two assessments performed in the aftermath of a wildfire that aid the watershed restoration process: 1) the Burned Area Emergency Response Report (BAER Report), a Department of Agriculture or Interior analysis run by the land managing agency (USFS, BLM, NPS, etc.), and 2) the EWP Damage Survey Reports (DSRs), run by the NRCS. The BAER reports are internal funding request documents and are not intended to inform interagency needs, thus requiring other reports to fulfill other funding requests. Within one fire, there may be multiple BAER Reports, split by federal land managing agencies. In the soil burn severity analysis of the ETF, two BAER teams evaluated the USFS and NPS lands separately, even though there is a culture of collaboration between the teams. One reason for this split is that the USFS is within the Department of Agriculture, while the NPS is within the Department of Interior. The USFS BAER report's soil burn severity (SBS) map was updated in the Spring of 2022 once snow-free conditions existed in order to avoid the challenges with smoke, snow and access in the fall of2020. However, the NPS BAER report was not concurrently updated, even though these same issues were most likely present.

USGS Debris Flow hazard mapping, another federally run analysis is limited to the fire perimeter. The Colorado Water Conservation Board (CWCB) completed a hazard analysis of peak streamflow within the burn perimeter and downstream to get a broader picture of the expected post-fire impacts. The Colorado Forest Restoration Institute (CFRI) completed a hillslope erosion analysis that routed soil erosion to streams in small watersheds. The problem was how to accumulate all of these analyses, including the BAER, into one understandable format

for use in understanding the post-fire priorities. For CPF and ETF water providers (Fort Collins, Greeley and Northern Water) hired JW Associates to create a composite watershed hazard analysis that used all of those analyses and put them into one priority hazard map.

BAER Reports cover federal land burned by wildfire, while EWP DSRs cover private lands where there has been a watershed impairment caused by a natural disaster, which may or may not be fire. EWP is activated when the NRCS State Conservationist has declared a local emergency, or the President has declared a disaster. The NRCS must receive a request from a sponsor to initiate EWP and thus the DSR process. The DSR process, an essential step in EWP, involves conducting a resource assessment and determining values-at-risk to determine threats to life and property on private lands. DSRs generally evaluate lands at a finer scale, outlining specific mitigation measures on private land, while BAER reports identify hazard potential at large scales (>1 km) and propose specific solutions for federal lands.

There are two post-fire evaluations run by state agencies that can work on non-federal lands. The first, Collaborative Burned Area Emergency Response (coBAER) is a program set up by the State of Colorado within the Department of Natural Resources to evaluate fires that burn primarily on non-federal lands. Similar to a federal BAER team, the coBAER team evaluates SBS, VARs, identifies modeling hazards, develops emergency protective measures, and communicates findings. They focus on human life and safety. The coBAER team does not currently have significant SBS evaluation experience. In the future, coBAER may be able to lead the initial evaluation of fires that burn on non-federal lands and collaborate with other federal agencies when evaluating fires that burn across jurisdictions.

The second program, Watershed Assessment and Vulnerability Evaluation (WAVE) is run by the Colorado State University (CSU) Water Center. This program evaluates private lands at the landowner's request and makes suggestions for post-fire treatments. WAVE also plans to host trainings around the state to build fire assessment capacity. This will most likely be a 2-day training on what makes a VAR, how to take GPS points, and how to turn all the information collected into a formal DSR.

Recommendations

- When possible, one BAER team should perform the assessments of the whole fire, even if the fire burned on lands managed by multiple agencies.
    - Soil burn severity maps are critical, as they form the basis for other analyses. Having one team perform the entire analysis may slow down the evaluation but may promote consistency across the whole fire.
    - An example of one BAER team analyzing across jurisdictions is the Fourmile Fire, where small parcels of BLM and County land were nested within each other, but all evaluated by one BAER team.
    - Roadblocks to this action include determining who would fund the team, and which agency has jurisdiction over activities.
- Advocate for the creation of one data collection and analysis team that can support various programs, preferably at both the federal and state levels.
    - This is a significant undertaking and may require state or federal legislation.
    - This team would be able to assess both public and private lands.
    - The data collection team would collect data for modeling efforts as well as Damage Survey Reports.
    - This team would conduct both the quick, immediate post-fire evaluation (analog: BAER Report) and, later, the more detailed surveys required for specific projects (analog: DSRs).

