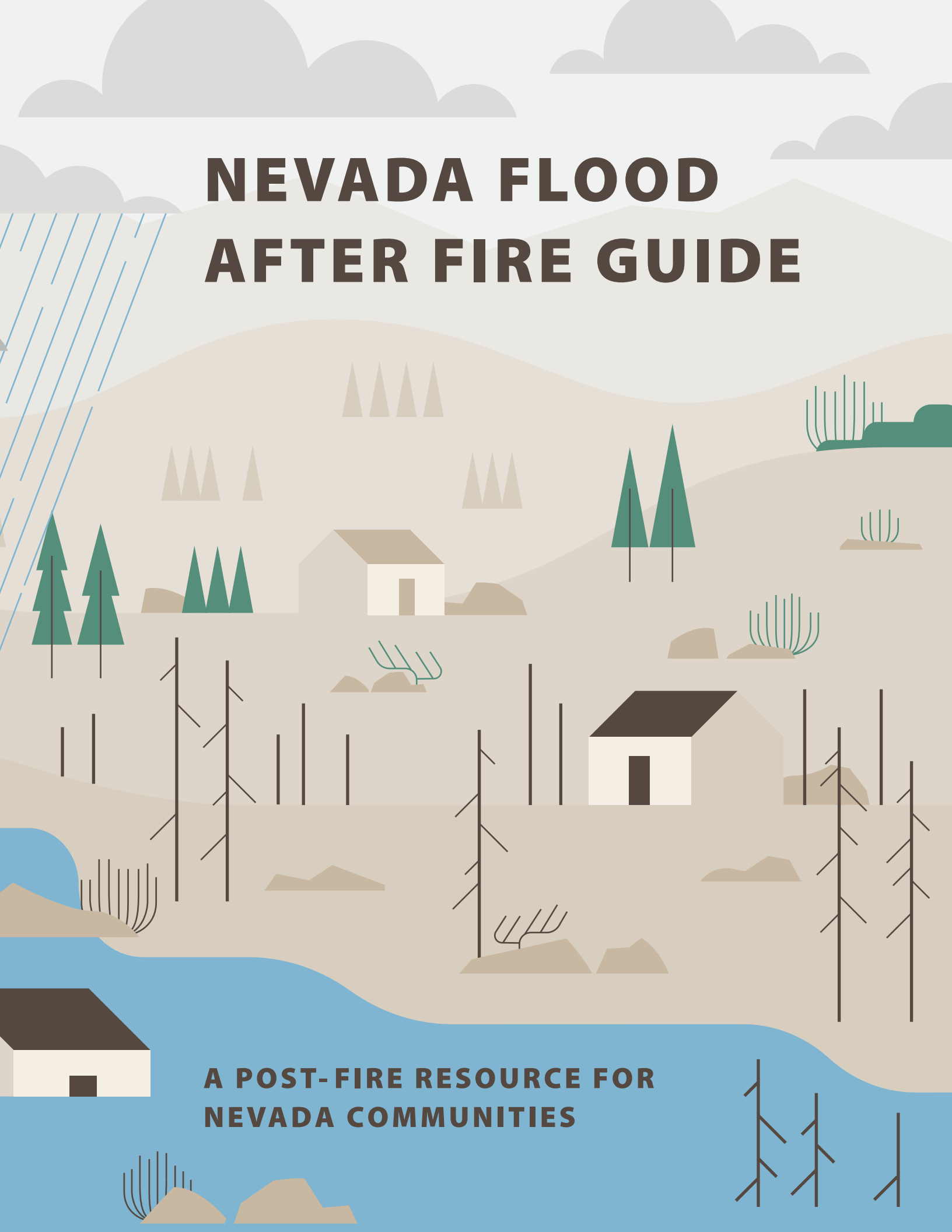
NEVADA FLOOD AFTER FIRE GUIDE



A POST-FIRE RESOURCE FOR NEVADA COMMUNITIES

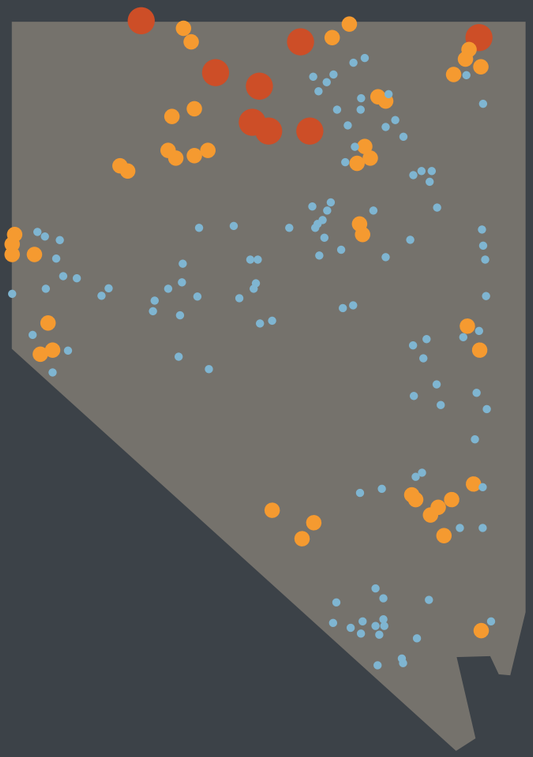
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INTRODUCTION

The purpose of this guide is to provide a consolidated, easy-to-use resource to help Nevada residents be prepared for a flood after a wildfire, know how to stay safe during a flood, and understand critical first steps to take following a flood to ensure safety and embark on the path to recovery.



