

# BobCat Burn Area

Increased Probability For  
Flash Floods/Debris Flows



National Weather Service Billings





# Impacts from 2013

## Musselshell county Burn Areas

- Significant Flash Flood/Debris Flow Events the year following the fire
- Steep terrain with large moderate to severely burned areas



**Roundup DES**

21 hours ago



We are getting several reports of flash flooding in the Dahl Fire Scar, along Buckskin, and Harper Coulee, please be careful when traveling the roadways in the burn scares. The Delphia and Wilson burn scar can expect the same things.





# Impacts from 2013

## Musselshell county Burn Areas



**Roundup DES**

May 26

Results so far, on the Dahl fire Scar, lots of run off with flash flooding affecting all of the drainage's, also most private roads in the burn scar were rivers, and have sever erosion as most were over-topped.





# Cascade Burn Flash Flood 2009

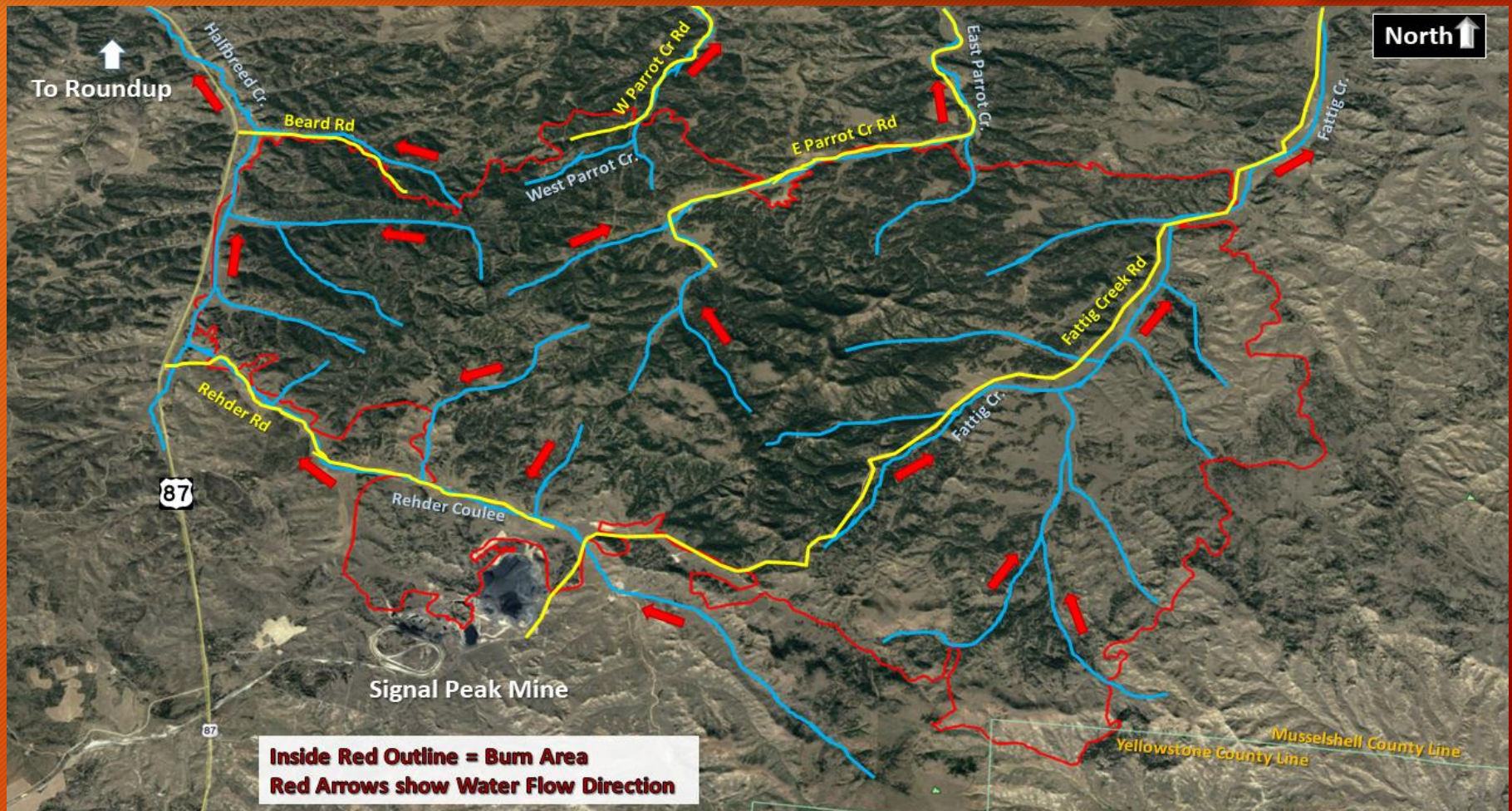
**WEST FORK OF ROCK CREEK**

Courtesy: Jim Moore



# BobCat Burn Area

## Impacted Roads and Streams





# Post Fire Burn Scar - Hydrologic Threat

- Changes cause the soil to be more susceptible to erosion and Flash Flooding
- Post-fire landscape hydrologic responses include:
  - Increases in water/flood magnitude in main channels and tributaries
  - Increased debris and sediment transport
  - Increased probability of debris flows in areas with steeper terrain



**Debris Flow Definition:** A moving mass of loose mud, sand, soil, rock, water that travels down a slope under the influence of gravity. 50% of the material must be sand size particles or larger.

