Planning for Recovery from Wildland Fire

May 2021

COLORADO
Division of Homeland Security
& Emergency Management
Department of Public Safety

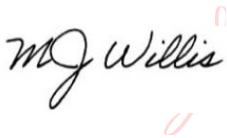
Intentionally Blank

TABLE OF CONTENTS

DIRECTOR'S MESSAGE

In the last 20 years, wildland fires in Colorado have increased in frequency and severity. This has resulted in lengthy and costly community and natural resource recoveries. As our communities continue to grow into the Wildland Urban Interface (WUI), more residents are subject to post-fire impacts such as flooding, debris flows, and other natural hazards exacerbated by fire. While recovery from a wildland fire begins and ends locally, there are many state, federal, and non-governmental partners available to draw upon for support. It is critical that impacted communities begin planning and implementing measures to limit the impacts from large wildland fires at the onset of the fire to limit impacts on residents, businesses, and the natural environment. Until communities reestablish forest or grasslands vegetation, flooding, soil erosion, and debris flows will continue to be threats.

This guide provides suggested actions that communities use to create a recovery organization, determine needs, develop a recovery plan, and implement mitigation measures for recovery. The guide stresses the importance of creating partnerships with local, state, federal, and non-governmental organizations to ensure the needs of impacted communities are met.



Digitally signed by Michael J Willis
DN: cn=Michael J Willis, o=OEM, ou=DHSEM, email=mike.willis@state.co.us, c=US
Date: 2021.06.14 11:33:57 -06'00'

M.J. Willis
Director
Colorado Office of Emergency Management

INTRODUCTION

1. A wildfire can have widespread impacts to Colorado's communities, including:
   1.1. Loss of life and property
   1.2. Interruption of services
   1.3. Environmental damage to wildlife habitats and watersheds
   1.4. Damage to the economic wellbeing of residents and businesses
2. The financial and environmental impacts to communities during a prolonged recovery can be significant.
3. With the unprecedented number and size of wildland fires across the nation in 2020, it is important to identify and prioritize recovery tasks necessary to stabilize and restore both the Colorado communities and the natural environment. This guide provides an overview of actions a community should consider during the recovery from wildland fires.

PURPOSE AND SCOPE

Purpose

1. The following guide is a listing of practical steps and actions to consider to assess, plan, mitigate, and recover from threats to the natural and built environment resulting from wildland fires.
2. This guide is intended for tribal, local, and state government; elected officials; their staffs; and others agencies that may have a role in preparing for, and recovering from a wildland fire.

Scope

1. This document is to provide a guide for local, tribal, and state agencies involved with the recovery from wildland fires. This guide is broken into three parts:
   1.1. Pre-Fire Preparedness and Mitigation.
   1.2. First 30 Days. Establish an organization to rapidly identify threats and needs and develop a plan with a list of tasks to implement in the first 30 days from the onset of a fire.
   1.3. Beyond 30 Days. Identify and addresses long-term recovery needs beyond 30 days from the onset of a fire. These recovery and mitigation tasks may take many years to complete.

PREPAREDNESS AND FIRE MITIGATION

Preparedness

1. As with recovering from any disaster, it is critical to have an internal recovery organization develop recovery plans and partnerships to aid in recovery from wildland fires.
2. Develop and exercise a community disaster recovery plan that defines the positions and roles of staff assigned to implement recovery from a wildland fire. The Colorado Division of Homeland Security and Emergency Management (DHSEM) can assist in the development of community recovery plans.

3. Develop Community Wildfire Protections Plan(s) (CWPPs) to identify risks and measures to implement to mitigate wildland fires.
4. It is critical that communities utilize "Whole Community" planning processes when developing the previously mentioned plans. "Whole Community" preparedness not only represents the community, but also involves the community in preparedness activities, and engages the full capacity of the private and non-profit sectors in conjunction with governmental partners. This includes businesses, faith-based and advocacy organizations, and the general public.
    - **4.1.** A critical component of "Whole Community" is the inclusion of community members with Access and Functional Needs (AFN) and disabilities in the planning for recovery from a disaster. Wildland fires may occur with little or no warning, thereby requiring life-sustaining services to be provided quickly to prevent additional suffering and loss of life. This includes individuals who are from diverse cultures, races, and nations of origin; individuals who do not read, have limited English proficiency, or are non-English speaking; people who have physical, sensory, behavioral, mental, intellectual, developmental and cognitive disabilities; senior individuals with or without disabilities or other AFN; children with or without disabilities and their parents and/or guardians; individuals who are economically disadvantaged or lack transportations; woman who are pregnant; individuals who have chronic medical conditions; and those with pharmacological dependency.
    - **4.2.** Utilize the Division of Homeland Security and Emergency Management's AFN Coordinator, who will work with communities in developing Whole Community AFN strategies.

Fire Mitigation

1. When limited to a low intensity burn, fire is a natural process and means for the biological environment to renew forests and grasslands. The problem is when naturally occurring low burn fires are suppressed over many years allowing for the development of unhealthy forests with dangerous amounts of biomass fuel.
2. Embracing the concept that it's not *if* an area will burn but *when and at what intensity* forest or grass lands will burn will help determine appropriate mitigation measures. Wildland fire mitigation measures may help to reduce the threat of intense and severe fires. These mitigation measures can take place before, during or after wildland fire has occurred.
3. Creating fire-adapted forests that are protected from catastrophic severe fires will require the removal of biomass fuel. This can be done in a number of ways:
    - 3.1. Review existing mitigations plans that may include state and local Hazard Mitigation Plans that may provide guidance on mitigation measures.
    - 3.2. Develop a CWPP or similar pre-fire plans where they do not exist.
    - 3.3. Determine the amount of fuel loading that exist in the forest and what the ideal amount of biomass, the number, size and spacing of trees and other vegetation to maintain a healthy forest to limit the fire burn severity.
    - 3.4. Low-intensity fires leave grasses and forbs roots intact to hold soil in place and will rapidly regenerate new plant growth.
    - 3.5. Landscape scale treatments may involve mechanically thinning the forest by cutting and removing timber and some understory vegetation, the controlled burning of undesirable vegetation, or a combination of both.