WILDFIRE RISK IN NEVADA

Wildfire happens often in Nevada so it is important to be prepared and ready for when it comes. Shown here are the amount and size (in acres) of wildfires from 2010-2019 throughout Nevada.

- Larger than 100,000
- 10,000–100,000
- 1,000–10,000
- 100–1,000
- 10–100
- less than 10

FLOOD HAPPENS AFTER FIRE

Post-wildfire conditions can increase flood risk in dry river channels, gullies, washes, and creeks that become regularly active with increased water movement after rainstorms.

WHY DOES THE RISK OF FLOODING INCREASE AFTER A FIRE?

In an unburned landscape, vegetation absorbs rainfall, reducing the speed and amount of runoff. That same landscape can be drastically altered by wildfire due to changes in the characteristics of the terrain and soil. Wildfires can remove this vegetation, and leave the ground charred and unable to absorb water creating the perfect conditions for flash flooding and debris flows (FEMA, 2020). This results in an increased flood risk in areas across the state that otherwise are considered to have a low flood risk (Figure 2).

The increased flood risk can persist for years following a fire until the landscape recovers and vegetation begins to reestablish itself in the burn scar area. As rainwater moves across charred and barren ground, it can pick up soil and sediment and carry it in a stream of floodwaters, which can lead to more severe damage following a fire (FEMA FloodSmart).

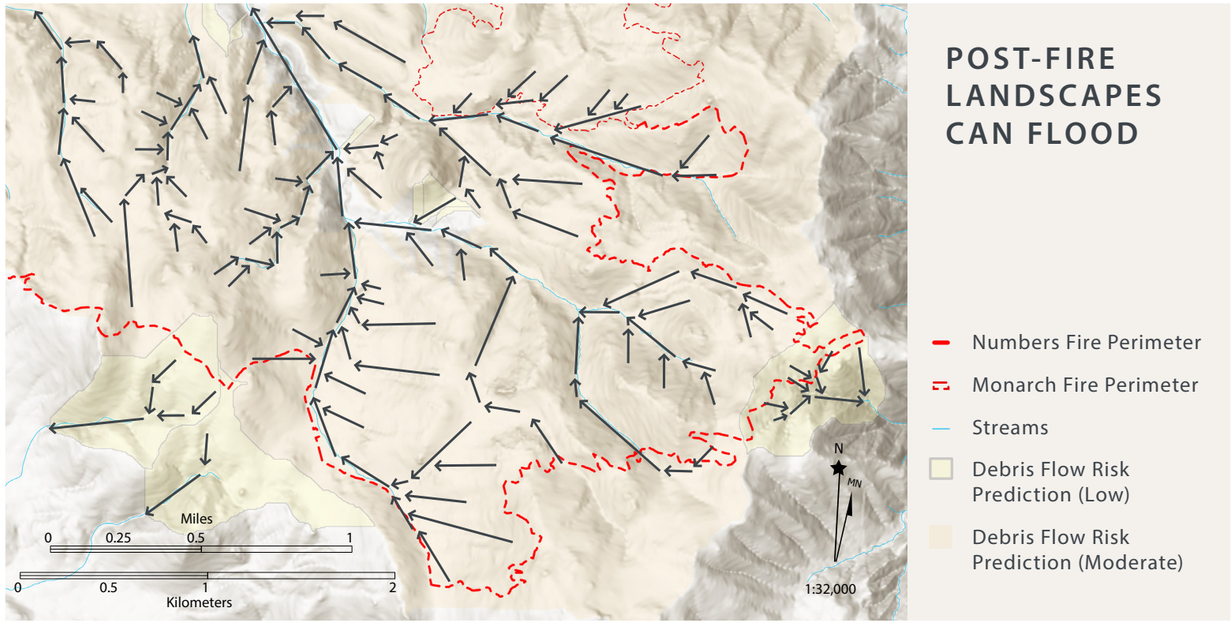


Figure 1. An example burned landscape from the Numbers Fire and Monarch Fire in Nevada. Flooding is possible in the downslope direction of the arrows.