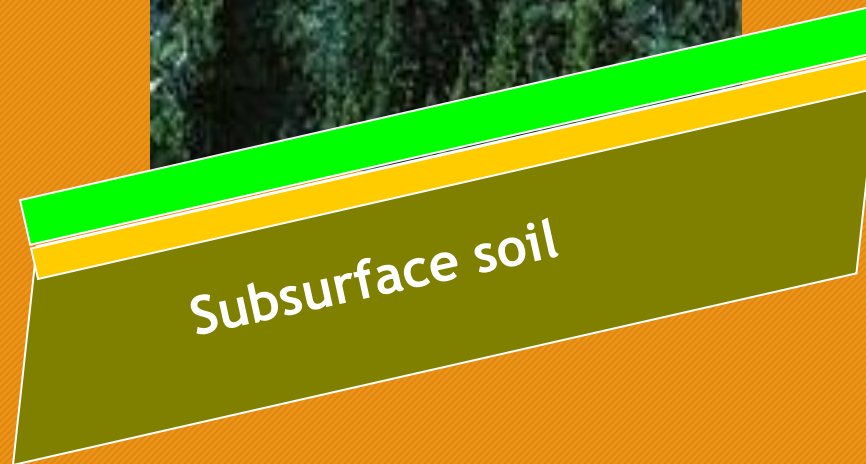


# Pre-Fire Ground Condition

## Coniferous Forest



Forest Litter →



← less permeable soil surface

*In drier climate, there may be less forest litter and more conifers*



# Post-Fire Ground Condition

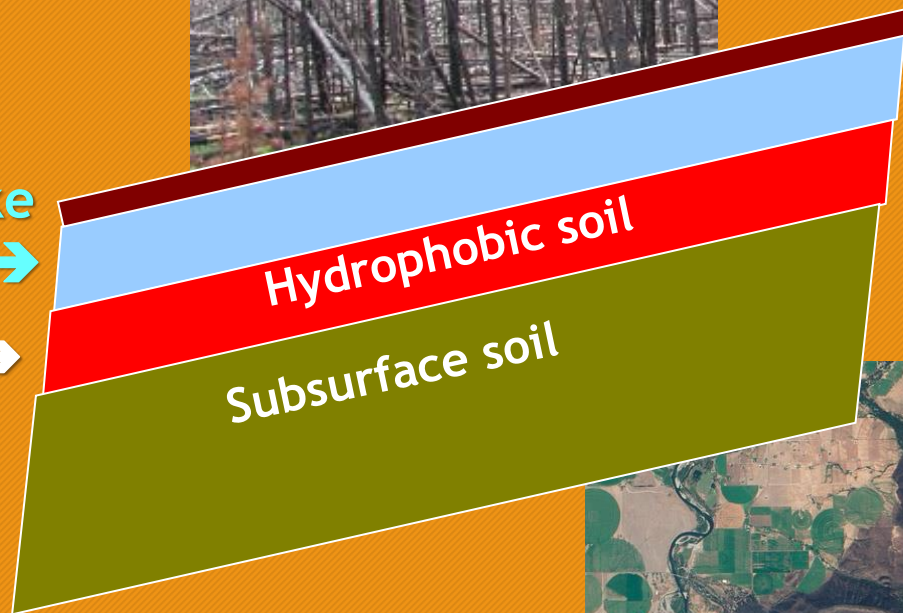
## Coniferous Forest



← Burnt surface

Wettable sand-like layer (~ 2-4 cm) →

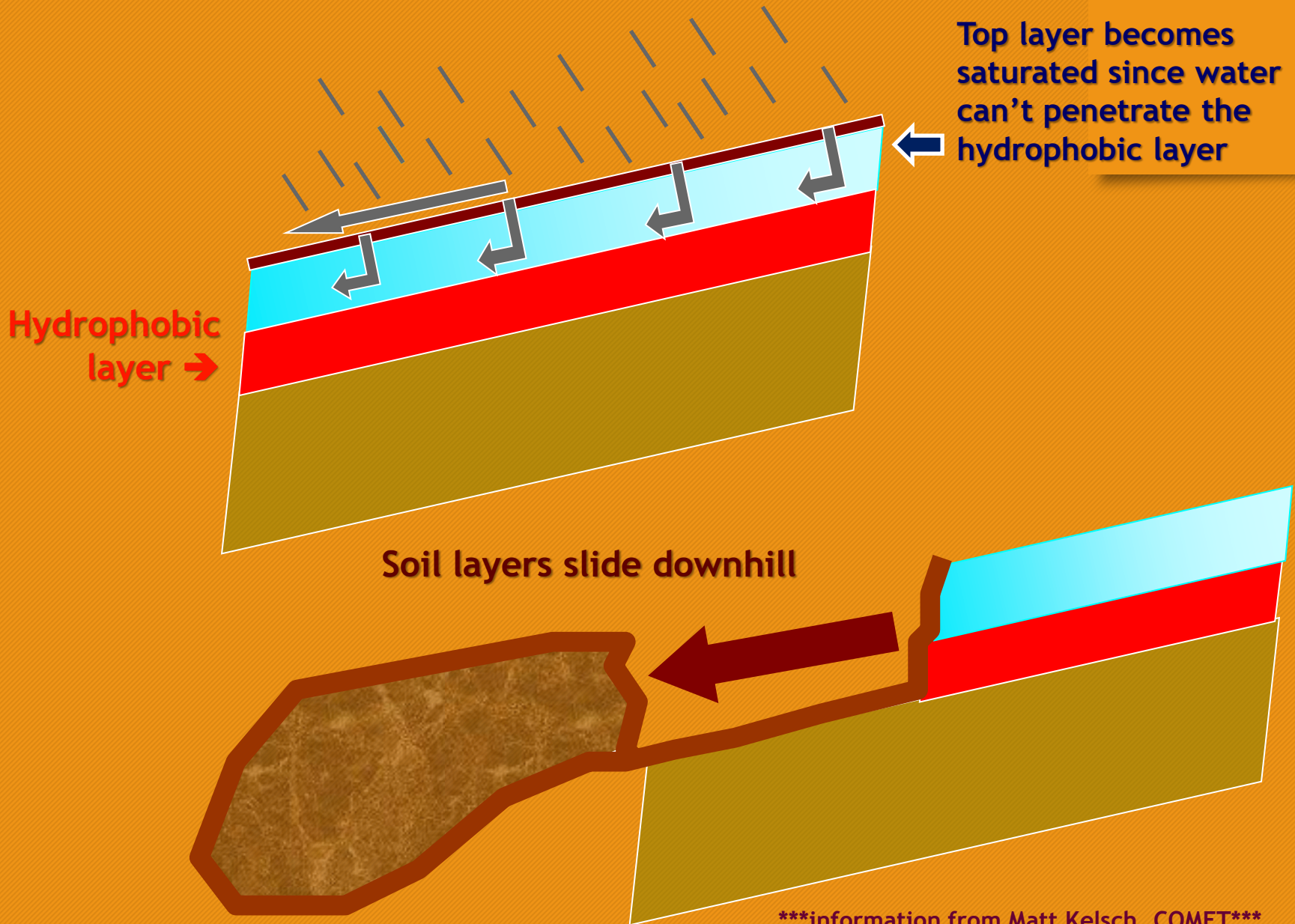
Water Repellant surface (~ 2 cm) →







# What Happens with Heavy Rainfall





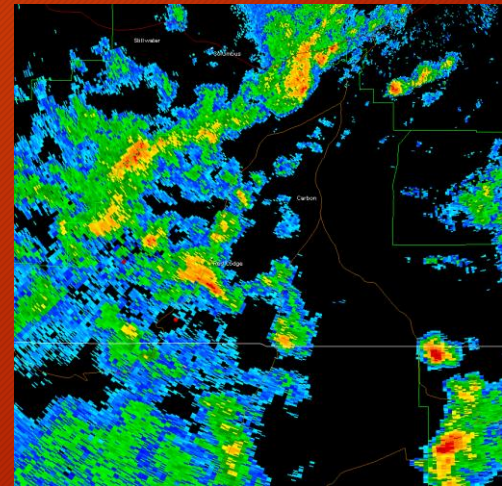
# Variables Affecting Intensity of Runoff

- Steepness of the terrain
- Intensity of Burn
  - High Severity = soil erosion and flood potential significantly increased
- Age of burn scar
  - Impacts will be greatest immediately after the fire and into the first year
  - Slowly breaks down over several years
- Rainfall Intensity
  - Rain on melting snow



# Rainfall Rates Likely to Produce Flash Flooding and/or Debris Flows

- 0.3 inches in 15 minutes
- 0.5 inches in less than one hour
- 1.0 inches in 2 hours
- 1.50 inches over any duration time
- Location and rate of precipitation, and steepness of terrain will determine ultimate impact
- Average of 5 events per season meet the above criteria in Musselshell county