3.6. Keep fires on the ground by removal of excessive fuels from the forest floor and ladder fuels, and thin the number of trees to provide adequate tree spacing that will prevent the development of a crown fire.
3.7. Create firebreaks near critical infrastructure facilities and areas of human settlement. Firebreaks can provide access to manage a forest fire.
3.8. Create open areas to establish a forest matrix of forested and cleared areas that will break up potential crown fires and provide wildlife habitat.

4. Increase wildfire awareness through public education, engaging the community in personal responsibility to create fire-resilient landscapes. Encourage residents and business owners to create Home and Business Ignition Safety Zones around structures.
5. Planning for establishing a healthy forest must be done on a landscape scale as small treated areas will be overwhelmed by large fires. Landscape scale treatments may cover many acres or square miles of land.
6. Encourage all residents and businesses in flood prone areas to have flood insurance.
7. Encourage residents and businesses to provide defensible space treatments that are localized measures taken to lessen the risk of damage from fires to developed lands that may consist of homes, businesses, agricultural facilities, critical infrastructure and entire neighborhood.
   7.1. Defensible space treatments typically consist of creating a 30 to 100-foot zone around structures that will have limited fuels to reduce potential exposure to flames and radiant heat.
   7.2. Defensible space treatment may be limited to a single structure or encompass an entire neighborhood
8. Take advantage of all FEMA and other mitigation planning grants.
9. There are federal, state and non-profit organizations providing for the planning and implementation of landscape scale treatments and defensible space treatments.

FIRST 30 DAYS

1. There are three main tasks that should be considered in the first 30 days of the onset of a fire event. These tasks are:
   1.1. Create a recovery organization
   1.2. Determine needs
   1.3. Develop a plan

Create a Recovery Organization

Identify a Fire Recovery Manager for Each Disaster Event.

1. To provide fire recovery management coordination, communications, and unity of effort among local, state, and federal agencies, the impacted local government taking the lead on fire recovery should establish a single point of contact (POC) for each fire event.
   1.1. The Fire Recovery Manager is typically appointed by elected officials of the jurisdictions(s) impacted by the fire and may be from local municipal or county staff such as from Office of Emergency Operations (OEM), Administration Office, Department of Public Works, local conservation district, or other entity. An appointment resolution or other documentation should state what the manager's responsibilities and the authority to carry out the work.
   1.2. This person will be responsible for providing fire recovery management coordination, communications, and unity of effort among local, state, and federal agencies for fire impacted local government(s).

1.3. The Fire Recovery Manager should have the authority to commit resources, procure materials, services, and make decisions on behalf of the jurisdiction.

Establish a Local Recovery Group.

1. A Local Recovery Group (LRG) should be established for each fire event for information sharing, planning, and implementation of short term and immediate needed recovery tasks.
2. The LRG lead is typically appointed by the Fire Recovery Manager or local elected officials.
3. The LRG would be created by the local government with the adoption of an enabling resolution that would outline tasks, responsibilities, name group members, identify an LRG lead, and set forth the subcommittee structure. The LRG will require funding, establishment of a fiscal agent, and process for approving budgets.
4. Typically, this group would initially meet on a daily or weekly basis.
5. This group may consist of:
   - 5.1. Elected officials
   - 5.2. Municipal and county staff
   - 5.3. Utility providers
   - 5.4. Watershed organizations
   - 5.5. Local civic organizations
   - 5.6. Local public health agency
   - 5.7. Volunteer aid organizations
   - 5.8. Special districts, such as: water and sanitation, weed control, soil conservation, watershed, and fire and medical districts
   - 5.9. Other agencies and organizations, as required
6. The LRG should be formed early by the Fire Recovery Manager, shortly after the advent of a fire.
7. LRGs tend to gain better local buy-in when some grassroots led recovery groups are included.

Establish a Long-Term Recovery Group.

1. As recovery from a large wildland fire will take a number of years, a Long-Term Recovery Group (LTRG) should be established. Duties of the LTRG may include:
   - 1.1. Long term restoration planning
   - 1.2. Reviewing on-going risks
   - 1.3. Researching and applying for funding opportunities
   - 1.4. Managing natural resources and infrastructure recovery grants
   - 1.5. Overseeing case management to affected homeowners
   - 1.6. Managing volunteer projects and coordination
   - 1.7. Developing strategies to limit soil erosion
   - 1.8. Developing plans for the transport of sediment and debris
   - 1.9. Other responsibilities as needed
2. An LTRG is typically formed shortly after the fire and would meet monthly for several years post-fire. It is expected that the LRG would phase out as immediate recovery needs are completed, or would transition to become part of the LTRG. Like LRGs a LTRG will gain better local buy-in when some grassroots led recovery groups are included.
3. On smaller fires, it is common to have one group responsible to serve both LRG and LTRG functions.
4. In addition to local and county governments, the LTRG may include representatives from:
   - 4.1. Natural Resource Conservation Service (NRCS)

4.2. U.S. Forest Service (USFS)
4.3. Bureau of Indian Affairs (BIA)
4.4. Bureau of Land Management (BLM)
4.5. Colorado Department of Public Health and Environment (CDPHE)
4.6. Colorado Division of Homeland Security and Emergency Management (DHSEM)
4.7. Colorado Department of Local Affairs (DOLA)
4.8. Local conservation districts
4.9. Individuals or organizations with expertise in economic development, housing, soil stabilization, water quality, and other disciplines

Develop Critical Contact List

1. Create and widely distribute a contact list of critical local, state, and federal agency staff that will play lead or supporting roles in post-fire recovery efforts.
2. The contact list should include name, position, agency, email, phone, and radio contact information.

Create a Public Information Strategy

1. The public will need updates on the progress of recovery work to be safe, in addition to developing community buy-in with the overall recovery plans and tasks.
2. The Recovery Manager, local Emergency Manager, or the LRG responsible for local recovery, needs to establish an information dissemination program that residents can rely on to be kept informed through regular updates, to have a forum to ask questions, and to provide input.
3. One technique to facilitate community communication is to set up a bulletin board where displaced residents may leave messages to friends and family of how to contact them and where they have relocated.
4. Methods to reach the public may include:
   4.1. Regularly scheduled public meetings
   4.2. Bulletin boards and flyers
   4.3. Local TV and radio broadcasts
   4.4. Social media platforms
   4.5. Variable message signs to provide safety information or meeting announcements
5. Consider creating a call center for residents to get answers to their questions.