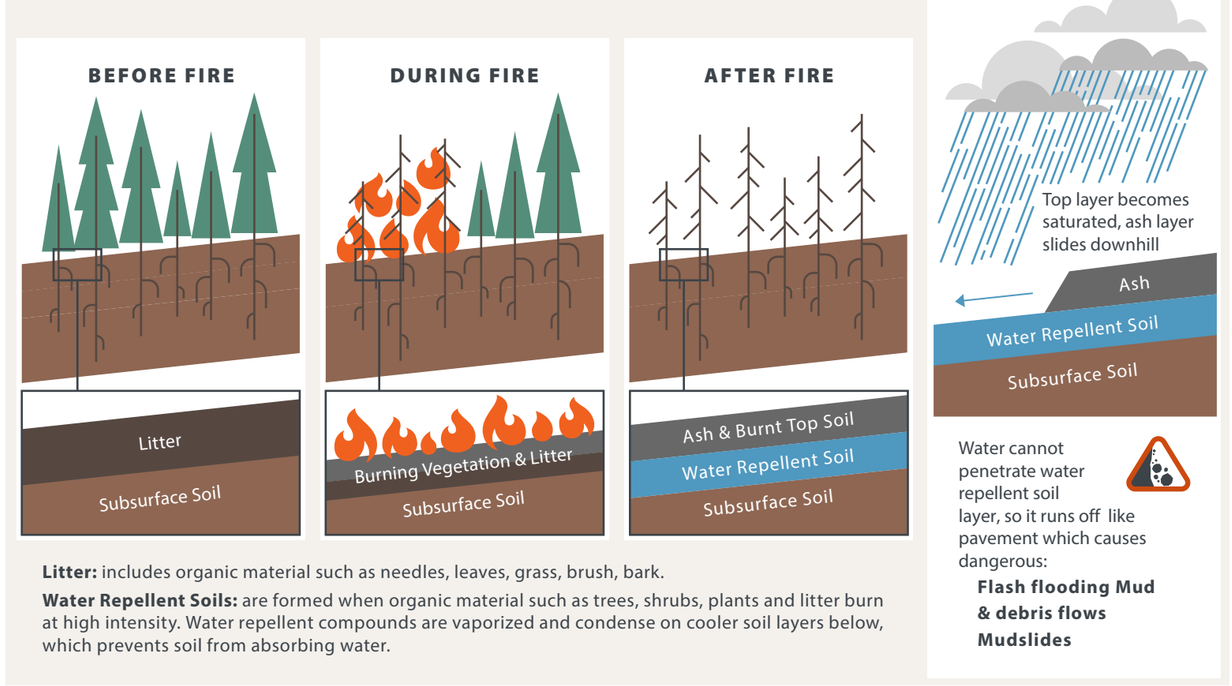


Figure 2. Burn scars are a flood risk, especially during heavy rains.

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HOW TO **STAY SAFE** IN A FLOOD

RECOGNIZE FLOOD RISK

Identify flood-prone or landslide-prone areas near you.

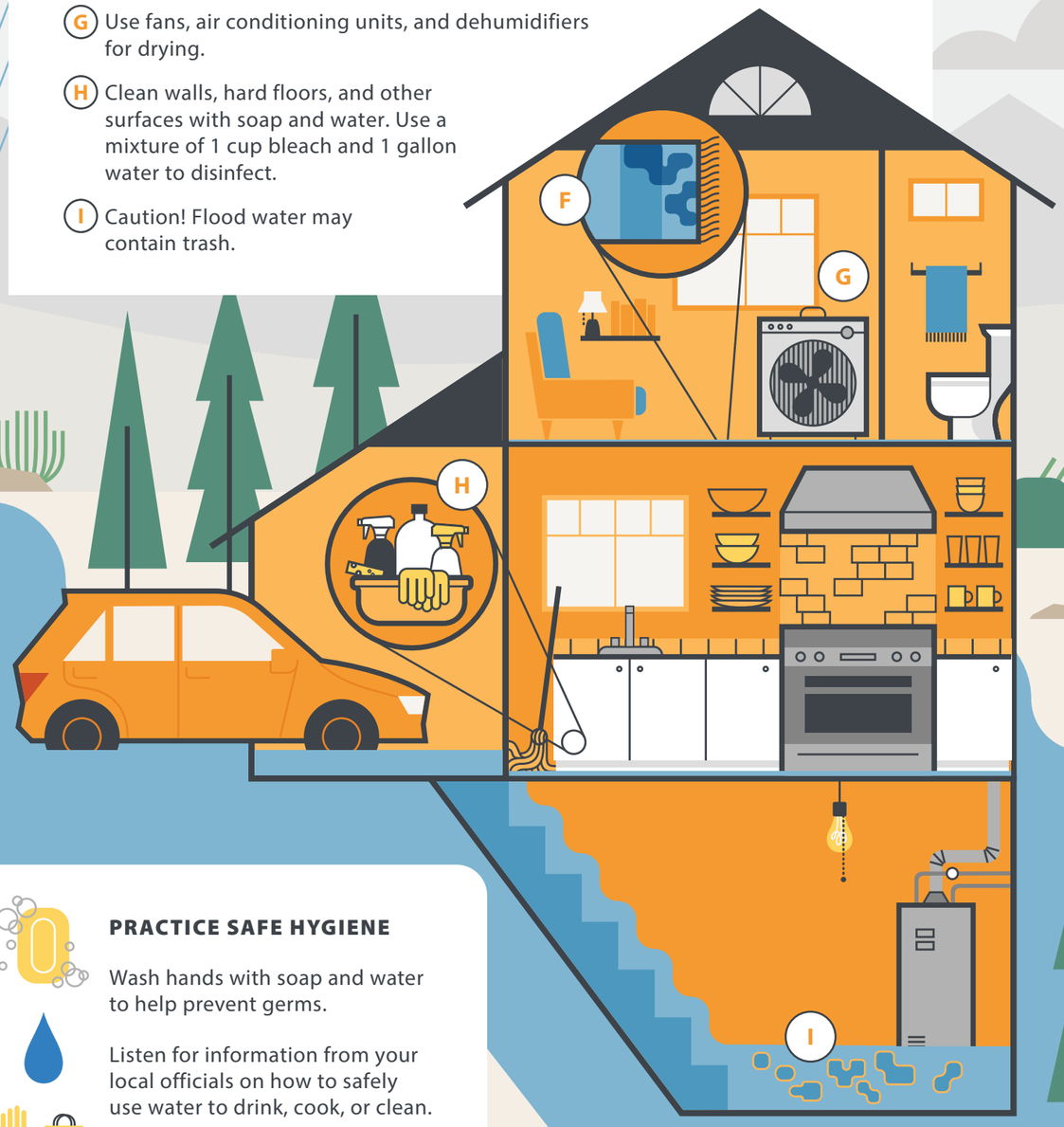
Know your community's warning signals, evacuation routes, and emergency shelter locations.