    - The compilation of the various analyses into one hazard analysis completed for the CPF and ETF could be used as a model for other fires. The data collection and analysis team could complete and update that hazard analysis.
    - coBAER could develop into this type of cross-jurisdictional team.
- Monitor the development and implementation of coBAER and advocate for specific additions when appropriate, in order to create a cross-jurisdictional, long-term data collection and analysis team.
    - Advocate for coBAER to analyze fires that burn primarily on private land or in other instances when federal BAER teams are not being organized.
        - If coBAER gets established, make sure that they add SBS expertise to the team.
    - Look to California's Watershed Emergency Response Team (WERT) as an example of a state agency that can evaluate private lands.
- Monitor the development and implementation of the CWCB's Wildfire Ready Watersheds Initiative and advocate for specific additions when appropriate, in order to create a program that prepares local agencies (of any capacity) for the eventual wildfire.
    - One of the goals of this initiative is to advance watershed- and landscape-scale approaches to planning and watershed restoration, which involves cross-jurisdictional analyses.
    - Specific recommendations:
        - Consistency between pre-fire planning and post-fire evaluation and restoration teams
        - Ability to assess, request funding, plan and implement projects across jurisdictions, including federal, state and private lands.
- Monitor the development and implementation of the CSU Water Center's WAVE program and advocate for specific additions when appropriate.
    - Both are state programs that are able to evaluate private lands, so ensure that the public knows which program to turn to for their needs.
    - Ideally, the necessary analyses and recommendations will be found in the automatically-triggered BAER or coBAER analysis, so that a private landowner does not need to turn to the WAVE program.
        - However, the WAVE program is a valuable tool for private landowners that want to go farther than the capacity of a BAER/coBAER program allows.

3.3.2 Standardizing GIS-Based Technical Platforms and Creating Data Hubs

Problem Statement

After a fire, GIS capabilities are critical to identify areas of most concern and outline potential watershed restoration project locations. These desktop analyses are particularly important in the context of megafires which are extremely challenging to assess in the field. Current watershed restoration strategies first rely on the watershed restoration sponsor agency for GIS capabilities and staff hours. If this is not available, then CWCB can set up a consultant that will create GIS tools for the sponsoring agency.

Data and model results come from many different agencies. There is no central data warehouse for fire watershed restoration projects. Although agencies are very willing to share data, it is up to the watershed restoration leaders to make sure they have compiled all the relevant information. It is difficult to know what data are missing, as datasets and model results often become available intermittently throughout the first year of fire watershed restoration and may be updated after their first release. The watershed restoration sponsor may miss information because there is no shared warehouse to receive results.

The CWCB recently began work on their Wildfire Ready Watersheds initiative. Mandated by legislation, this work will create a template for how local agencies can prepare for wildfire. This initiative includes a section on GIS preparedness, i.e., how to plan projects in spatial relation to VARs and areas of high burn severity, and possibly a checklist of data needed to perform a comprehensive watershed analysis.

Recommendations

- GIS tools used during watershed restoration need to expand beyond the immediate aftermath. They must have the data and workforce required to support a multi-year watershed restoration and debris management program, including identifying, delineating, and monitoring post-fire treatments.
- Agencies and organizations who may be affected by a wildfire should create a list of critical data layers and their locations so that data can be assembled as soon as a fire begins (see Appendix 5.4). For datasets that are relatively unchanging, they should be loaded into the GIS database before the fire breaks out, or as soon as it starts.
    - The sponsoring agency should reference this list frequently and check in with modelers to get results as soon as possible.
    - CWCB's Wildfire Ready Watersheds initiative may give information on what datasets are important.
- As the fire grows, and before it is contained, data sharing and communication between federal, state, and local leaders needs to increase. This will help the transition between suppression and watershed restoration to be as smooth as possible.
    - Easy data sharing platforms include Google Drive, OneDrive, and SharePoint
    - Best practices for properly documented GIS metadata should be followed when possible. Specifics on data sharing (or not sharing) should be specified explicitly.
- At a certain point in the fire response phase, the watershed restoration modeling should begin even with limited data, i.e., the Soil Burn Severity data. What-if scenarios could be run to identify potential values at risk during the response phase, informing impacted communities of potential impacts, and allowing them to start planning for the watershed restoration phase. This earlier watershed restoration awareness could reduce the amount of time it takes to ramp up the watershed restoration process.
    - When new versions of data become available, it is important to note the date of revision or revision number to distinguish from prior versions.
- Monitor the development and implementation of the CWCB's Wildfire-Ready Watersheds Initiative and advocate for specific additions when appropriate, in order to create a program that prepares local agencies (of any capacity) for the eventual wildfire.
    - CWCB indicated that there will be a section on GIS preparedness and a checklist of data needed to perform the comprehensive watershed analysis. Both items are recommended by this workgroup.
- While ideal and desirable, a frequently updated and continuously active statewide data hub and/or GIS platform is not recommended at this time by this group for the following reasons:
    - First, the workforce required to update the datasets from all counties and municipalities would be great and possibly duplicative of what is already happening at the local level. When an emergency happens and it is time to use the data, it may be hard to know if the data are up to date.
    - Second, the data sharing agreements, funding, and political will to make this happen do not currently exist.
    - Some counties may not want to share parcel data.
    - There are legal hurdles that need to be addressed in order to share sensitive data.
- A pre-incident GIS data hub is recommended to assist with GIS data distribution.