Organize Volunteers and Donations

1. A VOAD is a coalition of volunteer and nonprofit organizations that respond to disasters. They can aid in meeting many of the needs of displaced residents. Local governments have some legal limitations on their ability to assist individuals and work on private property, while VOADs may not. There are also instances where residents may be more comfortable working with a VOAD non-profit rather than a government agency. VOADs can aid in managing both volunteers and donations (funds and materials).
2. Volunteers can serve recovery in many roles.
   2.1. Restoration of burned lands and community recovery can be very labor intensive and expensive to be provided by contracted labor. Volunteers may be able to rapidly deploy.
   2.2. Volunteers can do routine work, allowing technical and management staff to focus on critical tasks.
   2.3. Volunteers who are credentialed in specific disciplines (e.g., engineers, tradesman, and others), particularly when paired with VOADs trained to provide professional

services, can offer critical expertise in areas where local capacity may be overwhelmed or absent.

2.4. Volunteer opportunities allow for residents to have a meaningful way to contribute to the recovery of their community.

2.5. Volunteer contributions can save limited recovery funds. Most fire recovery and restoration grants will credit the value of volunteer time as an in-kind contribution toward meeting required matching funding requirements. For example, Douglas County, CO, had all required grant matching funding for the 2002 Hayman fire covered by volunteer hours, worth approximately $500,000.

2.6. As soon as recovery and restoration work tasks are defined, the LTRG should determine which tasks are suitable for volunteers to complete and assign VOAD organizations to lead those projects.

2.7. The Fire Recover Manager will need to appoint or hire a Volunteer Manager to recruit and manage volunteers as well as coordinate with VOADs who provide volunteer labor. This person will be responsible for scheduling volunteer projects, coordinating delivery of tools and supplies, conducting safety training, tracking volunteer hours, providing meals and first aid kits, collecting liability waivers, and other tasks. It is possible to hire a person directly or hire a local non-profit organization to manage volunteers.

2.8. Do not allow people to self-deploy to disaster areas. Trusted organizations operating in the affected area know where volunteers are needed and can ensure appropriate volunteer safety, training, and housing.

3. Donations

3.1. A person or organization should be designated as a Donation Manager to manage donated materials and funds.

3.2. The Donations Manager is typically appointed by the Fire Recovery Manager. In some cases, the donations manager may be the same as the Volunteer Manager. For large disaster events it may be useful to hire a non-profit organization, such as the Adventist Community Services Disaster Response, that has a lot of experience in donations management.

3.3. Access to financial resources is very helpful in the early stages of a disaster. Consider encouraging potential donors to contribute cash and gift certificates rather than materials.

3.4. Develop a list of needed materials and services, specifying the type and quantities of the items needed, and widely distribute the list to potential donors.

3.5. Establish a disaster-specific bank account for cash donations separate from all other recovery funding.

Establish a Disaster Recovery Center (DRC) and Disaster Assistance Center (DAC)

1. Residents and businesses affected by a wildland fire will have many questions and concerns that must be answered. Tribal and local jurisdictions will typically begin by setting up a call center for residents to get answers to their questions. As recovery progresses, the questions will become more complex and will require subject-matter experts from a wide range of governmental and non-governmental entities. The DRC and DAC are fixed, one-stop locations for community members to meet with agencies and organizations to obtain information and assistance.
2. A DRC typically addresses long-term recovery issues related to insurance, land rehabilitation, debris removal, increased flood after fire risks, and administrative support for accessing FEMA Public Assistance (PA), Small Business Administration (SBA) loans, long-term housing options, re-entry information, and damage assessments.

3. A DAC typically addresses immediate needs such as emergency sheltering, short-term housing, emergency personal grants, food, clothing, toiletries, and behavioral health services.
4. It is common to have one center dedicated to perform the functions of both a DRC and DAC.
5. At the request of a local jurisdiction, the Colorado Division of Local Government (DLG) can be tasked with locating, establishing, and managing DRC and DAC facilities when a federal declaration has not been declared, per the State Emergency Operations Plan. In coordination with the impacted local governments, this effort is typically coordinated by the DOLA Field Representative with support from the DHSEM OEM Regional Field Managers from the impacted areas. Where a federal declaration has been declared, FEMA will likely manage the DRC, although DOLA may co-locate the DAC if appropriate.
6. The following are some potential agencies and organizations that may be part of either a DAC or DRC:
    6.1. DOLA
    6.2. Utility Agencies
    6.3. Colorado Division of Insurance and insurance companies
    6.4. OEM
    6.5. Local housing department or authority
    6.6. Colorado Department of Agriculture
    6.7. Colorado Department of Public Health and Environment (CDPHE) and local public health agencies
    6.8. Local and state behavioral health professionals
    6.9. Colorado Department of Human Services (DHS) and local human services agencies

Establish Administrative Functions.

1. It is important to establish administrative functions at the onset of a fire to capture all information necessary to be reimbursed for personnel and material supply costs, procure necessary materials, and provide for personnel administrative needs.
2. For small recovery efforts, the same person may serve many functions. Larger recovery efforts may require a number of staffs to fill these roles. These positions may be filled by using existing local government staff. For example, a fire recovery officer may use an existing county purchasing office to provide for procurement and the finance office to track expenditures.
3. These positions typically serve on the LRG.
4. The following positions should be created:
    4.1. Grants Management Officer - oversee and manage grants.
    4.2. Procurement Officer - assure that purchases of goods and services meet local, state, and federal requirements. Good procurement procedures will assure the goods and services requested meet fulfill required needs and the items were purchased at a competitive price.
    4.3. Records Management Officer - maintain complete records of meeting minutes, financial records, time sheets, equipment records, and other items for cost recovery and planning.
    4.4. Fiscal Officer – Assist in the preparation and maintains recovery budgets, reconciling daily, monthly and yearly financial transaction, balance sheets, process invoices, and submission of payment requests to participants pursuant to enabling resolutions and/or agreements. The Grants, Procurement, and Records Management Officers' are typically charged with submitting documentation for processing to the Fiscal Officer.