# Increased Probability for Flooding

## What Areas are at Risk?

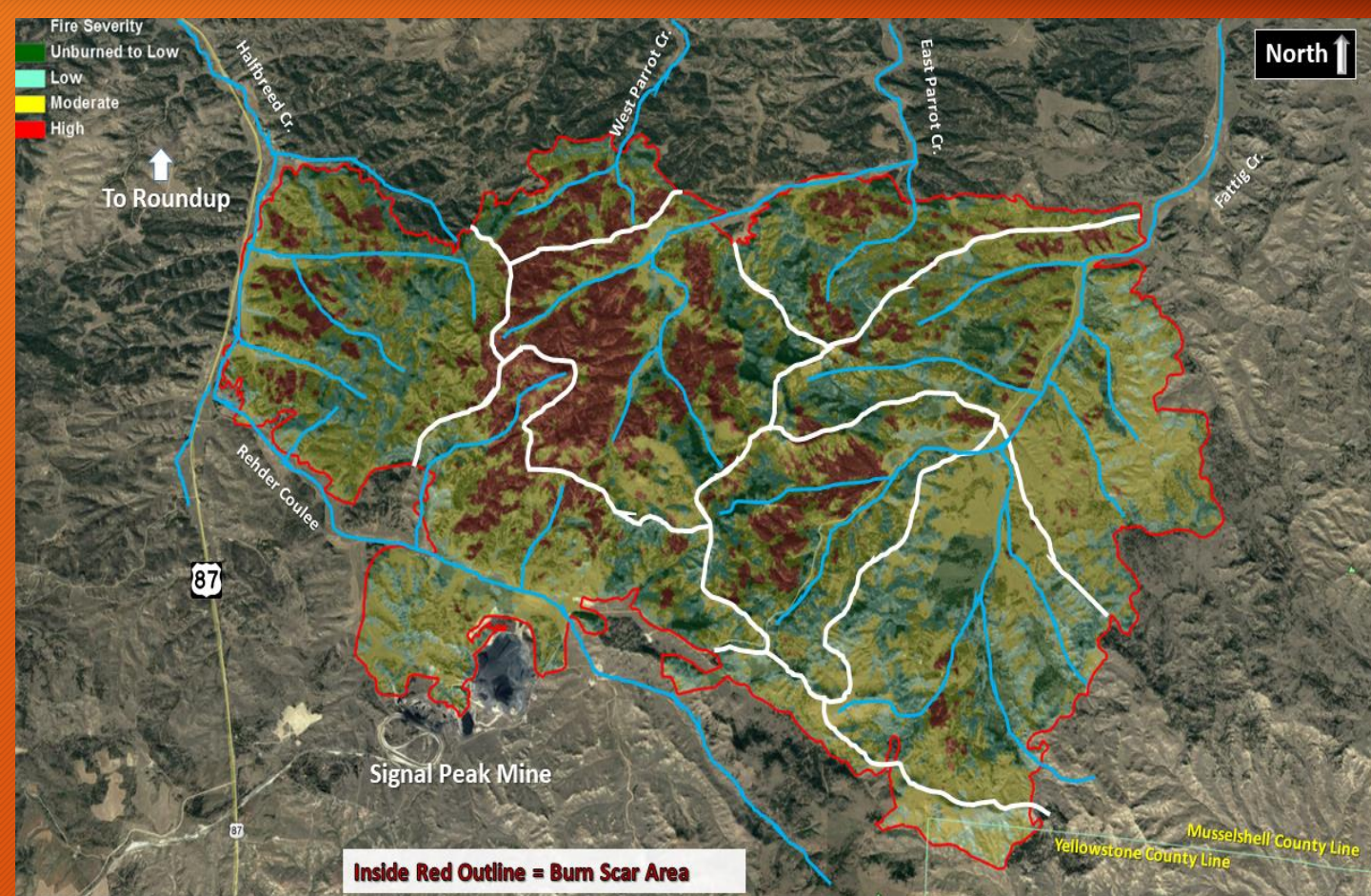
- Greatest Risk Area: All low lying areas, flood plains, existing and historic stream channels where gravity will move water and debris
- Be Aware: Water and debris can be transported into areas that don't normally see water flow.

We caution all residents and recreationalists in and around the burn area

All areas in and downslope / downstream of burn scars should be aware of the increased probability of Flash Flood and Debris Flows

# Most Impacted Drainages

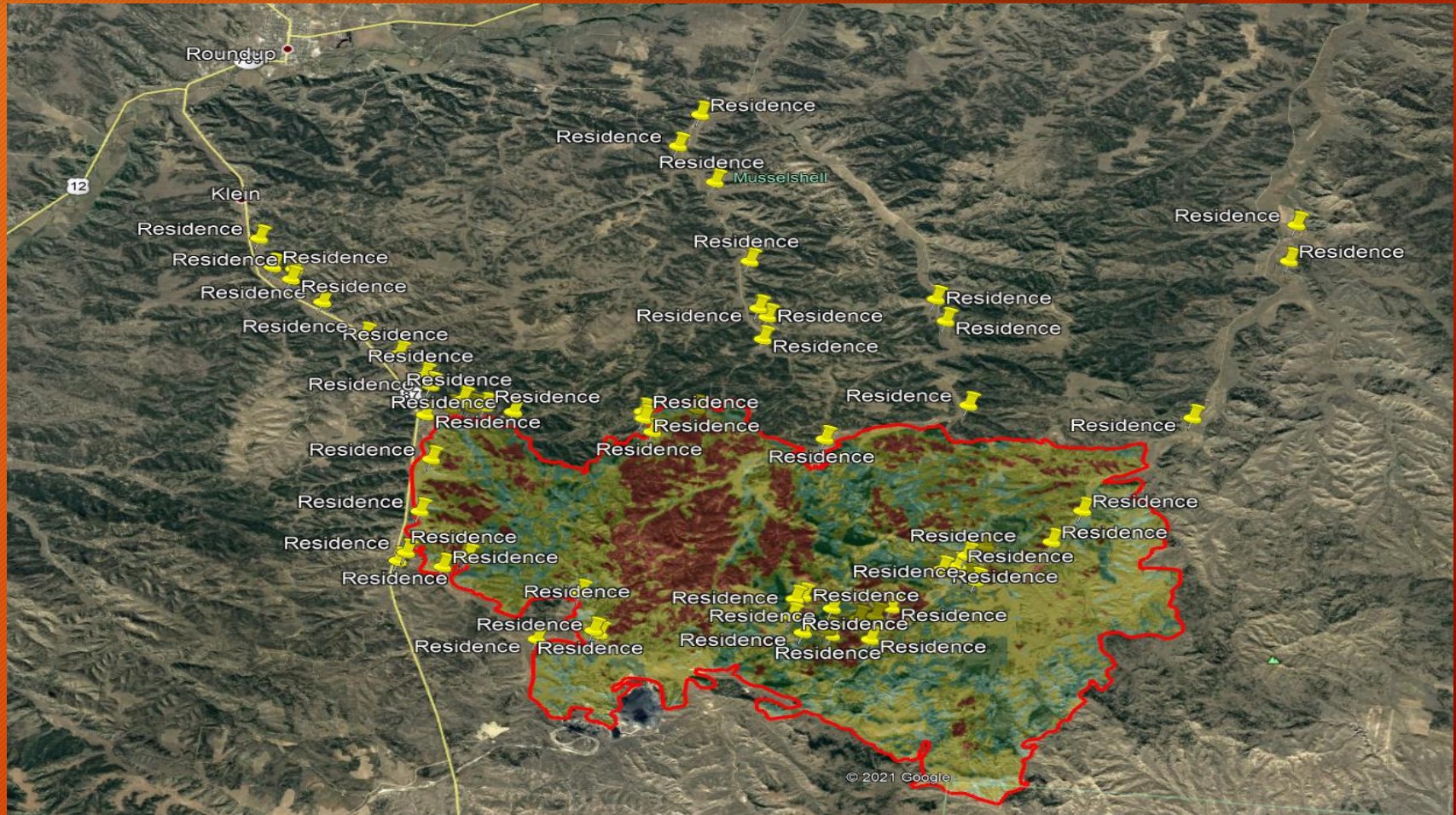
Based on Burn Severity Percentage/Area Burned