Know flood evacuation routes near you.



WHAT TO DO **AFTER** A FLOOD

- (F) Throw away items that cannot be disinfected, like wall coverings, cloth, rugs, and drywall.
- (G) Use fans, air conditioning units, and dehumidifiers for drying.
- (H) Clean walls, hard floors, and other surfaces with soap and water. Use a mixture of 1 cup bleach and 1 gallon water to disinfect.
- (I) Caution! Flood water may contain trash.



WHAT TO DO **DURING** A FLOOD

- (A) Gather emergency supplies and follow local radio or TV updates.
- (B) Unplug appliances to prevent electrical shock when power comes back on.
- (C) Do NOT drive or walk across flooded roads. Cars and people can be swept away.
- (D) Tie down or bring outdoor items inside.
- (E) When powerlines are down, water is in your home, or before you evacuate, TURN OFF gas, power, and water.

PRACTICE SAFE HYGIENE

Wash hands with soap and water to help prevent germs.

Listen for information from your local officials on how to safely use water to drink, cook, or clean.

For cleanup, wear rubber boots and plastic gloves.

FOR MORE INFORMATION VISIT:
emergency.cdc.gov/disasters/floods/
Figure adapted from the CDC.

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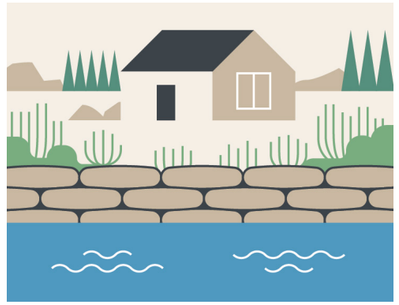


FIGURE 3. Burlap sack flood barrier protecting a home



FIGURE 4. Two-person effort filling sandbags

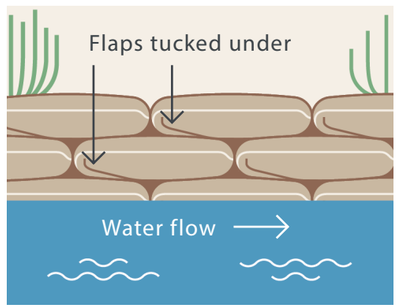


FIGURE 5. Proper sandbag placement when constructing a barrier

PREPARING YOUR PROPERTY

USE SANDBAGS TO PROTECT SENSITIVE AREAS

If your property is near a waterway or prone to flooding, sandbags can be a simple, but effective way to hold back water and prevent, or at least reduce, damage (Figure 3). They act as a barrier to divert mov-ing water around a structure, rather than flow through it. Because flooding after a wildfire can occur suddenly, it is a good idea to know how to properly fill a sandbag and have resources readily available to access quickly. However, it is important to note that other types of mitigation measures may be needed for intense boulder laden debris flows. Also, Individuals should still evacuate as directed by local officials, even if sandbags are used. Similarly, if there's no evacuation order, individuals should still consider evacuation based on their own judgment if sandbags are placed.

HOW TO FILL A SANDBAG

Traditional sandbags can weigh between 35 and 40 pounds, which makes filling sandbags easiest as a two-person effort. One member of the team should place an empty untreated burlap sack or com-mercial plastic sandbag on the ground between their feet holding up the sides of the bag, which have been folded down to make a 'collar' around the top (Figure 4). The second member should shovel a heavy bodied or sandy soil (ideally) into the bag, but any usable material at or near the site will be sufficient. However, avoid gravelly or rocky soils because water will be able to pass through. Fill the bag 1/3–1/2 of its capacity. Do not tie bags—fold the top of the bag over.