Request Jail and Prison Offender Trustees

1. Jail and prison trustees are offenders who have earned the privilege to work outside of their jails and prisons and may be available to support recovery tasks.
2. Trustee participation is subject to approval by local law enforcement and local elected officials.
3. Each county has its own rules and possible costs to utilize trustees. Many counties will supply trustees at no cost.
4. The Colorado Department of Corrections (CDOC) has crews of trained forest technicians that are qualified to do contour tree felling, constructing erosion control barriers, and other tasks through CDOC Juniper Valley Industries. CDOC charges on an hourly basis for use of prison trustees.
5. In many situations, trustees receive a one-day off reduction of sentences for each day of community service work.

Appoint a Safety Officer and Create a Safety Plan.

1. Appoint a safety officer to assess hazards and ensure the safety of incident personnel.
2. Create a safety plan to include:
   - 2.1. Medical contact information for hospitals
   - 2.2. On-site medical facilities
   - 2.3. Off-site medical facilities
   - 2.4. Location of first aid supplies
   - 2.5. Landing zones for medical helicopters
   - 2.6. Availability of medical transport
3. The safety plan should be updated each day to reflect changes in personnel, availability of facilities and resources, inclement weather, availability of air and ground services, and evacuation services.

Maintain Awareness of Disaster Declarations, Emergency Waivers, Nuisance Ordinances, and Insurance

Disaster Declarations

- 1.1. If warranted and, if local resources are exceeded, it is advisable for local governments to enact a Local Disaster Declaration (LDD). This allows the activation of the Local Emergency Operations Plan. Once the plan is activated, jurisdictions may:
  - 1.1.1. Access policies and procedures that are not available for normal status operations.
  - 1.1.2. Activate codes and ordinances. For example, an emergency ordinance may permit aerial application of seed on private property or allow for the removal of abandoned vehicles or debris on properties where it was not possible to coordinate with the property owners in a timely manner.
  - 1.1.3. Activate the local Emergency Operations Center to support incident command.
  - 1.1.4. Provide a mechanism for financial and technical support from state and federal agencies, which require an LDD. For example, an LDD is required before the state will approve Disaster Relief Fund (DRF) or Disaster Emergency Fund (DEF) grant funding.
- 1.2. Any declaration created by the local Office of Emergency Management (OEM) should be written in partnership with the fire-impacted county, municipal, and tribal governments to ensure a comprehensive and coordinated effort.

1.3. Ideally, local governments should have disaster declaration documents ready before a disaster and reviewed by a municipal or county attorney and available to be executed prior to the onset of any disaster. State OEM has examples of enabling local legislation and disaster declarations.

2. Emergency waivers
   2.1. Emergency Waivers provide a way to eliminate fines and fees that could create additional hardship on community members already suffering from the effects of the disaster. Without such waivers in place, FEMA will expect local jurisdictions to follow local policy and regulations.
3. Nuisance Ordinances
   3.1. Local government nuisance ordinances provide a strong legal basis to enter private property to remove hazardous debris, destroyed buildings, or abandoned vehicles when the owner cannot be located or refuses to cooperate.
   3.2. Forested areas of Colorado often contain absentee, seasonal occupied second ownership homes, making it difficult to locate owners. It is important to document that a sincere effort has been made to contact property owners in case a legal challenge is made at a later date.
4. Insurance
   4.1. Proof of insurance will be required to ensure the homeowner is not collecting monies from both an insurance company and through a government grant. This is known as duplication of benefits.
   4.2. Removal of debris from homes destroyed by a fire is typically covered by insurance if the owner is insured. State and federal grants will disallow reimbursement for removal of debris if insurance payments were made to cover the cost.

Determine Needs

Conduct Rapid Review of Hazards, Threats, and Consequences

1. Start a rapid assessment process and delineate tasks to identify hazards, threats, and consequences to residents, businesses, communities, and the natural environment.
2. Begin by identifying hazards that pose the greatest risk to the public from flooding, debris flows, landslides, and ignition of unburned forest and grasslands.
3. Consider secondary threats and the likelihood and potential magnitude of the loss of:
   3.1. Utilities including water, wastewater, natural gas, and electrical service
   3.2. Roads
   3.3. Agricultural lands
   3.4. Natural resources (timber, fish habitat, lakes, and streams)
   3.5. Source water supplies
   3.6. Cultural, historic, archeological, and unique natural heritage sites
4. This would likely take the form of a rapid needs assessment, including mapping out critical infrastructure within the jurisdiction overlaid with the hazard impact areas.
5. Develop a checklist of critical infrastructure necessary for residents to return to their homes and businesses.
6. Assess environmental health hazards including:
   6.1. Water and air quality
   6.2. Heavy smoke
   6.3. Hazardous material releases
   6.4. Contamination of drinking water

6.5. Availability of wastewater treatment
6.6. Other environmental health hazards that need to be mitigated so residents can return to affected areas

7. It may be possible for residents to return home utilizing bottled water or trucked-in water, but not if wastewater collection and treatment is not available.
8. Identify and assess homes and business structures to determine if they are safe to inhabit. Identify personnel and resources necessary to inspect the safety of structures.
9. Identify and assess the status of agricultural lands and facilities.
10. Identify and assess threats from geological hazards, including debris in streams, unstable slopes that may result in landslides, and enhanced flooding from burn scars.
11. Identify potential sources of hazardous materials from damaged or destroyed homes and businesses.
12. Review county 1041 regulations regarding natural hazards mapping, CWPPs, and other local plans that will be on file with the municipal and county government.
13. Create a prioritized list of mitigation action items, informed by an understanding of potential threats and considering the consequences to residents, homes, businesses, and agricultural lands.
14. On USFS lands, work with the Burned Area Emergency Response (BAER) Team as soon as it is assigned to the fire(s). Request a BAER report and burn severity map.
15. On BLM lands, work with the Emergency Stabilization and Rehabilitation (ESR) Team as soon as it is assigned to the fire(s). Request an ESR report and burn severity map.
16. BAER and ESR teams will likely be assembled from outside of Colorado, so assume they will not know of local critical infrastructure, roads, utilities, source water supplies, agricultural lands, and natural resources.
17. The Colorado Water Conservation Board (CWCB) is a great resource to augment assessments of flooding, debris, and soil, transport.