1. East Parrot Creek
2. Fattig Creek
3. Halfbreed Creek
4. West Parrot Creek
5. Rehder Coulee

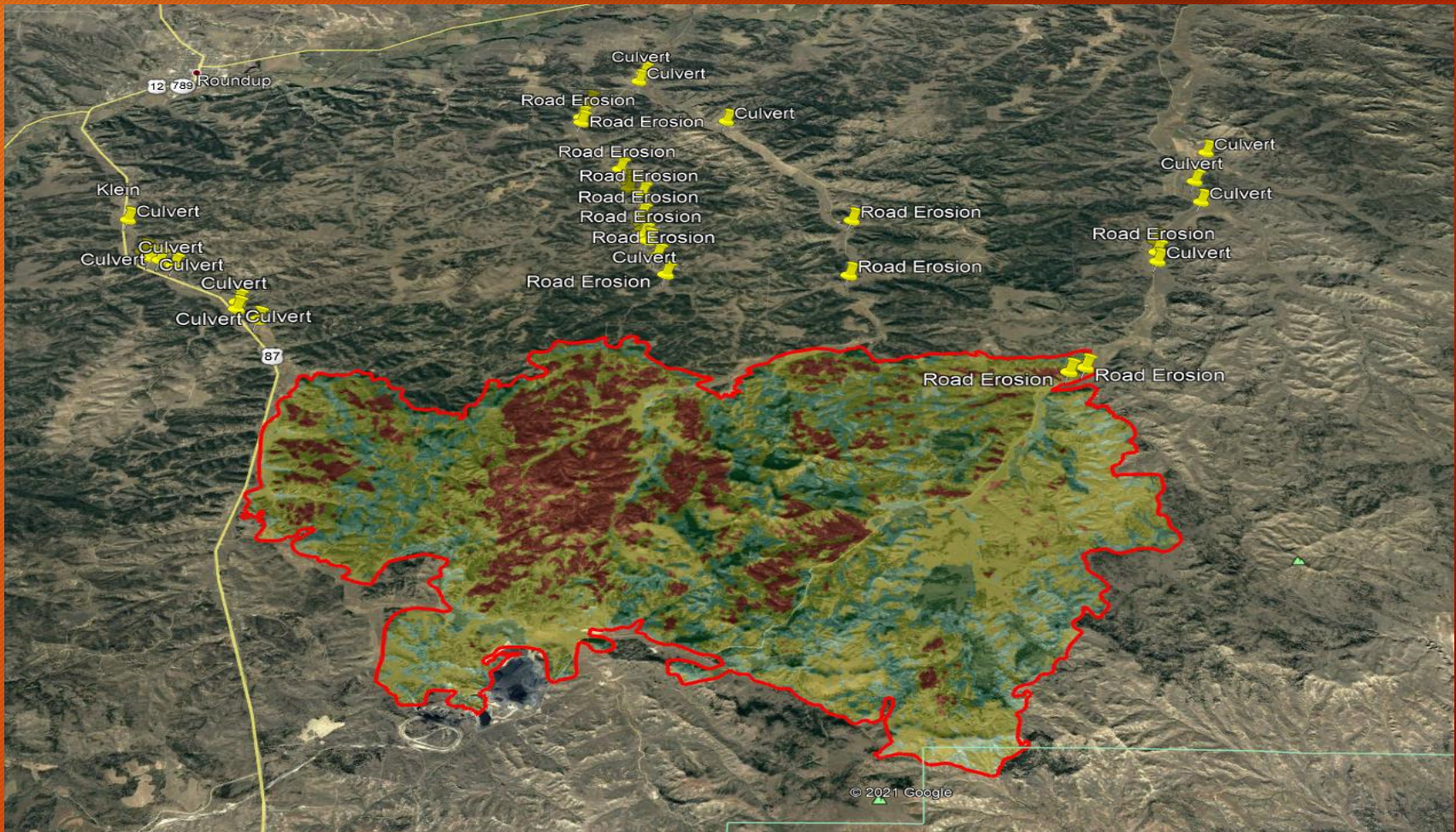
# Residences:

Sample of Populated Locations In and Downstream of the BobCat Burn Area



# Roads:

## Sample of Culverts and Potential Erosion Points





# How Do We Best Prepare/Respond?

- Unsure of your risk - Please Contact Local Officials
- Have an evacuation/escape route planned that is least likely to be impacted by Flash Flooding or Debris Flows
- Have an Emergency Supply Kit available
- Stay informed before and during any potential event;
  - Know where to obtain National Weather Service (NWS) Outlooks, Watches and Warnings
  - Facebook, Instagram, and Twitter
  - NOAA Weather Radio Weather.gov/Billings
- Be alert if any precipitation develops.

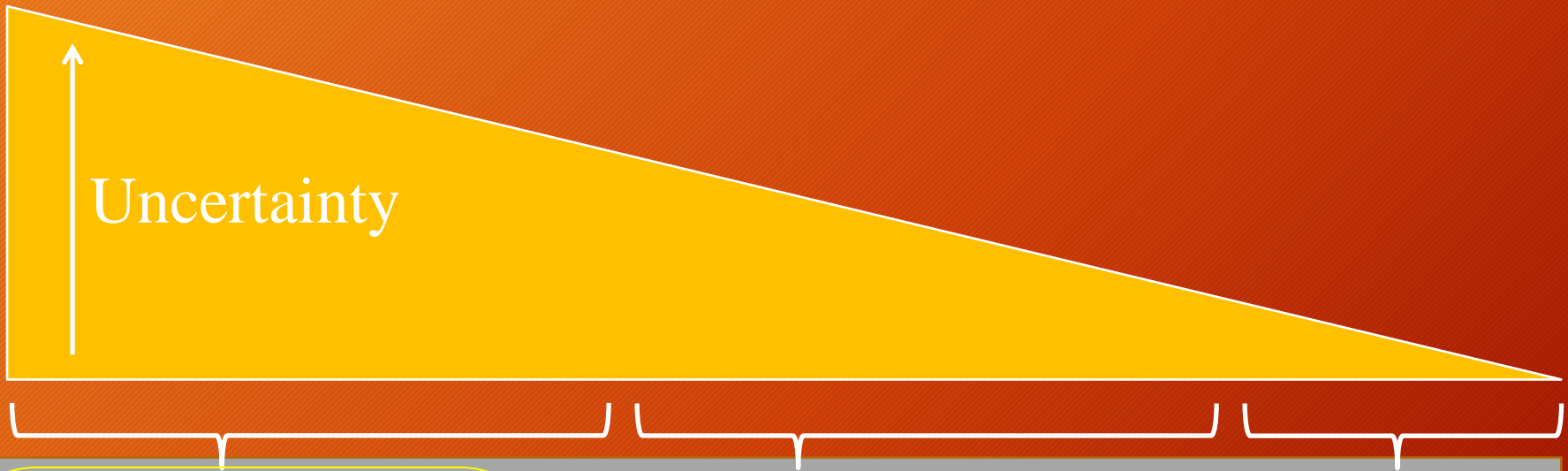
**Do not wait for a warning to evacuate should heavy precipitation develop**

- **Do not drive through any amount of moving water.**
- Call 911 if you are caught in a Flash Flood or Debris Flow.





# Hazardous Weather *Planning Ahead*



## Up to a Week in Advance

### Outlook

There is a risk of heavy rain somewhere in the region. The location, magnitude and timing still uncertain.



Stay Tuned to the Forecast  
Formulate Some Initial Plans

## A Couple Days

### Watch

Potential of heavy rain is becoming more likely. Still some uncertainty on location, magnitude and timing.



Make Plans to Limit Impacts

## Within a Day

For this type of flooding - warning lead times will be very limited

### Warning

Severe weather conditions are occurring or highly likely.



Put Plans in Action



# Hazardous Weather Planning Ahead

Warning Graphical Display

Local forecast by 7:59u, 48° or 21st zone

News Headlines  
 - February 17, 2021 Snow & Cold Summary  
 - New flood stage for the Clark Fork of the Yellowstone River near Betty

NWS Forecast Office Billings, MT  
 Billings, MT  
 Current Hazards Current Conditions Radar Forecasts Rivers and Lakes Climate and Past Weather Programs

What is ahead

## What's Ahead

Locations	Wed (17 <sup>th</sup> )	Thu (18 <sup>th</sup> )	Fri (19 <sup>th</sup> )	Sat (20 <sup>th</sup> )	Sun (21 <sup>st</sup> )
High/Low Temps					
Billings	26°/5°	28°/12°	36°/20°	37°/20°	39°/30°
Livingston	30°/8°	30°/19°	37°/20°	35°/20°	38°/32°
Sheridan	27°/2°	26°/5°	36°/15°	35°/12°	38°/22°
Miles City	19°/-2°	22°/2°	35°/16°	36°/16°	39°/29°

Heads Up!!

- Snow showers today...some spots may see 1-2"
- Winds increasing Thursday night Foothills
- Strong winds possible early next week

Click a location below for detailed forecast.