HOW TO PROPERLY PLACE A SANDBAG

To ensure the tightest seal and prevent water from leaking, make sure the ground where the bags will be placed is free of any debris. Begin placing the bags lengthwise and parallel to the direction the water is flowing, with the folded over end of the bag facing against the water flow. Stage the placement of the bags so they cross over each other and are not stacked in straight columns (Figure 5). Bags can be stacked up to three-high in a single line or can be stacked in a pyramid shape, with each layer containing one row fewer than the layer below. The pyramid pattern provides more stability, but requires more bags.

For more details on sandbagging techniques follow this link to watch a tutorial video:
www.youtube.com/watch?v=OwAPJeqqWyk

WHERE TO FIND SANDBAG MATERIALS

Designated locations for materials are determined on a county-by-county basis throughout Nevada. Check your county website ahead of time to learn about locations closest to you.

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PREPARE TO EVACUATE SAFELY WITH A PLAN

Post-fire flooding and debris flow can occur quickly with little to no warning. It may be dangerous to evacuate at the last minute. It some situations, it may be safer to shelter in place on the highest ground/home level as possible. This underscores the impor-tance of knowing your flood risk and being prepared if a storm is approaching after a fire has recently burned.

EVACUATION INFORMATION

For the most current evacuation notices, check local Sheriff and County websites and social media (especially Twitter and Facebook) and make sure you are signed up for an emergency notification system. You can also listen to local radio stations to find cur-rent information. Listen to the local radio station for updates on road closures or other obstacles. Nevada Department of Transportation (DOT) has an interactive map that dis-plays road conditions and live traffic speed throughout the state. To learn more, visit: **nvroads.com/#.**

Nevada DOT provides the public with statewide traffic camera information to help inform travel decisions based on road conditions. This can be especially useful when many people are trying to evacuate at the same time. To learn more, visit: **www.dot.nv.gov/travel-info/road-conditions/traffic-cameras or call 1-877-NV-ROADS.**

Evacuation centers provide a safe refuge in a time of crisis. Designated locations are determined on a county-by-county basis throughout Nevada, so check your county website ahead of time to learn about your options.

PET AND LIVESTOCK EVACUATION

Pet and livestock evacuation is often overlooked, but it is important to have a plan in place on what you will do in the case of an emergency. It's important to think through the steps that will need to take place in order to ensure the safety of your animals.

Designated livestock evacuation locations are determined on a county-by-county ba-sis, so check your county website ahead of time to learn about your options.

START PLANNING NOW TO BE PREPARED

EVACUATION CHECKLISTS

It's important to plan ahead to safeguard your home, have an evacuation plan in place, and put together an evacuation go-bag with important personal documents/possessions and a 2-week supply water and non-perishable food items. During a post-wildfire flooding event, time is of the essence and there may not be much time to gather your belongings before you need to evacuate or lose power and water in your home. To ensure the essentials packed ahead of time and everyone knows what to do, use the below check lists to help!

For more information, visit: **www.livingwithfire.com**.

TO-GO BAG ESSENTIALS

- ☐ Important documents (bank, IRS, trust, investment, insurance policies, birth certificates, medical records, passport, etc.)
- ☐ Credit and ATM debit cards
- ☐ Medications
- ☐ Prescription glasses
- ☐ Driver's license
- ☐ Computer backup files
- ☐ Inventory of home contents (video or photos)
- ☐ Photographs of home exterior and landscape
- ☐ Address book
- ☐ Cell phone, charger, and backup battery pack
- ☐ Personal toiletries
- ☐ 2-week supply of water and non-perishable food
- ☐ Enough clothing for 3-5 days
- ☐ Family heirlooms, photo albums, and videos
- ☐ Sanitation and personal hygiene items
- ☐ Battery powered flashlight and radio (with extra batteries)
- ☐ Extra cash
- ☐ First aid kit
- ☐ Extra tank of gas
- ☐ Multipurpose took
- ☐ Pet supplies (food, water, leash, bowl, ID, etc.)
- ☐ Baby supplies (bottles, food, formula, diapers, etc.)

PREPARE FAMILY MEMBERS, PETS, AND LIVESTOCK

- ☐ Plan several evacuation routes from your home
- ☐ Designate a safe meeting place and contact person
- ☐ Relay your evacuation plans to a contact person
- ☐ Be aware of emergency notification systems
- ☐ Have a plan for all pets and livestock, do not turn loose. Notify local Humane Society if assistance will be needed.

PREPARE YOUR PROPERTY

- ☐ Document your property and belongings with photos and videos and create an inventory list.
- ☐ Make sure your sump pump is working and then install a battery-operated back-up, in case of a power failure. Installing a water alarm will also let you know if water is accumulating in your basement.
- ☐ Clear debris from gutters and downspouts.
- ☐ Anchor any fuel tanks.
- ☐ Raise electrical components (switches, sockets, circuit breakers, and wiring) at least 12 inches above your homes projected flood elevation.
- ☐ Place the furnace, water heater, washer, and dryer on cement blocks at least 12 inches above the projected flood elevation.
- ☐ Move furniture, valuables, and important documents to a safe place.
- ☐ Remove hazardous materials such as chemicals from your home and outbuildings to a located that is not at risk of flooding. For information on disposal locations: ndep.nv.gov/land/waste/hazardous-waste-management.
- ☐ Protect areas susceptible to floodwaters by acquiring appropriate flood flighting materials to have on hand for post-wildfire flooding.