Request Federal Assistance with Assessments

1. Regardless of the ownership of impacted lands, USFS, NRCS, BLM, and BIA may play a supportive role in post-fire assessments and recovery efforts. The local Fire Recovery Manager should reach out to these entities to request information on burned area conditions and possible post-fire assessments that may impact lands outside of federal ownership.
2. While federal agencies are primarily restricted to work on federal lands, they are responsible for impacts to offsite lands and facilities resulting from fires on federal lands.

Request Landowner Permission to Enter/Perform Emergency and Restoration Work

1. The Fire Recovery Manager should work to acquire private landowner permission to:
   1.1. Perform damage and hazard risk assessments on private property
   1.2. Perform post-fire land rehabilitation
   1.3. Determine if items such as destroyed vehicles, structures, and debris are covered by insurance. If so, the insurance company will handle removal. If not, the Fire Recovery Manager should coordinate removal
2. State OEM staff can provide sample Right-of-Entry forms.

Conduct Debris Management

1. Debris removal, processing, and disposal is often the largest single expense to restore lands to a stable condition. Until debris is removed, it is difficult to have safe access to

fire impacted areas and begin land restoration. Additionally, remaining debris does not allow residents to feel that their community is returning to a state of normalcy.

2. CDPHE has the ability to waive certain landfill requirements for debris.
3. Working with local and CDOT highway maintenance staff, determine the type, volume, and likely locations of storm generated debris along highways.
4. Create a strategy for the removal, processing, and disposal of debris. Debris from fires may include forest wood material, soil, gravel, large rocks, burned structures, and vehicles.
5. Determine who will be responsible for removing and transporting debris material.
6. Establish debris management sites to sort, collect for transport, separate items for recycling, and determine final disposal locations.
7. Consult with the local health department to determine the presence of hazardous materials in burned structures and how to handle and dispose of these materials
   7.1. Materials with asbestos is a special hazardous waste that must be handled consisted with CDPHE regulations. Asbestos containing materials are common in older homes where certain types of floor tiles, siding, and insulation products were used. Asbestos must be separated, transported and disposed of in a manner to protect demolition and cleanup workers.
8. If human remains are suspected within debris, contact the county sheriff's office who will arrange for a cadaver search team.

Initiate Efforts to Procure Funding for Post-Fire Recovery

1. Post-fire recovery is costly and will likely require funding from several sources to meet needs. Fire impacted communities should work with their LRG and LTRG to determine which potential funding sources are available to meet recovery needs.
2. The following is a partial list of potential sources of funding. Do not overlook potential contributions from counties, municipal governments, and non-profit organizations as well.

Table 1: Post-Fire Recovery Funding

Funding Mechanism	Funding sources	Deadlines	Available funds	Matching funds
Emergency Watershed Protection	USDA-NRCS	Within 60 days of fire	Project Specific	25% cash or in-kind
Colorado Water supply reserve fund	CWCB	November each year	$400,000	25% match in-kind or cash
Colorado Severance Tax operational **fund**	CWCB	January	Negotiable	Negotiable
Colorado Healthy Rivers Fund	Colorado Watershed Assembly	November	$20,000	20% in-kind or cash
Post Fire Management Assistance	FEMA	If a state or tribal disaster is declared	Variable depending on HMP $550,000	Negotiable
Community Development Block Grant-DR	DOLA-HUD	Emergency or Major Disaster Declaration	Negotiable	Negotiable
Emergency Community Water Assistance	USDA-Rural Development Office	Year Around	$500,000	Negotiable

FEMA Public Assistance	FEMA	Emergency or Major Disaster Declaration	Negotiable	25% match in-kind or cash
Colorado Watershed Restoration	CWCB	November	$400,000 statewide	50% match in-kind or cash

Table 1: Adopted and modified from Colorado Fire-Playbook-Appendix B-Key Sources of Funding.

3. There are two important USDA sources of funding for fire recovery on private lands. As soon as possible, a request should be made to the USDA NRCS for Emergency Watershed Protection (EWP) and Farm Service Agency (FSA) program funding. These programs have a very short time frame by which a request for assistance may be made, usually within 30 days of the beginning of the disaster event.
   3.1. USDA Natural Resource Conservation Service Programs:
      3.1.1. Environmental Quality Incentives Program (EQUIP): This program is not specific to disasters, but is very useful since it can address any number of natural resource concerns, including: immediate soil erosion protection, minimizing noxious and invasive plant proliferation, protecting water quality, restoring livestock infrastructure for grazing management, emergency animal mortality management, etc.
      3.1.2. Emergency Watershed Protection (EWP) program: EWP can help communities restore damaged and destroyed infrastructure, remove debris, stabilize hillsides and stream banks, and fix water control structures. This grant is the primary source of funding for fire restoration on private lands.
      3.1.3. The process to receive NRCS funding requires a local government to contact the local NRCS District Conservationist to begin the grant request. NRCS will complete a Damage Survey Report (DSR) to determine what work is eligible for funding and write an agreement for funding. Both EQUIP and EWP grants require a 25% cost share. Volunteer labor and donated materials may be used to meet the 25% match requirement.
   3.2. USDA Farm Services Agency Programs.
      3.2.1. The Farm Services field staff assess fire damages to rural settlements and agricultural lands. In addition to farm, ranch, and livestock lands they are particularly interested in improvements that have been destroyed, including, but not limited to: fencing, irrigation and pump equipment, homes, and agriculture equipment. The damage information will be used to justify payments under the following programs:
         3.2.1.1. Emergency Conservation Program to Producers: This is a grant program that can cover property damaged by a natural disaster which needs conservation practices to stabilize natural resources;
         3.2.1.2. Non-Insured Disaster Assistance Program: Available for crop losses when federal crop insurance is not available;
         3.2.1.3. Livestock Forage Disaster Program Payments: Provides benefits to eligible livestock producers and contract growers for losses suffered on grazing or pasture lands;
         3.2.1.4. Livestock Indemnity Program Payments: Provides benefits to livestock producers for livestock deaths in excess of normal mortality;
         3.2.1.5. Tree Assistance Program: Provides for funding to replace wind-breaks on the high plains;
         3.2.1.6. Disaster Set-Aside Program: Allows producers who have existing direct loans with FSA to postpone up to 12 months of payments if they are not able

to stay on schedule due to a disaster. These payments will be added on to the back end of the loan.

3.3. These assistance programs are available in counties, or contiguous counties, that have been designated as having disasters or emergencies by the President, Secretary of Agriculture, or FSA Administrator.