    - Data hubs are an ideal platform over shared drives as the GIS metadata can be viewed and displayed. Likewise, non-GIS personnel are frequently asked to obtain/moving GIS data. The GIS data hub can help to ensure common mistakes are avoided and facilitate display of the GIS data without special software or licensing.
- In-field GPS data collection (with offline capabilities) and on-site GIS based desktop mapping support is recommended and critical to post-fire watershed restoration.
    - During East Troublesome Fire watershed restoration, on-site GIS mapping capabilities were helpful in a low/no-bandwidth environment and/or in areas of limited internet connectivity during Damage Survey Reporting (DSR) data collection. Adequate mobile-based computer hardware (i.e. laptops) and software prepared with offline GIS base data facilitated the use of GIS for the East Troublesome Fire Damage Survey Reporting (DSR).

3.3.3 Coordination and Standardization of Data Collection, Modeling and Assessments

Problem Statement

As stated in the first issue, many federal agencies may be involved in post-fire data collection. Because the structure of fire watershed restoration is left up to each watershed restoration sponsor, there is little centralization involved in fire watershed restoration, and each watershed restoration sponsor must track down data and results from multiple agencies. This process takes time and effort, requiring consistent communication and double-checking between agencies regarding any changes or updates to data.

Different agencies occasionally use different parameters, models, or model setups that make the results incomparable. Although model results are useful on their own, it is best when different agency results can be combined and synthesized to find the most critical areas for watershed restoration projects. This requires consistent parameterization and model setup across agencies. Examples of these parameters and model setups include the use or lack of sediment bulking factors, and the range of return interval storms used in models. The USFS runs many of their models using a 2-year storm event, the CWCB Technical Assistance (TA) team ran models at the 2-, 10-, and 25-year event, and NRCS engineering standards are the 25-year event. The CWCB TA team was under tremendous time constraints when conducting ETF modeling and used different models than the USFS used in the BAER process. They also analyzed a larger spatial extent, modeling outside of the fire to other critical pour points.

Analyses are occasionally not consistent in scope, i.e., analyses may focus on one specific area without ties to the surrounding watershed or are disconnected from actionable information. This often means that the watershed restoration sponsor does not know how to translate model results into watershed solutions. USGS hazard mapping does not extend outside of the fire perimeter. The CWCB re-ran analyses to pour points outside of the fire in order to get a broader picture of the expected fire effects.

The problem is how to accumulate all these analyses, including the BAER, into one understandable format for use in understanding the post-fire priorities. For CPF and ETF water providers (Fort Collins, Greeley and Northern Water) hired JW Associates to create a composite watershed hazard analysis that used all of those analyses and put them into one priority hazard map.

Recommendations

- Watershed restoration partners should establish communication channels for quick and frequent data sharing. This should include shared drives such as Microsoft OneDrive or Dropbox and regularly scheduled check-ins.

