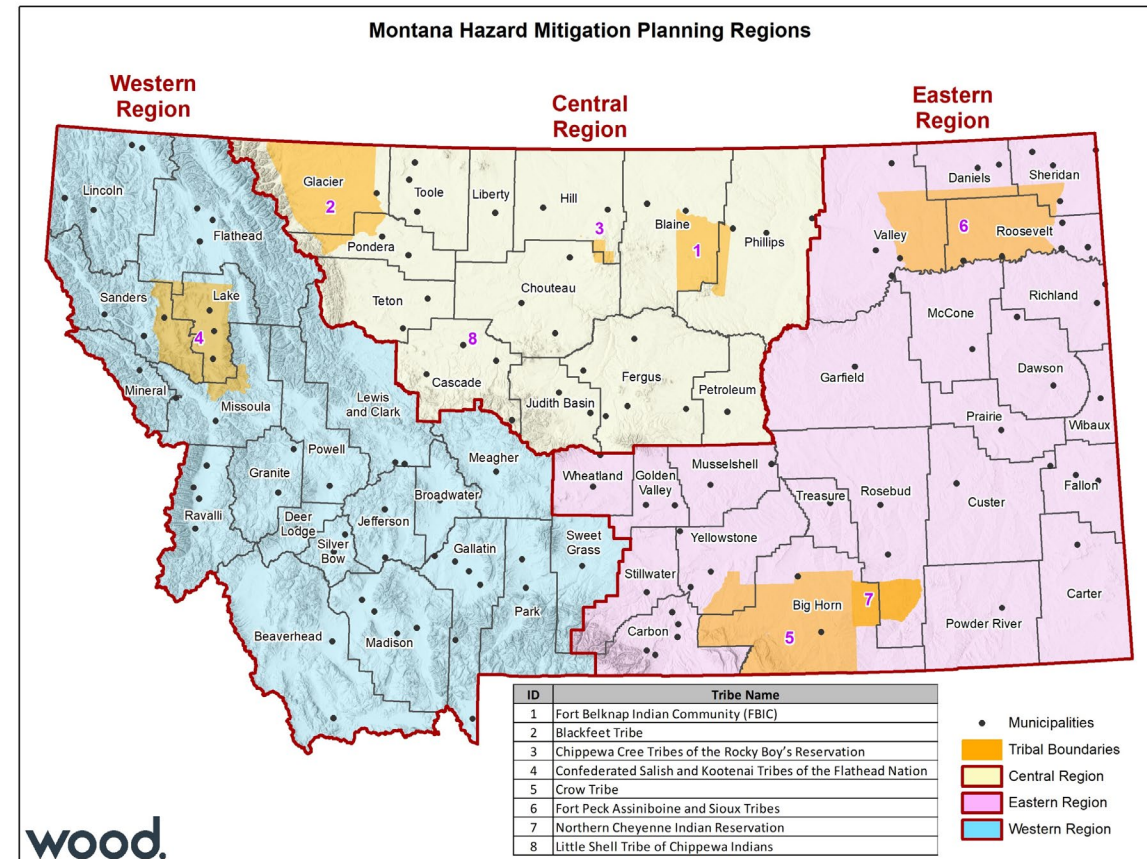




# State of Montana Western Region Hazard Mitigation Plan



## Meeting 2 – Risk Assessment Update

September 12, 2022, 10:00am-12:00pm MDT

Please type your name, title, and affiliation in the chat box





## Agenda

1. Introductions
2. Review of the hazard mitigation planning process
3. Highlights from returned Data Collection Guides
4. Highlights of Hazard Identification and Risk Assessment (HIRA)
5. Next steps
6. Questions and answers



# Meeting Logistics

- Please mute your mic when not speaking.
  - ...but please feel free to unmute when you have something to say!
  - You can also use the chat log to make comments, ask questions, or provide information.
  - This meeting is being recorded.
  - Slides, meeting summary, and recording will be made available.
  - Meeting will use Slido polls to get feedback from participants.
- Join at [slido.com](https://www.slido.com) #Hazards**

# Introductions



# Introductions

- **Montana Disaster and Emergency Services**

- Sara Hartley – State Hazard Mitigation Officer
- Andrew Long– Mitigation Coordinator
- Ryan Lee – Western Region Supervisor
- Audrey Walleser-Martin – Western Region Field Officer
- Kyle Sturgill-Simon– Western Region Field Officer