Begin Hydrologic and Hydraulic (H&H) Studies

1. Burn areas pose a potential danger to residents as well as response and recovery personnel. These areas also threaten damage to critical infrastructure and the environment as a result of enhanced stream runoff. An H&H study will aid in determining what additional stream runoff and sediment may do to bridges, culverts, roads, utilities, streams and rivers, and the environment.
2. Utilize hydraulic studies to anticipate and plan for:
   - **2.1.** Debris flows
   - **2.2.** Damaging kinetic impacts of debris to road, trails, utilities, and railroads
   - **2.3.** Dangerous erosion resulting in removal of the toe of slopes creating unstable embankments and bridge foundations
3. Utilize hydrologic studies to determine:
   - 3.1. Increases in stream and river flows
   - 3.2. Increases in floodways and flood plains
   - 3.3. Stream and river sediment scouring and disposition
4. Typically, NRCS, USFS, FEMA, and BLM will cover the cost of an H&H study as part of their grant funded programs. In some situations, the U.S. Army Corps of Engineers may complete an H&H study as part of a special designated study. The Colorado Water Conservation Board will complete an H&H study as part of a floodplain mapping study. In some instances, a local government will have to contract and pay an engineering firm to complete an H&H study.

Preposition Materials and Equipment.

1. Preposition materials to clear, reconstruct or harden roads, bridges, or utilities threatened or washed out by storm water.
2. These materials may include:
   - 2.1. Culverts
   - 2.2. Wire cable
   - 2.3. Rip rap
   - 2.4. Mortar
   - 2.5. Road base
   - 2.6. Gravel
   - 2.7. Timbers
   - 2.8. Other items needed endemic to the area
3. Preposition construction equipment within areas that maximizes access and limit the equipment from becoming inaccessible or isolated due to flooding or debris blockages.

Review Communications Capabilities

1. Communications in the Colorado Mountains can be challenging under normal conditions. Communications may be further be impaired by the loss of utilities and communication facilities.
2. Test communication capabilities to determine potential shortfalls.

3. Develop and distribute a communications plan for recovery personnel to aid in recovery coordination and provide backup plans should the primary communication system fail.
4. Determine and order communications equipment as needed, such as Cell on Wheels (COW), Cell on Light Truck (COLT), or a Site on Wheels (SOW).

Create Partnerships.

1. Recovery from fires can only be accomplished through partnerships. No one entity will likely have all of the needed resources, expertise, or funding to recovery from a major fire event.
2. In addition to federal and state agencies, there are numerous specialized local and state organizations that contribute to recovery efforts.
3. Examples of organizations that may be helpful with recovery from fires include:
    3.1. Watershed organizations that cover most of Colorado
    3.2. Soil Conservation Districts
    3.3. Environmental organizations
    3.4. Hunting and fishing organizations, such as Trout Unlimited to restore streams
    3.5. National Forest Foundation
    3.6. American Forest Foundation
    3.7. Large utility organizations such as Denver Water and Colorado Springs Utilities

Develop a Plan

Take the Time to Develop a Plan

1. After researching and identifying the recovery work that needs to be completed, it is necessary to organize this information into a plan of action. It is critical to begin the development of a plan as soon as the Fire Recovery Manager is in place.
2. The Fire Manager and LRG should establish recovery objectives and priorities, assuring that limited funds and resources are used in an efficient and effective manner. Develop a recovery plan to identify:
    2.1. Immediate threats to residents and property, to include:
        2.1.1. Natural debris
        2.1.2. Building demolition and vehicles
        2.1.3. Streambed debris
        2.1.4. Hazardous materials
    2.2. Safety and access control officer
    2.3. Public information procedures and officer
    2.4. Restoration of critical infrastructure
    2.5. Address the mission and personnel needs to establish a DAC or a DRC
    2.6. Soil stabilization and vegetation restoration
    2.7. Debris removal and contracting
    2.8. Volunteer and donation management
    2.9. Administrative functions including fiscal and grants management
3. Do not overlook existing plans. Examples of potential recovery and mitigation plans and studies that should be consulted, include:
    3.1. CWPPs. Most Colorado Forest communities have developed CWPPs that will identify high value resources and facilities threatened by fire and suggest mitigation measures.
    3.2. Regional and local Hazard Mitigation plans
    3.3. State Enhanced-State Hazard Mitigation Plan

3.4. County House Bill 1041 hazard identification and mapping
3.5. FEMA Flood Insurance Rate Mapping
3.6. Colorado Geological Survey hazard studies for the fire impacted area
3.7. U.S. Geological Survey hazard studies for the fire impacted area

BEYOND 30 DAYS

The following are items that should be considered after the more immediate recovery needs have been completed and the jurisdiction has developed its recovery plan.

Address Noxious and Invasive Weeds

1. Fire burn areas provide an excellent environment for noxious and invasive weeds. Weed seed may be dormant and viable to germinate when the soil is denuded and exposed by fire.
2. Common post fire weeds may include Mullen, with seeds that may be viable in the ground for 100 years and thistle seeds for 30 years, waiting for a fire to provide a good environment to grow. It is necessary to develop a weed management plan and provide funding for weed elimination and suppression for at least three years after a fire.
3. For assistance with the writing of weed management plans and the treatment of areas with weeds, contact NRCS district offices, Colorado State University Extension offices, local Soil Conservation Districts, and county weed management offices.

Plan for Floods and Debris Flows

1. Fires will burn away protective vegetation and create hydrophobic soils that greatly limit water's ability to infiltrate the soil, resulting in greater water volumes and runoff velocity which cause erosion and debris flows. This water runoff will likely be many times greater than what would be expected in a healthy landscape. The runoff may result in the degradation of streams, lakes, reservoirs, and drinking water sources, and the transport of forest debris.
2. Fire burn areas are classified as having been burned in a low, moderate, or high intensity manner.
   2.1. Areas within the burn that are not burned or are classified as having a low-intensity burn, can generally be ignored.
   2.2. Areas with moderate to high-intensity burn should be considered for restoration treatments.
3. The types of treatment will be predicated upon the slope, aspect, soil type, and other factors. It is important to have the USFS, BLM, or NRCS complete mapping delineating the severity of the fire burn.
4. Identified known historic landslide and debris flows.
5. Identify all critical public infrastructure, utilities, residents, and businesses that may be impacted by flooding, water quality, and debris flows.
6. Where available, review FEMA Flood Insurance Rate (FIR) mapping to determine floodplains and floodways. FIR mapping is not available for many of the mountainous areas of Colorado. It may be necessary to work with the CWCB or a consulting firm to establish a floodplain or floodway.
7. Utilize an H&H study to determine the severity and magnitude of the impacts of post fire flooding and debris transport and determine the changes in locations of floodplains and floodways or new areas that have not been mapped by FEMA.