- Data need to be standardized only to the point at which best management practices (BMPs) are being put into place.
    - Beyond that, modeling needs to focus on efficiency rather than perfect accuracy, so that projects can begin soon after the fire is extinguished, and tight funding timelines can be followed.
    - Return interval ranges and sediment bulking factors are two parameters that need to be consistent across analyses.
- Analyses should be run from the top of the watershed all the way down to the lowest (reasonable) values at risk, to get the whole picture of the burn scar response. The spatial extent of the model should not stop at the fire perimeter.
- At the end of model runs, units should be converted into the unit system most useful to the watershed restoration sponsor or landowner, which is generally the imperial system.
- Assessment teams and watershed restoration sponsors should focus on getting broad, comparative information at the start of assessments to prioritize projects. As the watershed restoration continues, watershed restoration partners will further refine the models to determine exact engineering criteria.
    - One particularly critical result for DSR generation is a flood inundation map.
    - It is recommended that modeling products (like the flood inundation map) be made available to field crews for live display for on-site discussion of potential post-fire impacts with Landowners. Visualizations of these datasets is a powerful tool.
    - Consider using a similar approach used in CPF and ETF for accumulating various modeling results into one watershed hazard and prioritization for the whole burn perimeter.
- Monitor the development and implementation of the CWCB's Wildfire-Ready Watersheds Initiative and advocate for specific additions when appropriate, in order to create a program that prepares local agencies (of any capacity) for the eventual wildfire.
    - This initiative is creating a framework for local communities and stakeholders to refine existing susceptibility evaluations to determine pre- and post-fire mitigation strategies.
- Monitor the development and implementation of coBAER and advocate for the use of post-fire BMPs when appropriate.
    - Advocate for coBAER to be a resource to help watershed restoration sponsors manage data and choose the best models for their watershed evaluations.
- Monitor the development and implementation of the CSU Water Center's WAVE program and advocate for the use of post-fire BMPs when appropriate.
    - Ensure that WAVE and coBAER are not overlapping each other and creating unnecessary redundancy.
- In the later stages of post-fire modeling, it may be beneficial to use continuous SBS values rather than categorical SBS, and consider non-Newtonian flow when sediment bulking factors get high (i.e., when there is a high percentage of sediment and debris in the water column).

4.0 Conclusions and Next STEPS

Wildfire dramatically changes a watershed and requires significant work from numerous local, state and federal agencies in order to protect values at risk and maintain clean water supplies. Although much work has been done to make the watershed restoration process as smooth as possible, there is always room for improvement, especially as wildfire acreage continues to grow.

This report outlines many additions and changes that can be made to the watershed restoration process. However, this document is only as effective as the implementation of the recommendations made. The WWRPI workgroup is committed to facilitating this process but acknowledges that to ensure successful

implementation, the workgroup will require support from the many local, state, and federal agencies and organizations that play a part in post-fire watershed restoration. Following the completion of this report, the workgroup will distribute it to the agencies and partners listed below and begin seeking opportunities for implementation.

4.1 Distribution List in Alphabetical Order

- BLM
- Colorado State Conservation Board
- County Governments (OEMs/MACs)
- CWCB
- DHSEM
- Federal Legislators
- Flood Technical Assistance Program
- NPS
- NRCS
- State Legislators
- USFS
- Water Conservancy Districts
- Water Utilities

5.0 APPENDICES

5.1 Workgroup Participants

Participant	Agency	Policy	Technical	Collaboration, Process, Outreach
Adam Jokerst +	City of Greeley	X		
Adam Ortega	Colorado Department of Agriculture			X
Allen Freemyer	Freemyer and Associates	X		
Allison Rhea	Colorado Forest Restoration Institute		X	
Andrea Harbin Monahan	Colorado Water Conservation Board			X
Angela Boag	Colorado Department of Natural Resources	X		
Blake Osborn	Colorado Water Center		X	X
Brad Piehl	JW Associates		X	
Brian Craig*	Northern Water	X	X	X
Carol Ekarius	Coalitions and Collaboratives, Inc.		X	
Carrie Adair	Arkansas River Watershed Collaborative		X	
Chris Sturm	Colorado Water Conservation Board	X	X	X
Christine Arbogast	Colorado Water Congress	X		
Christopher Hudak	Colorado Division of Homeland Security & Emergency Management	X	X	X
Clint Evans	Natural Resources Conservation Service	X		
Daniel Bowker	Coalition for the Poudre River Watershed			X
Edward Moyer	Grand County	X		
Eric Schroder	US Forest Service		X	X
Esther Vincent*	Northern Water	X		X
Francis Fitzgerald	Colorado School of Mines		X	
Gerald Blackler	Enginuity Engineering Solutions		X	
Jackie Daoust+	Northern Water			X
James Raymond	Colorado Division of Homeland Security & Emergency Management	X		
Jamie Kostelnik	U.S. Geological Survey		X	
Jeff Sickles	Enginuity Engineering Solutions		X	
Jennifer Petrzelka+	City of Greeley			X
Jill Oropeza	Fort Collins Utilities		X	
Joel Humphries	Bureau of Land Management	X		
John Ring	Bureau of Land Management	X		
Jordan Sanchez	Brandeberry-McKenna Public Affairs	X		
Julie McKenna	Brandeberry-McKenna Public Affairs	X		
Karen Berry	Colorado School of Mines		X	
Katherine Morris	Grand County			X
Katlin Miller*	Middle Park Conservation District			X
Kelly Romero-Heaney	Colorado Department of Natural Resources	X		