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STAY INFORMED AND BE PREPARED

MAKE SURE YOU ARE INSURED FOR FLOODING.

You can recover faster and more fully after a disaster with flood insurance. Homeowners, renters, and business insurance typically do not cover flooding and flood insurance needs to be purchased separately to protect assets. It is important to note tha the National Flood Insurance Program (NFIP), managed by the Federal Emergency Management Agency (FEMA), normally has a 30-day waiting period before policies become active.

TO FIND MAPS OF THE FLOOD-PRONE AREAS near your home, visit:
msc.fema.gov/portal/home

TO LEARN MORE ABOUT FLOOD INSURANCE, visit FEMA's webpage at:
www.fema.gov/national-flood-insurance-program

TO USE A QR CODE Scan the QR code in the QR code scanner app or built-in QR code camera in your smartphone and you will be directed to the link associated with that code.

STAY UPDATED WITH NOTIFICATIONS + ALERTS

One of the easiest ways to be prepared ahead of time and mitigate risk is to get information as early as possible. There are a number of resources readily available that you can access to receive updates and information on weather conditions and emergency alerts.

1. NEVADAFLOODS.ORG: A cooperative effort between several local, state and federal agencies to raise awareness on flood risk and share information on flood, flood preparedness, and flood insurance. For more information, visit:
nevadafloods.org/index.html

2. NATIONAL WEATHER SERVICE (NWS) AND NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) WEATHER RADIO: Provides a nationwide network of radio stations providing continuous weather information from local offices across the country 24 hours a day, 7 days a week. Included in the broadcastings are weather warnings, watches, forecasts, and other hazard information, including fires and burn scar status. For more information, visit:
www.weather.gov/nwr&ln_desc=NOAA+Weather+Radio/

3. CODERED: Utilized across many counties throughout Nevada, this high-speed mobile app provides several types of notifications, including fire, flooding, and evacuation notices. For more information, call your local emergency management office to see if your area is registered.

4. REVERSE 9-1-1: Some parts of Nevada have reverse 9-1-1 systems in place that provide NWS watch and warning communications for extreme storm events. Check your local county's website for more information on alert systems specific to and available in your area.

5. AMERICAN RED CROSS EMERGENCY APP: Monitors more than 35 different types of severe weather and emergency alerts to keep you informed on conditions. Provides information on ways to be prepared and methods to communicate with friends and family safely. For more information, visit:
www.redcross.org/get-help/how-to-prepare-for-emergencies/mobile-apps.html

6. FEMA MOBILE APP: Provides real-time alerts from the NWS, information on emergency preparedness with checklists, methods to communicate with friends and family on safety, and locations of emergency shelters. Available in both English and Spanish. For more information, visit:
www.fema.gov/about/news-multimedia/mobile-app-text-messages#download.

7. WEATHER UNDERGROUND: App with interactive map with radar providing weather updates with data points from 200,000 personal weather stations across the globe. For more information, visit:
www.wunderground.com/download

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POST-FIRE FLOODING HAZARDS



FLASH FLOODING

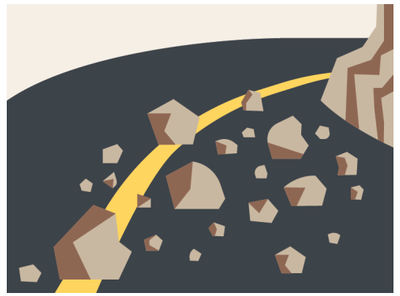
The odds of a flash flood increase dramatically when a fire has burned the area upstream. For any burn area, it takes much less rainfall to result in flash flooding than before the wildfire because the soil properties, which contribute to water absorption, are compromised. Thunderstorms that develop quickly over burned areas can produce flash flooding and debris flows nearly as fast as the NWS radar can detect the rainfall, providing only a short time for warnings. These floods are typically much larger for a given sized storm than they were before the wildfire, so flooding is likely to be much more extensive following a wildfire, endangering properties previously considered safe from flooding.

A general rule of thumb is that half an inch of rainfall in less than an hour is sufficient to cause flash flooding in a burn area. The likelihood of flooding can depend on the terrain, how much time the ground has had to heal, vegetation regrowth, and the severity of the fire on the landscape. These floodwaters typically carry fast-moving debris, including downed trees and gravel, and can pose significant risks to life.



DEBRIS FLOWS

Debris flows are a common hazard following a wildfire and are very dangerous. When heavy rainfall runs downhill through a burned area, it can trigger flash floods, which pick up all types of material in their path potentially resulting in a flow composed of more solids than liquid. Materials can include loose ash, rocks, sand, soil, boulders, and burned trees that travel down a slope under the influence of gravity creating a moving mass, or a debris flow.