- County/Tribal Emergency Management Coordinators

- Federal & State Partners

- Other Stakeholders

- **Wood Project Team**

- Jeff Brislawn – Project Manger
- Amy Carr – Lead Planner
- Mack Chambers – Lead GIS Analyst
- Cameron Nelson – Hazard Mitigation Specialist
- Chris Johnson – Hazard Mitigation Planner/GIS
- Natalie Schoen – Hazard Mitigation Planner
- Adam Qian – Environmental Planner
- Melissa Baum – Hazard Mitigation Planner
- Emily Geery – SWCA Wildfire Risk Assessment Support
- Victoria Amato – SWCA Wildfire Planning Specialist

Jurisdictional representatives & stakeholders  
**Type your name, title, and affiliation in chat box**

# Review of the Hazard Mitigation Planning Process



# Terminology

**Hazard:** Act or phenomenon with potential to do harm

**Vulnerability:** Susceptibility to harm, damage, loss

**Exposure:** People, property, systems or functions that could be lost to a hazard

**Risk:** Combines hazard, vulnerability, exposure and probability

**Mitigation:** Actions taken in advance of a hazard's impact that reduce its severity



# Disaster Mitigation Action of 2000

## Federal Legislation

### 44 CFR 201.6

- Requires communities to update their hazard mitigation plans every 5 years to remain eligible for federal pre- and post-disaster funding for hazard mitigation grants from FEMA
- Plan ensures the counties and municipalities in the Region will remain eligible for mitigation projects when funding becomes available
- Tribal Mitigation Planning Guidance updated in 2017 and 2019





# FEMA's Nine-Step Planning Process

- **Step 1** Determine the Planning Area and Resources
- **Step 2** Build the Planning Team
- **Step 3** Create an Outreach Strategy
- **Step 4** Review Community Capabilities
- **Step 5** Conduct a Risk Assessment
- **Step 6** Develop a Mitigation Strategy
- **Step 7** Keep the Plan Current
- **Step 8** Review and Adopt the Plan
- **Step 9** Create a Safe and Resilient Community

# Progress So Far

- Kickoff meeting May 26<sup>th</sup>
- Risk and capability assessments in process of being drafted by Wood, based on research and CPTs/stakeholder input
- Data Collection Guides provided to participating jurisdictions
- Online public survey closes October 8<sup>th</sup>

# Highlights From Data Collection Guides



# Highlights From Data Collection Guides

## Growth and Development Trends

Jurisdiction	Comments
Granite County	<ul style="list-style-type: none"><li>• <b>Residential growth has doubled</b> in the past 5 years.</li><li>• People are <b>building homes in remote hard to access locations</b>. Areas are not serviced by emergency services year-round</li></ul>
Lewis and Clark County	<ul style="list-style-type: none"><li>• <b>Steady growth in the Helena valley</b>. Some new residential structures in SFHA (not as high as existing structures).</li><li>• High rate of development in the north valley including North Hills an <b>area susceptible to wildfire</b></li><li>• <b>Interest in increasing development in downtown Lincoln</b> to attract tourism.</li><li>• There <b>will be an increase in development in the 500-yr floodplain</b>.</li><li>• <b>100-yr floodplain</b> is currently seeing an <b>increase</b> in the number of <b>commercial structures</b>.</li><li>• An <b>increase in development in the wildland urban interface</b> is expected.</li></ul>
City of Helena	<ul style="list-style-type: none"><li>• <b>Commercial structures being built</b> throughout the community.</li><li>• A good amount of <b>residential construction has occurred East of Town</b> in Mountain View Meadows.</li><li>• City works very hard to assure fire and building code compliance with all new projects.</li></ul>
Madison County	<ul style="list-style-type: none"><li>• Madison County was designated as the <b>6th fastest growing county</b> within the state</li><li>• The population/construction <b>boom</b> has put a <b>strain on current infrastructure</b> throughout the county.</li></ul>
Jefferson County	<ul style="list-style-type: none"><li>• Most development consists <b>of single-family residential</b> use on individual lots</li><li>• <b>Land owned by the Federal Government limits potential</b> for all types of <b>development</b>.</li><li>• <b>Most development taking place on existing lots</b></li><li>• Development should be <b>expected in WUI areas</b>.</li><li>• Development tends to be <b>occurring near the population centers at the edges of the county</b>.</li><li>• <b>Zoning limits development potential</b> in <b>Northern Jefferson County</b> and in the <b>southeastern</b> part of the county (Milligan Canyon/Boulder Valley).</li></ul>