7.1. Remove debris from stream channels to limit the potential of debris dams being created where failing would cause catastrophic flooding. The severity of the 1976 Big Thompson flood was dramatically increased due to debris creating a high wall of flood waters and debris which then traveled down the Big Thompson Canyon and destroying and displacing everything in its path.
7.2. This effort consists of cutting up and removing all large woody debris and in some cases the deposition of silt and gravel that pose a threat to downstream infrastructure.
7.3. It can be useful to place otherwise undesirable debris material such as tree root balls, logs, and/or gravel along damaged streambanks and terraces for reclamation.
7.4. Remove or cut into smaller sizes all potential large hazardous logs and debris from stream channels as soon as practical.

8. Meet with all residents at homes and businesses which may be threatened by flooding to:
   8.1. Inform residents and business owners of the increased risk of flooding, mudflows, and other hazards that can occur after a fire;
   8.2. Explain what residents should do in the event of a flood. This information should include where to assemble for rescue, where not to drive, where to receive information and why it is import not to attempt driving through flood waters;
   8.3. Provide information and resources regarding the step's residents can take to financially protect their homes and assets by purchasing food insurance under FEMA's National Flood Insurance Program (NFIP).
   8.4. Develop a plan for the rescue of residents, their pets and farm animals.
   8.5. Determine where and how residents can be extracted from their homes.
9. Where necessary, create clearings in forested areas to serve as extraction sites.
10. Ensure all resources, such as housing and transportation, are available for the whole community, including those that have access and functional needs. Have a plan and process in place for community members to request material in other languages: to access print, electronic, and in-person support if needed; to find other accommodations that may be needed; to find who to go to for support.
11. Consider providing a flood survival kit to residents that contains some necessary items, including a dedicated weather radio and flash lights. The kit will help emphasize the seriousness of a potential flood event for the residents, although it will not provide much protection from waters.

Evaluate Hazardous Standing Trees

1. Standing burned trees (snags) are a hazard to the public when located in proximity to trails, roads, and utilities. These weakened trees may fall without warning for many years post-fire.
2. Cut down all large standing trees that are dead or badly damaged within 100 feet of trails, roads, and utilities.
3. Consider removing unburned fuel along roads to prevent fire from blocking safe access and escape routes.

Establish Warning Systems

1. An early flood warning system should be established to notify public officials of intense rainfall and rising stream levels.
2. Develop a comprehensive alert and warning plan that encompasses all available and redundant systems to reach as many residents as possible. The plan should include the education of residents, annual testing of the systems, and exercises.

3. Consideration should be given to the following:
    3.1. Establish contact procedures to activate the Integrated Public Alert & Warning System (IPAWS). This FEMA local alerting system adopted by most Colorado counties provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts and radio and television via the Emergency Alert System.
    3.2. The National Weather Service (NWS) is available to monitor and provide early flood warnings for flood prone fire burn areas. A meeting should be held with the NWS Warning Coordinator Manager for the impacted areas.
    3.3. For large fires, request the USFS, BLM or National Weather Service to set up portable temporarily weather station(s) that have the capability to monitor rainfall and transmit rainfall data in real time.
    3.4. Seek to install rain gauges that will provide continuous real time information on rainfall until vegetation has been reestablished in fire burn areas. There are a number of options regarding transmitting, receiving, and processing data. If line-of-sight radio transmission is not possible, it is possible to transmit data via satellite connection. Cost is approximately $7,000 per unit not including installations costs.
    3.5. Review existing U.S. Geological Survey (USGS) and Colorado Department of Transportation stream gauges to determine gaps in coverage to place additional gauges.
    3.6. Stream gauges should transmit data in at least 10-minute increments to allow adequate warning to the public.
    3.7. CDOT or local public works departments should place available standard highway signs that read “In Case of Flooding, Climb to Safety” in areas with the potential of flooding.
        3.7.1. These signs were recommended as a result of many lives lost in the 1976 Big Thompson flood when residents attempted to drive out of the Big Thompson Canyon were caught in rising flood waters when they should have abandoned their vehicles and climbed to safety.
        3.7.2. Variable message signs stating in the event of flooding, climb to safety and not attempt to drive through flood waters.

Restore Private Driveways and Roads

1. Often, homes and businesses are not directly impacted by flooding from fire burn scars, but lose the ability to access the property due to washed out roads and bridges.
2. A decision will need to be made by the state or local governments whether to fund the reestablishment of washed out private driveways, roads, and bridges providing access to private property.
3. Most recovery grants, including FEMA PA grants, do not provide funding for reconstruction of privately-owned facilities.
    3.1. DHSEM included a provision in the Community Development Block Grant – Disaster Recovery (CDBG-DR) grant program for funding to replace private access facilities in the 2013 flood recovery agreement with HUD.
    3.2. Other funding such as the state Disaster Emergency Fund may be available to fund private roads and bridges.

Limit Soil Erosion and Sediment Transport

1. The most important long-term task to assist environmental recovery and limit soil erosion and transport after a wildland fire, is to reestablish grasses and forbs on burned lands. Soil

flowing into streams and lakes will contain phosphorus and other nutrients which creates eutrophic water conditions that results in the death of fish and other aquatic life. Reestablishing vegetation will lessen erosion, allowing the reestablishment of wildlife habitats, and reduce sediment and debris to streets, storm water facilities, reservoirs, and ultimately public water supplies.