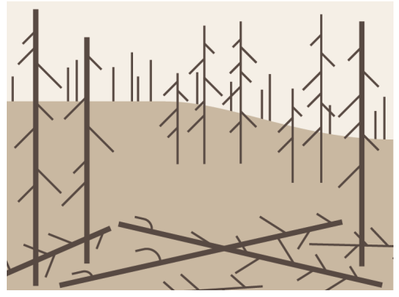
ROCKFALL

Rockfall is a natural process where rock fragments on slopes fall, bounce, or roll downhill. After a fire, this process may become more frequent because wildfires can burn hot enough to crack rocks (making them less stable and more likely to fall) and destroy trees, stumps, logs, woody debris, and roots that normally hold loose rocks in place. Rockfalls can be especially hazardous to life and property along roads, trails, and slopes near residential, industrial, and farm buildings.



ROADWAY EROSION

Increased runoff from rain in a burn area may cause increased erosion and sediment buildup on roadways. Piles of sediment can build up on roadways and in drainage ditches leading to clogged culverts, blocked flows beneath bridges, and erosion of embankments supporting roads. In heavy storms, this may lead to partially or completely collapsed roadways. These hazards make traveling in burn areas or in areas downslope of burn areas especially dangerous at night.



BURNED AND DISTRESSED TREES

It is important for homeowners to check and monitor trees after a wildfire, because burned and distressed trees may fall at any time, with or without wind. Fallen trees may also get hung up in the branches of other trees and break away later. Remain alert and monitor the trees on your property. Additionally, burned and downed trees can contribute to debris that can be mobilized during a flood event and carried into waterways around your home. Large tree pieces can block waterways and culverts, leading to waterway backups and breaching of roadways.



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TURN AROUND, DON'T DROWN!

It's reported that over half of all flood-related drownings occur when a vehicle is driven into hazardous flood water with the next highest percentage of flood-related deaths due to walking into or near flood waters (Figure 7). Remember:

- Do not walk (or swim) through moving water—just 6 inches of water can sweep an adult off their feet.
- Do not attempt to drive through flooded areas—just 6 inches of water is enough to stall your car and can cause you to lose traction.
- Stay off bridges located above fast-moving water. Floods can compromise the structural integrity of roads and foundations increasing the likelihood of it washing away/collapsing without warning.
- Be aware of streams, drainage channels, canyons, and other low-lying areas that can flood suddenly. Remember: flash floods can occur miles downstream/downslope from where rain is falling and they can appear in low-lying areas with or without typical warnings (e.g., without clouds or rain signaling a storm is coming).

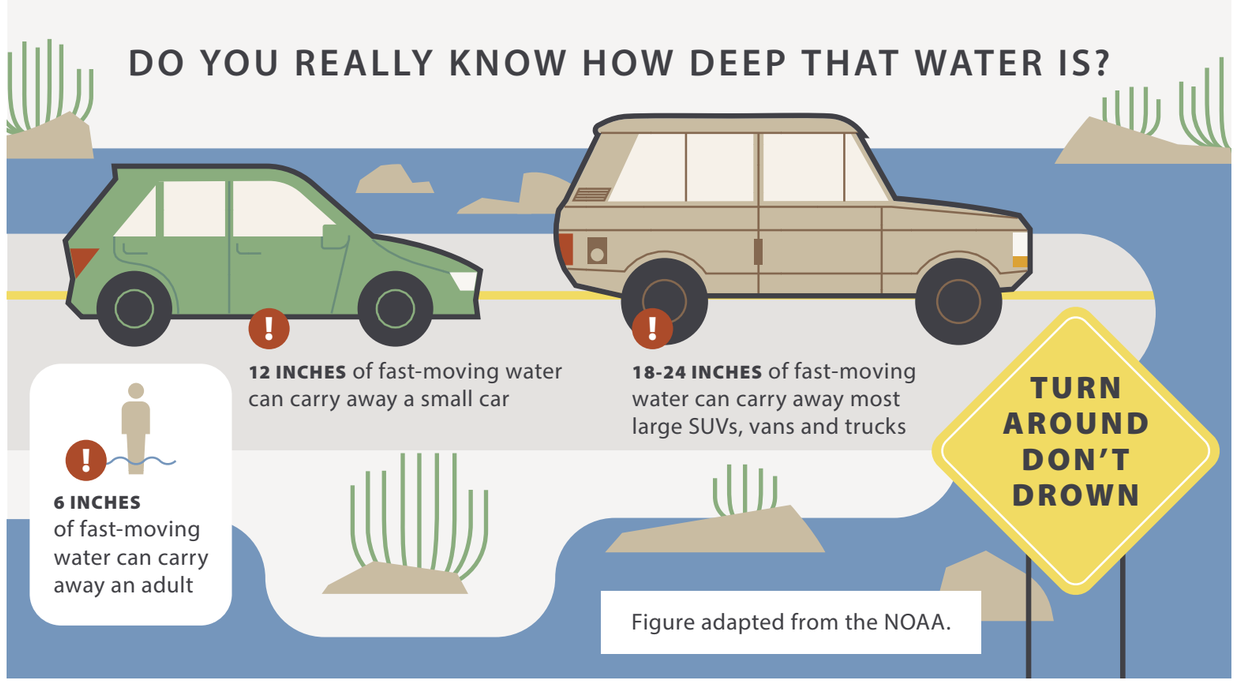


FIGURE 7. Turn Around, Don't Drown! (NOAA)

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RECOVERY SUPPORT PROGRAMS

This section describes a selection of recovery programs and services provided by government and non-governmental organizations to individuals, families, and businesses.