Participant	Agency	Policy	Technical	Collaboration, Process, Outreach
Kimberly Tekavec*	Northern Water	X	X	X
Koren Nydick	National Park Service	X	X	
Liz Schnackenberg	U.S. Forest Service		X	
Lori Hodges	Larimer County	X		
Monte Williams	U.S. Forest Service	X		
Morgan Lynch	Mile High Flood District		X	
Peggy Montaño	Trout Law	X		X
Rachel Stevenson	Colorado Division of Homeland Security & Emergency Management		X	
Robert Skorkowsky	US Forest Service			X
Sally Boccella	Senator Hickenlooper	X	X	X
Sean Chambers*	City of Greeley	X		X
Shayle Sabo	Larimer County			X
Shayna Jones	Coalition for the Poudre River Watershed			X
Todd Boldt*	Natural Resources Conservation Service		X	X
Tom Bates	US Forest Service			X
Zachary Wehr	Colorado State Forest Service			X
Zane Kessler	Colorado River District	X		

**Focus Group Leads*

[+] *No longer with organization*

5.2 Contact Information for Focus Group Leads

Policy Focus Group

- Esther Vincent: evincent@northernwater.org, 970-622-2356
- Sean Chambers: sean.chambers@greeleygov.com, 970-350-9815

Collaboration, Process and Landowner Outreach Focus Group

- Kimberly Tekavec: ktekavec@northernwater.org, 970-622-2211
- Katlin Miller: middleparkcd@gmail.com, 970-531-0127

Technical Focus Group

- Brian Craig: bcraig@northernwater.org, 970-622-2223
- Todd Boldt: todd.boldt@usda.gov, 970-215-9897

5.3 Existing Guidebooks

In no specific order, here is a non-comprehensive list of existing websites or guidebooks for fire watershed restoration in Colorado or around the West.

- Colorado Silver Jackets Post-Wildfire Guide
- USFS After Fire: Landscape toolkit for the Southwest
- CSU Extension After the Disaster Guidebook
- Division of Fire Prevention & Control Wildfire Preparedness Plans
- Colorado Resiliency Office, Dept. of Local Affairs
- Colorado Post-Fire Playbook
- After The Flames Website

5.4 Datasets Relevant to Post-Fire Watershed Restoration

Dataset	Agency	Existing or Created	Relevant Decision
Baseline Water Quality	Water Conservancy Districts, County, Municipal	Existing	How water quality is changing and what that means for overall watershed restoration planning (i.e. how much work to do, whether to look at trucking in water)
Commercial, Residential, Public Properties	USGS protected areas or CoMap overlay with structures dataset	Created	Identify Values At Risk
Cultural Resources	Historic structures can be found through National Park Service	Existing	Assist with permitting process during watershed restoration, identify values at risk
Debris Flow Potential	USGS to predict based on fire behavior or CGS to map historic debris flows	Created	Where to place projects, who to evacuate
Endangered Species	Colorado Parks and Wildfire for certain species	Existing	Identify Values At Risk
Flood Inundation maps	CWCB	Created	Where to place projects, who to evacuate
Hillslope Erosion	CFRI	Created	Sediment bulking for flood risk, reservoir storage, water quality
Peak Flows	USFS/NPS/BLM	Created	Flood risk
Recreation Infrastructure	USFS, BLM, State, County, COTREX	Existing	Project Evaluation
Risk Assessment & Analysis		Created	ID VAR's by pour point & Sub-watershed
Roads and other Transportation Infrastructure	County, CDOT, USFS	Existing	Flood and Debris Mitigation, Evacuation
Secondary Geologic Hazards	Colorado Geological Survey	Existing	Debris Flow

Dataset	Agency	Existing or Created	Relevant Decision
Slope and Aspect	USGS/Landfire	Existing	Model Input
Soil Burn Severity	USFS/NPS/BLM	Created	Model Input
Soil Type/Erodibility	NRCS SSURGO or STATSGO	Existing	Model Input
SSURGO Soils Data	NRCS SSURGO or STATSGO	Existing	Soil types, erodibility, Surface rock fraction, Hydrologic Soil Group
Utilities: gas and power lines, water lines, reservoirs	Municipal, County, Water District, HIFLD (homeland infrastructure foundation-level data), CDPHE, USGS NHD	Existing	Emergency Preparedness, Values At Risk
Values at Risk	A composite of the above layers, created by the watershed restoration managers	Created	How to prioritize projects