Last Map Update: Wed, Feb. 17, 2021 at 6:08:04 am MST

Weather.gov/billings

Weather.gov/Billings Headlines

Weather Stories

## Heavy Rainfall Possible Late This Week

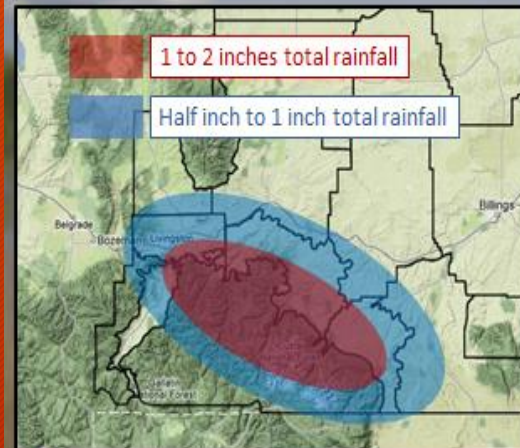
- 1 – 2" Total Rainfall Possible
- Significant Rises In Streams and Creeks
- Potential Flash Flooding In Burn Affected Areas



**Be Prepared for Potential Rapid Runoff in Burn Scar Affected Areas!**

Still a great deal of uncertainty exists with this system. Monitor forecasts closely!

## Heavy Rainfall Possible Saturday and Saturday Night

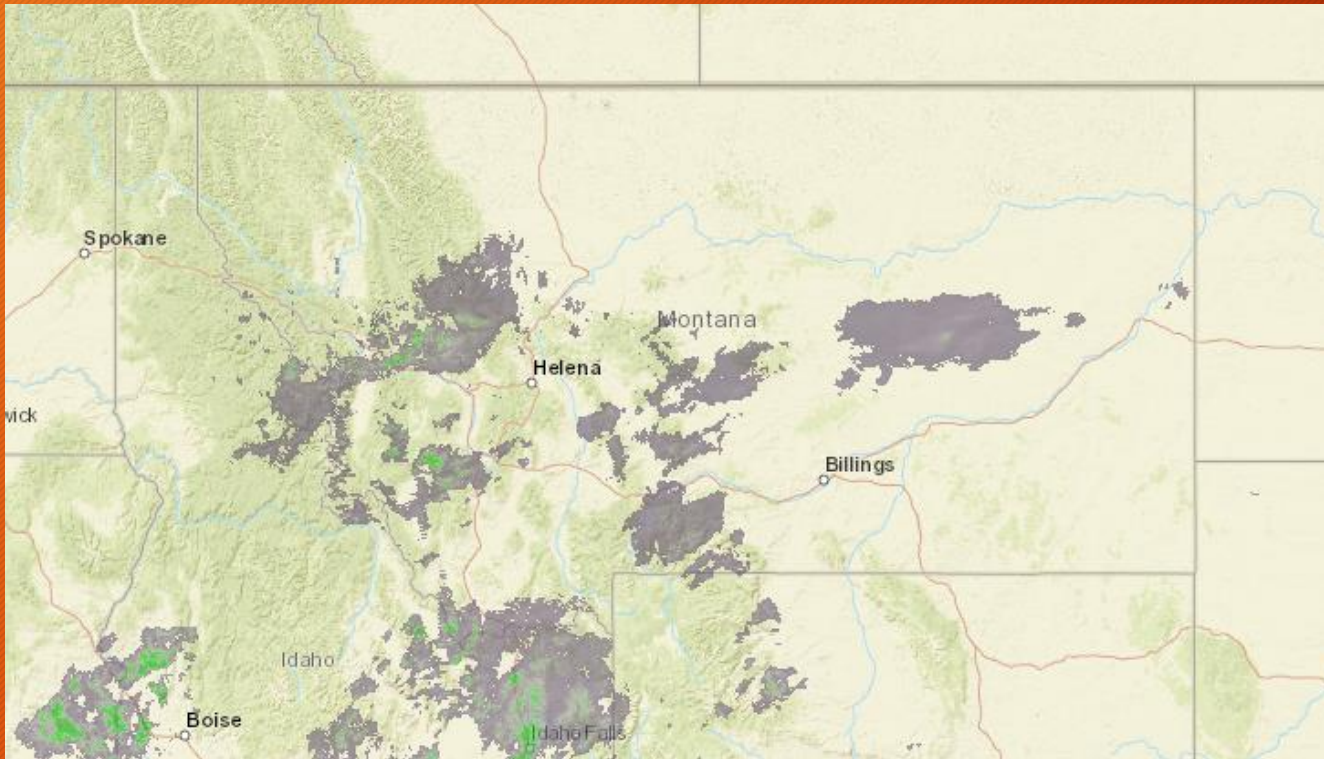


Potential Impacts:

- Quick water rises on streams and creeks
- Large debris flows in Pine Creek burn scar area
- Flash flooding in Pine Creek burn scar area

**Rapid Runoff Possible in Pine Creek Burn Scar Area!**

# NWS Radar



<https://radar.weather.gov/>

# Flood Insurance

National Flood Insurance Program

<https://www.fema.gov/flood-insurance>

Montana DNRC

<http://dnrc.mt.gov/divisions/water/operations/floodplain-management>

A poster titled "FLOODS AFTER WILDFIRE" with the subtitle "Make Sure You are Covered." The illustration shows a house and a barn partially submerged in floodwaters, with rain falling. The text below the illustration states: "Typically a flood insurance policy is not effective until 30 days after purchase." It also mentions "Section 100241 of the Biggert-Waters Act of 2012 waives the 30-day waiting period on flood insurance for properties affected by flooding on Federal land resulting from wildfires." Logos for the Insurance Institute for Business & Home Safety and the U.S. Forest Service are at the bottom.