# Highlights From Data Collection Guides

## Growth and Development Trends Continued

Jurisdiction	Comments
Flathead County	<ul style="list-style-type: none"><li>• Expected to continue to <b>grow in population</b> over the next <b>5 years</b>.</li><li>• Most of the growth is expected to occur within and near the communities of <b>Bigfork, Evergreen, Lakeside, rural Whitefish</b> and <b>West Valley</b>.</li></ul>
Powell County	<ul style="list-style-type: none"><li>• Very <b>minimal development</b> in the last 5 years.</li><li>• New growth is expected to <b>continue at a slow pace</b>.</li></ul>
City of Deer Lodge	<ul style="list-style-type: none"><li>• Populations have steadily <b>trended downward</b> over the last 5 years.</li><li>• Local effort to increase housing stock, renovate existing stock, and attract new businesses.</li><li>• <b>No major development expected in floodplains</b>. Occasional property improvements/single-family housing within the flood fringe is a possibility.</li></ul>
Sweet Grass County	<ul style="list-style-type: none"><li>• <b>Very little development</b> in this area. Not a lot of growth anticipated in rural area.</li><li>• Wildland urban interface may be of concern during fires.</li></ul>

# Highlights From Data Collection Guides

## Vulnerable Populations

Jurisdiction	Comments
Granite County	<ul style="list-style-type: none"><li>• The <b>lack of transportation</b> for some <b>elderly and disabled</b> has continued to be an issue</li><li>• We have contacts for school buses if this ever is an issue</li></ul>
Lewis and Clark County	<ul style="list-style-type: none"><li>• <b>AFN populations</b> in our community are particularly vulnerable to many of our key hazards including earthquake, flood, and wildfire.</li><li>• <b>Limited resources and local capability to provide shelter or long-term support</b> to those with special needs is an ongoing issue for our LEPC and NGOs.</li></ul>
Madison County	<ul style="list-style-type: none"><li>• <b>Extremely hard to nail down an effective way to be able to notify and assist</b> these AFN populations in time of any event/incident.</li><li>• We are also noticing a <b>huge boom on one side of our county with Amish people</b> (how do we approach and notify) this part of the community in the event of an incident/emergent situation?</li></ul>
Powell County	<ul style="list-style-type: none"><li>• A primary concern is that the <b>north half of the county, (townships of Helmville and Ovando and a large portion of the Bob Marshall Wilderness) does not have cell service</b> and is <b>not well-served by the sheriff's department</b> due to staffing issues and funding shortages.</li></ul>
Sweet Grass County	<ul style="list-style-type: none"><li>• <b>Evacuation</b> is largest concern</li></ul>
Jefferson County	<ul style="list-style-type: none"><li>• <b>Substantial population</b> with access and functional needs.</li><li>• From the <b>lack of the financial or physical ability to prepare</b> for disasters to the <b>inability to absorb and recover</b> from the results of those hazards, the challenges to this population are high.</li></ul>

# Review of Hazard Identification and Risk Assessment



# Conducting a Risk Assessment - Components

- Hazard Identification
  - What, where, how often, how bad
- Vulnerability Assessment
  - What will be affected?
  - Estimate losses by jurisdiction
  - Assess vulnerabilities of Critical Facilities, People, Economy, Natural and Built Environment





# Hazard Identification and Risk Assessment Includes

- Hazard description
- Past events
- Location (geographical area affected)
- Probability of future occurrences
- Impact severity Warning time
- Related hazards
- Climate change considerations
- Vulnerability assessment
  - Population
  - Property
  - Critical facilities and infrastructure
  - Economy
  - Environment and cultural resources
  - Development trends
- Risk summary and significance by jurisdiction

# Recent Disasters in Western Montana

2022 – Severe Storm and Flooding (DR-4655-MT)

2020 – Montana COVID-19 Pandemic (DR-4508-MT)

2020 – Bridger Foothills Fire (FM-5346)

2019 – Flooding (DR-4437)

2019 – North Hills Fire (FM-5286)

2018 – Flooding (DR-4405)

2017 – Alice Creek Fire (FM-5208)

2017 – Highway 200 Fire Complex (FM-5210)

2017 – LoLo Peak Fire (FM-5197)

2017 – Moose Peak Fire (FM-5211)

2017 – Rice Ridge Fire (FM-5207)

2017 – West Fork Fire (FM-5209)