2. The loss of soil will limit the recovery of vegetation on a burn site for decades. Constructing sediment trap structures are useful to provide protection for critical infrastructures, homes, and businesses. These may be as simple as straw barriers, waddles, felled trees place on slope contours, wooden structures placed in tributary streams, and detentions or retention ponds.
3. Once the sediment reaches a stream or water body it is often impossible to remove or exponentially more expensive to remove or prevent further movement into a drainage way.
    3.1. A major Colorado water provider spent more than $20 million in an attempt to remove sediment from Strontia Springs Reservoir to recover water storage capacity, with very little success, and was not able to remove any material from Cheeseman Reservoir, two critical reservoirs serving the Cities of Denver and Aurora.
4. Target areas for treatment are typically determined by the USFS, NRCS or conservation districts.
    4.1. A burn of low severity where the roots of grasses are not burned generally do not need to be treated and will often have a quick regeneration.
    4.2. With severe, slow moving fires, the combustion of vegetative materials creates a hydrophobic barrier, leaving water unable to penetrate soils. This condition increases the rate of water runoff and reduces the percolation of water into the soil profile making it difficult for seeds to germinate and for roots of surviving plants to obtain moisture. Hydrophobic soils should be broken up to provide a seed bed for the germination of forbs and grasses on high value or venerable areas.
5. Reestablishing vegetation is dependent upon the germination rate of grass and forb seeds. The germination success rate is greatly improved if the soil is lightly broken up and covered with a mulch material.
    5.1. While breaking up the soil is not possible with aerial seeding, consider breaking up the soil with volunteers using rakes or ATVs that can drag a disk or harrow to break up the soil and place seed with a seed broadcaster.
    5.2. Where breaking up the soil is not possible, applying mulch on impacted areas is critical.
    5.3. In addition to aerial seeding, a helicopter can be very successfully used to, “bail bomb” mulch on steep slopes or otherwise inaccessible areas.
6. Generally, seed used for revegetation should consist of the native grasses and forbs species that would naturally be found on site.
    6.1. Under some circumstances, it may be useful to add a non-native cover crop seed to the native seed mix so that it may germinate and grow quickly to limit erosion while giving the native seed a chance to germinate.
    6.2. Consult with NRCS staff to develop a seed mix of the desired species and verities to be planted.
    6.3. When ordering grass seed, state that the seed must be “100 percent pure live seed,” obtain certified (blue tag) seed to guarantee the variety was tested under field conditions, and that it is recommended for the site.
    6.4. A mixture of rapidly growing sterile non-native grasses mixed with native seeds can be used but it is preferable that most of the seed be native seed. An important benefit of the native seed is that it can be placed late in the year and survive through winter.

6.5. Generally, request that seed be bagged in 50 lbs. bags with the disaster incident name or ordering agency name printed on the bags. These 50 lbs. bags work well with private landowners and volunteers. In some cases, large supper bags may be preferable for loading air seeding aircraft. Aircraft can be filled from 50-lb. bags.
6.6. It is not likely that it will be possible to seed an entire fire burn area, so create a seeding plan to target critical areas, such as:
6.6.1. Areas along streams and water bodies, particularly sources of drinking water
6.6.2. Seed steep slopes
6.6.3. Seed strips of land along contours
6.7. Planting of seed can be done by volunteers, mechanically by seeders mounted on ATV's or aircraft. For large areas it is considerably less expensive to use a fixed wing aircraft to complete seeding. Aircraft can accurately place seed with GPS guidance.

7. Placing mulch cover over seed on the ground will greatly increase the germination and growth rate of grasses and forbs by providing a barrier to hold moisture, limit drying by sunlight, and provide a source of organic matter to support plant growth. The mulch cover further breaks up the energy of falling rain preventing soil erosion.
7.1. Straw mulch from grain crops must be certified by NRCS to be weed free. There are manufactured mulch products made from wood waste that is preferable since it is less likely to be blown away by strong winds but costs more.
7.2. Boulder County had great success in utilizing a helicopter to place wood chips to protect steep burned slopes within the 2020 Cal-Wood fire. The county made chips on-site utilizing hazard trees that needed to be removed and eliminated the expense of purchasing mulch materials.
7.3. Concentrate mulch in areas that have slopes greater than 20% and adjacent to streams.
7.4. Straw mulch can be placed by hand, placed by machinery, or air dropped by a helicopter, known as straw bale bombing.
7.5. Generally, hydro mulch is not recommended due to the expense. If utilized, have the seed placed on the ground before spraying the hydro mulch. Do not mix the seed into the hydro mulch mixture.

Restore Fire Suppression Damages

1. On large fires, it is common to use heavy earth moving equipment to construct fire lines, fire breaks and water bars by removing all vegetation, including heavy timber, in order to contain and prevent fire spread. This work will result in exposing unprotected mineral soil to erosion and noxious and invasive weeds.
2. Fire lines, fire breaks, roads, and other soil disturbances need to be mapped and documented to aid in creating a restoration plan.

Reserve Aircraft for Aerial Seeding

1. Contracting for aircraft to do aerial seeding or placement of mulch can be very competitive. Aircraft used for aerial seeding are the same type of craft used for fire suppression, fertilizing, and spraying of crops.
1.1. As soon as possible seek aircraft services.
1.2. Seek out small private landing strips that owners may donate for use or offer at a lower cost compared to municipal facilities.
1.3. Where possible, bundle small aerial projects together into larger contracts for ease of management and cost savings.

1.4. A fixed wing Air Tractor or similar aircraft is the least expensive way to seed large areas and does a comparable job as more expensive helicopters.

2. A Geographic Information System (GIS) map with the Latitude and Longitude points outlining the areas to be seeded will need to be created and loaded into the aircraft's computer to show where the pilot is to "paint" the forest with seed or mulch. When the placement of seed or mulch is completed, the pilot will provide a copy of the map showing the areas, and number of acres of acres treated, and serve as the bill for the completed work.

REFERENCES

1. *Developing and Maintaining Emergency Operations Plans: Comprehensive Preparedness Guide* (DPG) 101. Federal Emergency Management Agency, 2010, Retrieved from fema.gov/media library-data/20130726-1828-250450041/cpg-101_comprehensive_emergency_operations_plans_2010.pdf. December 2019.
2. Robert T. Stafford Disaster Relief and Emergency Assistance Act. Public Law 93-288, as amended by Public Law 100-707.
3. *FEMA 325, Public Assistance Debris Management Guide,* July 2007.
4. *Local Government Guide to Recovery, April 2017*
5. National Response Framework, May 2013
6. National Incident Management System, December 20078
7. National Disaster Response Framework, May 2013

Intentionally Blank