**FLOODS AFTER WILDFIRE**  
Make Sure You are Covered.

*Typically a flood insurance policy is not effective until 30 days after purchase.*

Section 100241 of the Biggert-Waters Act of 2012  
*waives the 30-day waiting period on flood insurance*  
for properties affected by flooding on Federal land  
resulting from wildfires.

Visit [FloodSmart.gov](http://FloodSmart.gov)

Insurance Institute for Business & Home Safety<sup>®</sup> in partnership with U.S. Forest Service

## Plan ahead!

There is typically a 30-day waiting period for an NFIP policy to go into effect!

# Ready.Gov and FEMA

- <https://www.ready.gov/floods>
- <https://floodsmart.gov/wildfires>

## FLOOD AFTER FIRE

Did you know that wildfires dramatically alter the terrain and increase the risk of floods?

**Reduce your risk. The time to buy flood insurance is now.**

Contact your local insurance agent for more information or visit the National Flood Insurance Program at [www.fema.gov/national-flood-insurance-program](http://www.fema.gov/national-flood-insurance-program)

**During normal conditions, vegetation helps absorb rainwater.**

**But after an intense wildfire, burned vegetation and charred soil form a water repellent layer, blocking water absorption.**

**During the next rainfall, water bounces off of the soil.**

**And as a result, properties located below or downstream of the burn areas are at an increased risk for flooding.**

**Heavy Rains**  
Excessive amounts of rainfall can happen throughout the year. Properties directly affected by fires and those located below or downstream of burn areas are most at risk for flooding.

**Degree of Land Slope**  
Higher degrees of land slope speed up water flow and increase flood risk.

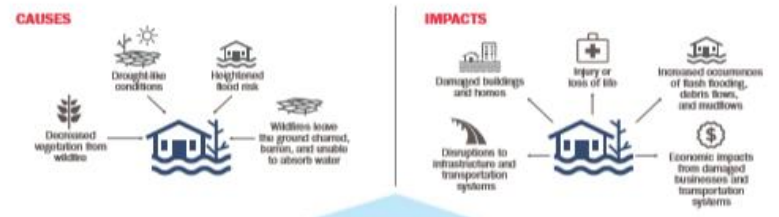
**Flash Floods**  
Intense rainfall can flood low lying areas in less than six hours. Flash floods roll boulders, tear out trees and destroy buildings and bridges.

**Mudflows**  
Rivers of liquid and flowing mud are caused by a combination of brush loss and subsequent heavy rains. Rapid snowmelt can also trigger mudflows.



### POST-WILDFIRE FLOODING

Wildfires leave the ground unable to absorb water, creating conditions ripe for flash flooding and mudflow.



### How Can I Reduce My Risk?

- Secure objects in your yard that may be swept away or damaged by floodwaters
- Elevate your home and utilities (electrical, furnace, water heater, etc.) above the flood elevation
- Get back homes from their charred and structures
- Know your risk by visiting FEMA's FloodMap Service Center ([msc.fema.gov/portal](http://msc.fema.gov/portal)) or contacting your community's floodplain administrator to find out if your home is in a flood zone
- Coordinate with your community to keep storm drains free of debris
- Purchase flood insurance through the National Flood Insurance Program. Talk to your insurance agent today.

### How Can My Local Government Reduce My Risk?

- Join the National Flood Insurance Program and consider adopting regulations above the minimum requirements of the program
- Incorporate flood mitigation into community plans
- Consider future conditions in floodplain management activities
- Regulate development, including updating and enforcing building codes, in flood zones and wildfire hazard areas
- Improve stormwater management planning

### Definitions

National Flood Insurance Program (NFIP) provides flood insurance to homeowners, renters, and business owners in communities that participate in the NFIP. Participating communities adopt and enforce ordinances that reduce the risk of flooding.

### Additional Resources

- [Ready.gov](http://ready.gov)
- [ready.gov/floods](http://ready.gov/floods)
- [ready.gov/wildfires](http://ready.gov/wildfires)
- National Flood Insurance Program [fema.gov/national-flood-insurance-program](http://fema.gov/national-flood-insurance-program)
- Flood Economics <http://floodeconomics.com/>



# Montana DNRC Resources

- <http://dnrc.mt.gov/divisions/water/operations/floodplain-management>
- <http://dnrc.mt.gov/flood-and-fire>
- Montana Insurance Commission
  - <https://csimt.gov/your-insurance/flood/>

# NWS Billings Contacts

- Tom Frieders - Warning Coordination Meteorologist
  - [tom.frieders@noaa.gov](mailto:tom.frieders@noaa.gov)
- Todd Chambers - Hydrology Focal Point
  - [todd.chambers@noaa.gov](mailto:todd.chambers@noaa.gov)
- NWS Billings - [nws.billings@noaa.gov](mailto:nws.billings@noaa.gov)
  - [www.weather.gov/billings](http://www.weather.gov/billings)
  - <https://www.facebook.com/NWSBillings/>
  - <https://twitter.com/NWSBillings>

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National Weather Service Billings