## 48 Federally Declared Disasters in Region since 1953



31 Fire



8 Flood



5 Severe Storm(s)



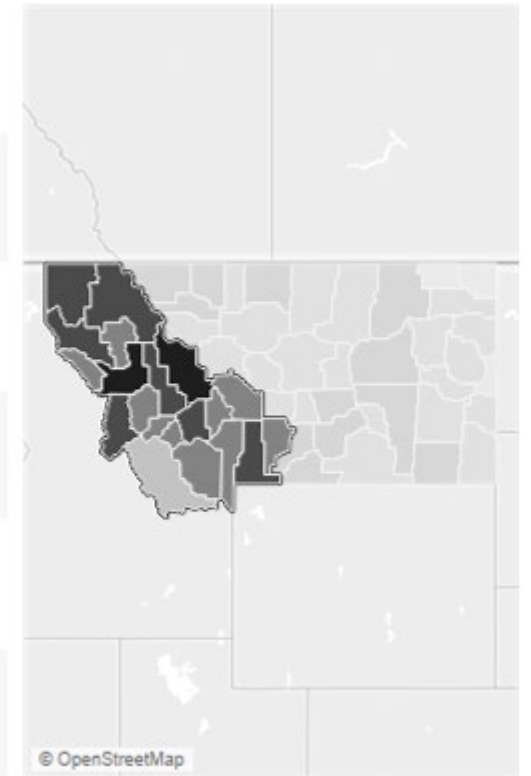
2 Biological



1 Drought



1 Hurricane



# Asset Inventory Update

- Parcel level analysis
  - Assessors' data, parcel centroids
  - General property
  - Residential, commercial, etc.
- People
- Critical facilities and infrastructure
  - Grouped by FEMA Lifeline categories



# Hazard Rankings

## Location/Spatial Extent

Extensive: 50-100% of planning area

Significant: 10-50% of planning area

Limited: Less than 10% of planning area

## Potential Severity

Catastrophic: Multiple deaths, shutdown of facilities for 30 days or more, >50% of property is severely damaged

Critical: Multiple severe injuries, shutdown of facilities for at least 2 weeks, >25% of property is severely damaged

Moderate: Some injuries, shutdown of critical facilities for more than one week, >10% of property is severely damaged

Negligible: Minor injuries, minimal quality-of-life impact, interruption of facilities and services for 24 hours or less, less than 10% of property is severely damaged.

## Frequency of Occurrence

Highly Likely: Near 100% probability each year.

Likely: Between 10 and 100% probability per year or at least one chance in ten years.

Occasional: Between 1 and 10% probability per year or at least one chance in next 100 years.

Unlikely: Less than 1% probability in next 100 years.

## Significance (combination of Location/Severity/Frequency)

High: widespread potential impact

Medium: moderate potential impact

Low: minimal potential impact

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#Hazards**

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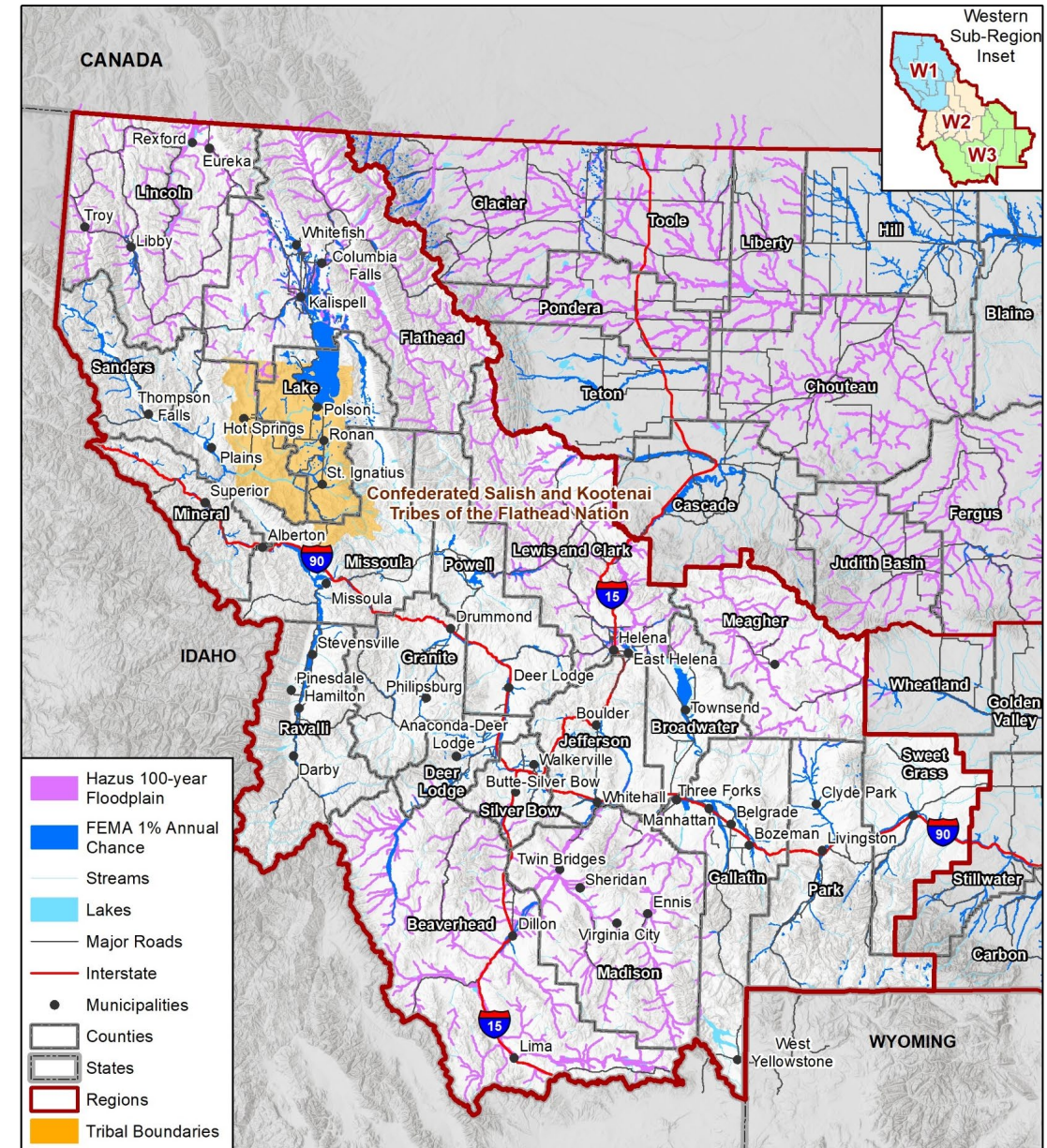
**What jurisdiction do you represent?**