AGRICULTURAL RESOURCES

- U.S. Department of Agricultural – Disaster Assistance Programs: Provides financial and technical assistance to drought-affected areas through its Disaster Assistance Pr0grams. This includes emergency assistance and loans for losses to crops, livestock, trees, and farmland.
  https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/
- U.S. Department of Agriculture – Environmental Quality Incentives Program: Provides financial and technical assistance to agricultural producers to address natural resource concerns and deliver environmental benefits, such as improved water and air quality, conserved ground and surface water, increased soil health and reduced soil erosion and sedimentation, improved or created wildlife habitat, and mitigation against increasing weather volatility and improved drought resiliency.
  https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/
- U.S. Department of Agriculture – Emergency Farm Loan Program: Helps eligible farms and ranchers rebuild and recover from sustained losses due to natural disasters. The program is triggered when an event is a presidentially declared a disaster.
  https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/emergency-farm-loans/index

BUSINESS RESOURCES

- U.S. Small Business Administration – Economic Injury Disaster Loan: Provides loans to small businesses, small agricultural cooperatives, and most nonprofit organizations located in a declared disaster area that has suffered significant economic injury.
  https://www.sba.gov/funding-programs/disaster-assistance/economic-injury-disaster-loans

HOUSING RESOURCES

- Federal Housing Administration (FHA): Homeowners with FHA loans may qualify for relief if a presidentially declared disaster has affected their ability to make mortgage payments.
  https://www.hud.gov/program_offices/housing/sfh/nsc/qaho0121
- FEMA – Individuals and Households Program: Provides financial and direct services to eligible individuals and households affected by a disaster.
  https://www.fema.gov/assistance/individual/program

UNEMPLOYMENT RESOURCES

- Federal Emergency Management Agency – Disaster Unemployment Assistance: Provides temporary unemployment benefits to people who lost or had their employment interrupted because of a major disaster.
  https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4466

FOOD RESOURCES

- Local Food Banks: Contact your city and/or county food bank to learn about available resources
- Nevada Department of Agriculture – The Emergency Food Assistance Program: Provides nonprofit distribution sites with food for low-income families.
  https://agri.nv.gov/Food/The_Emergency_Food_Assistance_Program/TEFAP-Emergency_Food_Assistance_Program/
- U.S. Department of Agriculture – Disaster Supplemental Nutrition Assistance Program (D-SNAP): Helps replace food lost in a disaster. Certain requirements must be met for households to be eligible.
  https://fns-prod.azureedge.net/sites/default/files/media/file/FY2021-DSNAP-IncomeEligibilityStandards.pdf

RELIGIOUS RESOURCES

- Southern Nevada Baptist Association Disaster Relief: Provides help to victims of natural and man-made disasters, such as floods, earthquakes, and fires.
  https://www.snba.net/disaster-relief
- Catholic Charities of Southern Nevada: Offers a wide variety of housing and shelter services ranging from emergency shelter to long term support and guidance.
  https://www.catholiccharities.com/services/housing-shelter/
- Messages of Faith Ministry – Emergency Response Team: Provides spiritual and ministerial care following disasters, crisis, and traumatic events. Chaplains are deployed to assist and provide spiritual care and comfort in times of need.
  http://www.chaplaincynevada.org/NevadaStateChaplainsTaskForce.html

NON-GOVERNMENTAL RESOURCES

- The American Red Cross: Responds to disasters 365 days a year and can help assist impacted individuals with their immediate emergency needs.
  https://www.redcross.org/get-help/disaster-relief-and-recovery-services.html
- The Salvation Army: Provides temporary assistance for families in need, including vouchers for rent, emergency aid, and legal aid.
  www.salvationarmy.org/

TRIBAL RESOURCES

- Indian Health Services: May aid with repairs and reconstruction of homes on reservation lands in coordination with tribal authorities. IHS may use their interagency agreements to fund cleanup costs and work with area leaders to assess further needs of impacted communities.
  https://www.ihs.gov/
- Administration for Native Americans: Occasionally provides funding to help Native American communities recover from natural disasters.
  https://www.acf.hhs.gov/ana

ACKNOWLEDGEMENTS

This Nevada Post-Wildfire Guide was a collaborative effort by the Nevada Silver Jackets Team. Silver Jackets is an interagency partnership program encouraging Federal, state, local, and tribal agencies to work together to find solutions for complex flood risk management issues.

AGENCIES THAT CONTRIBUTED TO THIS GUIDE INCLUDED:

FEMA

DEM

EXTENSION
College of Agriculture, Biotechnology & Natural Resources

Nevada Department of CONSERVATION & NATURAL RESOURCES

Nevada Division of Forestry

NEVADA FLOODS .ORG

ENVIRONMENTAL PROTECTION

National Flood Risk Management Program

NEVADA DIVISION OF WATER RESOURCES

National Weather Service

US Army Corps of Engineers

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