# Flooding

- The Missouri River, along with its tributaries are Western Region’s primary flood hazards.
  - Among the major tributaries are the Beaverhead, Bitterroot, Flathead, Gallatin, Kootenai, Jefferson and Madison Rivers.
- Since 1953 there have been **8 Federally Declared Flood Events** in the Western Region

County	Flood Source
Anaconda-Deer Lodge	DNRC
Beaverhead	DNRC (partial), Hazus
Broadwater	NFHL
Butte-Silver Bow	DNRC
Flathead	NFHL (partial), Hazus
Gallatin	NFHL
Granite	NFHL
Jefferson	DNRC
Lake	NFHL
Lewis and Clark	NFHL (partial), Hazus
Lincoln	NFHL (partial), Hazus
Madison	Hazus
Meagher	Hazus
Mineral	DNRC
Missoula	NFHL
Park	NFHL
Powell	DNRC
Ravalli	NFHL
Sanders	NFHL
Sweet Grass	NFHL

## Western Region Flood Hazards



Map compiled 8/2022;  
intended for planning purposes only.  
Data Source: Montana State Library,  
DNRC, FEMA, Hazus

0 50 100 Miles



# Flooding – Parcels at Risk to 1% Annual Flood Event

County	Improved Parcels	Improved Value	Content Value	Total Value	Estimated Loss	Population
Anaconda-Deer Lodge	106	\$12,303,639	\$7,126,725	\$19,430,364	\$4,857,591	184
Beaverhead	703	\$123,698,654	\$72,423,792	\$196,122,446	\$49,030,612	1,297
Broadwater	63	\$13,059,075	\$8,424,203	\$21,483,278	\$5,370,819	102
Butte-Silver Bow	222	\$53,878,704	\$34,272,577	\$88,151,281	\$22,037,820	437
Flathead	5,116	\$1,279,788,861	\$697,369,170	\$1,977,158,031	\$494,289,508	11,481
Gallatin	1,028	\$306,928,837	\$172,536,359	\$479,465,196	\$119,866,299	2,181
Granite	135	\$20,931,697	\$12,534,501	\$33,466,198	\$8,366,550	274
Jefferson	233	\$39,132,931	\$26,037,496	\$65,170,427	\$16,292,607	466
Lake	267	\$71,895,835	\$39,532,313	\$111,428,148	\$27,857,037	570
Lewis and Clark	1,694	\$412,970,355	\$234,263,360	\$647,233,715	\$161,808,429	3,694
Lincoln	704	\$108,631,571	\$61,757,575	\$170,389,146	\$42,597,287	1,518
Madison	587	\$112,975,153	\$72,354,280	\$185,329,433	\$46,332,358	1,065
Meagher County	70	\$8,513,470	\$6,474,705	\$14,988,175	\$3,747,044	115
Mineral	141	\$28,107,461	\$16,014,056	\$44,121,517	\$11,030,379	294
Missoula	763	\$172,559,054	\$95,729,539	\$268,288,593	\$67,072,148	1,612
Park	379	\$133,391,064	\$79,363,842	\$212,754,906	\$53,188,727	669
Powell	233	\$32,135,558	\$21,300,919	\$53,436,477	\$13,359,119	406
Ravalli	464	\$144,387,729	\$96,208,844	\$240,596,573	\$60,149,143	900
Sanders	293	\$47,408,482	\$27,031,653	\$74,440,135	\$18,610,034	543
Sweet Grass	66	\$19,203,097	\$13,427,859	\$32,630,956	\$8,157,739	96
<b>Total</b>	<b>13,267</b>	<b>\$3,141,901,227</b>	<b>\$1,794,183,763</b>	<b>\$4,936,084,990</b>	<b>\$1,234,021,247</b>	<b>27,905</b>

- Flathead County has the highest amount of Estimated Loss Value with \$494,289,508 total
- Lewis and Clark County has the 2nd highest amount of Estimated Loss Value with \$161,808,429
- Overall, \$4,936,084,990 in total value and a combined estimated loss of \$1,234,021,247 for 1% annual chance flooding.
- There are 13,267 parcels located in the floodplain and 27,905 people at risk to a 1% annual chance flood.

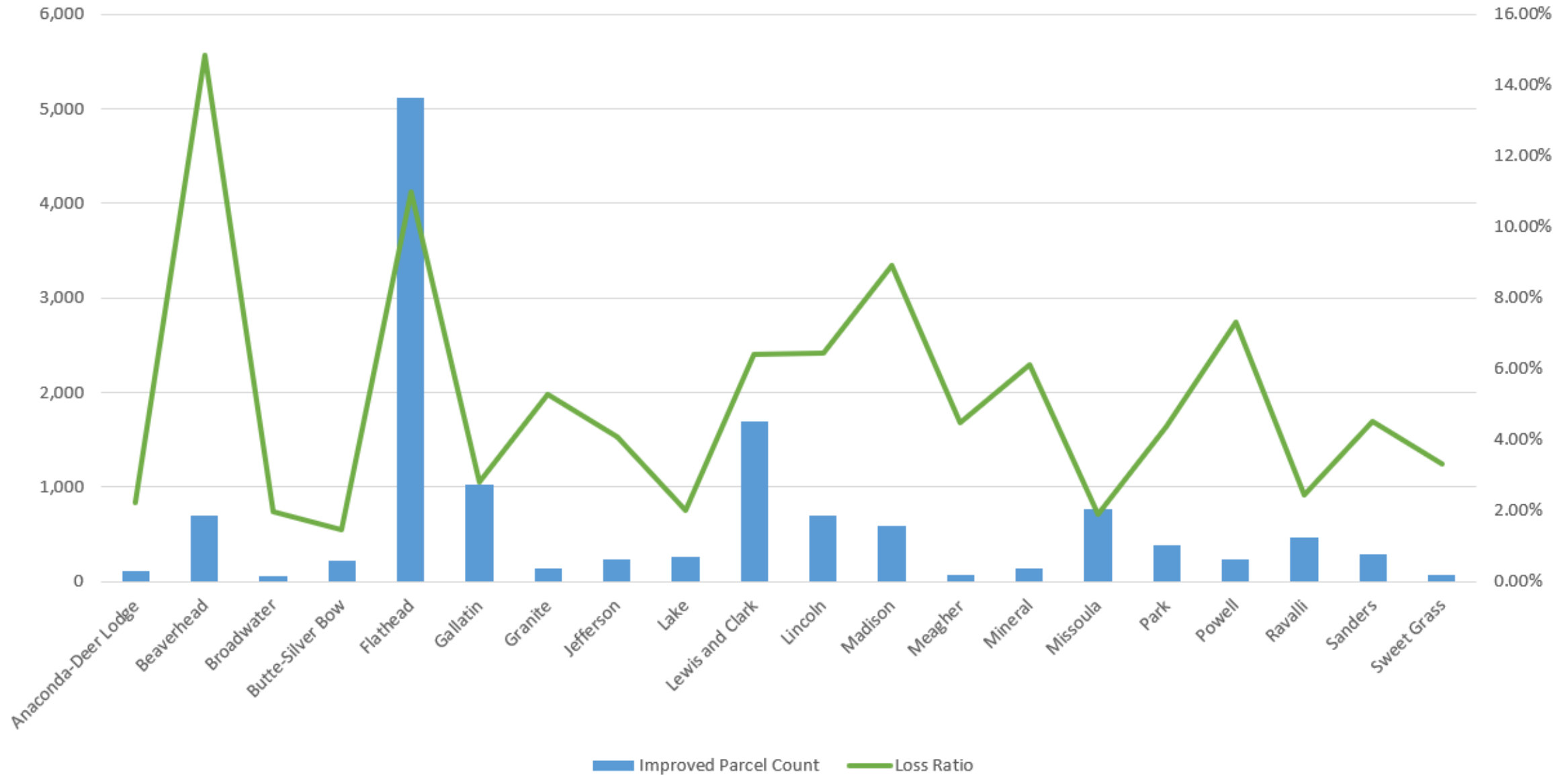




# Flooding – Flathead Reservation Parcels at Risk to 1% Annual Flood Event

County	Property Type	Improved Parcels	Improved Value	Content Value	Total Value	Estimated Loss	Population
Lake	Agricultural	23	\$5,452,970	\$5,452,970	\$10,905,940	\$2,726,485	
	Commercial	3	\$139,860	\$139,860	\$279,720	\$69,930	
	Exempt	2	\$172,690	\$172,690	\$345,380	\$86,345	
	Residential	94	\$20,554,299	\$10,277,150	\$30,831,449	\$7,707,862	236
	Tribal	2	\$171,290	\$171,290	\$342,580	\$85,645	
	Vacant	3	\$101,250	\$101,250	\$202,500	\$50,625	
<b>Total</b>		<b>127</b>	<b>\$26,592,359</b>	<b>\$16,315,210</b>	<b>\$42,907,569</b>	<b>\$10,726,892</b>	<b>236</b>

# Flood Improved Parcel Count and Loss Ratio by County



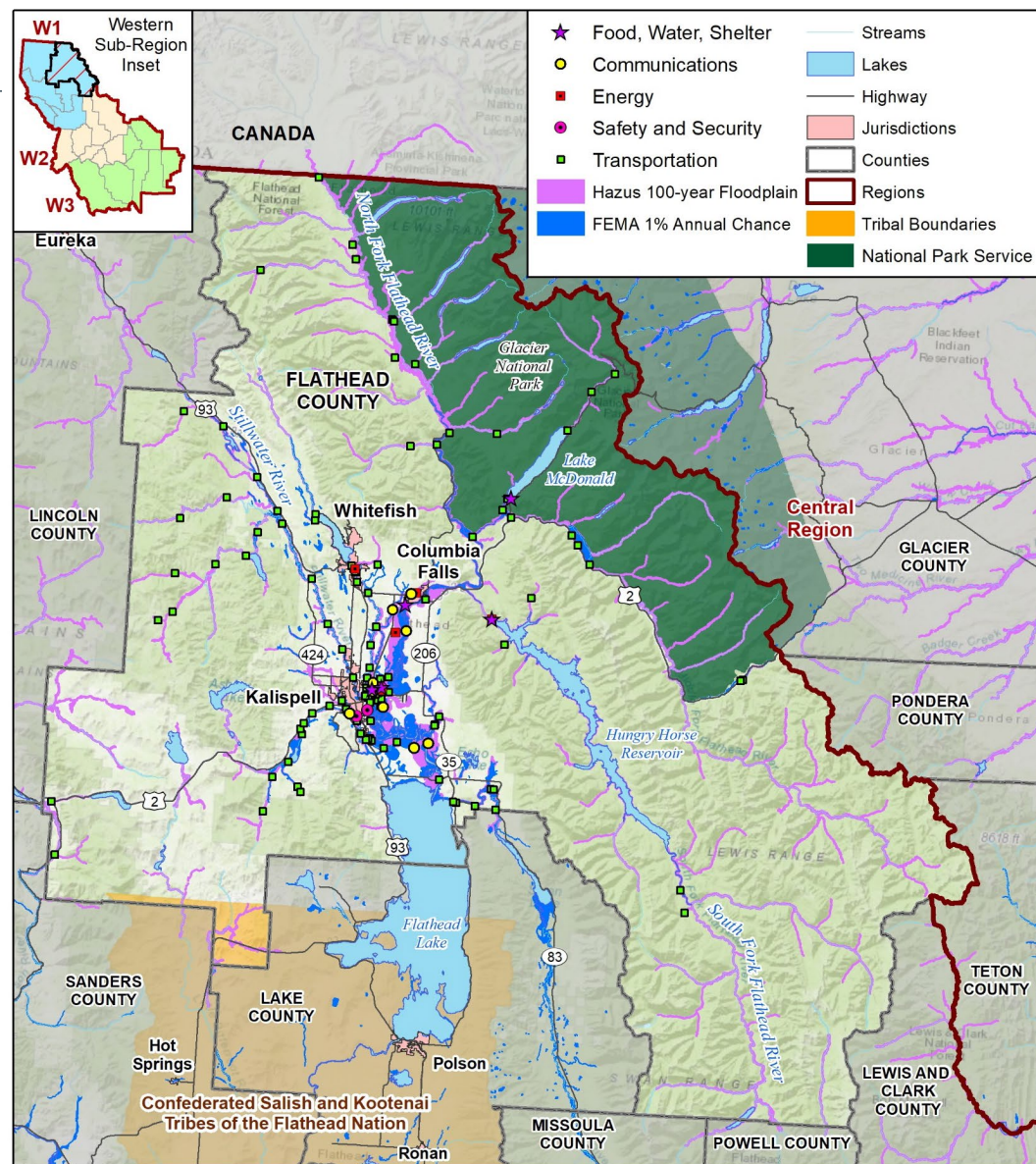
# Flooding – Critical Facilities at Risk to 1% Annual Flood Event

County	Communications	Energy	Food, Water, Shelter	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Total
Anaconda - Deer Lodge	3	-	1	-	-	-	40	44
Beaverhead	-	1	1	-	-	-	2	4
Broadwater	-	2	1	-	-	1	13	17
Butte-Silver Bow	1	-	2	-	-	2	11	16
Flathead	12	6	5	-	-	5	108	136
Granite	1	5	1	-	-	-	24	31
Jefferson	-	-	2	-	-	1	49	52
Lake/CSKT	-	-	0/1	-	-	-	5/22	5/23
Lewis and Clark	10	7	2	-	-	7	92	118
Lincoln	-	-	3	-	1	1	66	71
Madison	-	2	1	-	1	5	57	70
Meagher	-	-	-	-	-	-	32	32
Mineral	-	-	-	-	-	1	67	68
Park	1	-	1	-	-	-	55	57
Powell	-	-	1	-	-	1	45	47
Ravalli	1	-	1	-	-	-	32	34
Sanders	-	3	2	-	-	-	40	45
Sweet Grass	1	-	2	-	-	2	11	16
<b>Total</b>	<b>29</b>	<b>26</b>	<b>26</b>	<b>0</b>	<b>2</b>	<b>24</b>	<b>787</b>	<b>898</b>

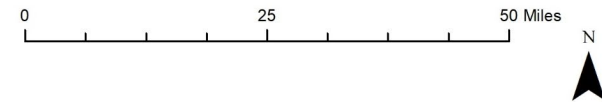
# Flooding – Critical Facilities at Risk to 1% Annual Flood Event

County	Jurisdiction	Communications	Energy	Food, Water, Shelter	Hazardous Materials	Health and Medical	Safety and Security	Transportation	Total
Flathead	Columbia Falls	-	1	-	-	-	-	-	1
	Kalispell	-	-	-	-	-	1	1	2
	Whitefish	-	1	-	-	-	-	4	5
	Unincorporated County	12	4	5	-	-	4	103	128
	<b>Total</b>	<b>12</b>	<b>6</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>108</b>	<b>136</b>

## Western Region Flathead County Flood Hazards & Facilities



Map compiled 9/2022;  
intended for planning purposes only.  
Data Source: Montana State Library,  
DNRC, FEMA, Hazus, HIFLD 2022,  
Montana DES, NBI



# Flooding – Western Region NFIP Data

County	Date Joined	Effective Firm Date	Dollars Paid (Historical)	Flood Claims	Current Policies	Coverage (\$)	Repetitive Loss Properties	Repetitive Loss Properties (\$Paid)
Anaconda-Deer Lodge	12/18/1985	12/18/1985	\$8,283.79	9	11	\$2,275,000.00	-	-
Beaverhead	9/30/1982	9/30/1982	\$2,464.07	12	22	\$4,856,600.00	-	-
Broadwater	12/1/1986	8/18/2014	-	2	8	\$2,318,000.00	-	-
Butte-Silver Bow	9/28/1979	6/1/2022	-	10	24	\$8,244.84	-	-
Flathead	9/5/1984	11/4/2015	\$690,320.95	131	495	\$118,260,200.00	7	\$89,602.81
Gallatin	8/1/1984	4/21/2021	\$323,243.98	73	333	\$86,865,600.00	6	\$88,477.61
Granite	7/5/1982	4/19/2016	\$16,934.45	7	18	\$4,810,500.00	-	-
Jefferson	6/17/1986	06/17/86(M)	\$6,965.60	5	22	\$4,205,500.00	-	-
Lake	12/17/1987	2/6/2013	\$20,284.57	12	35	\$10,546,000.00	-	-
Lewis and Clark	4/1/1981	9/19/2012	\$432,256.74	102	169	\$40,762,300.00	15	\$110,881.17
Lincoln	8/1/1980	9/29/2006	\$446,923.17	38	57	\$16,698,600.00	6	\$84,452.18
Madison	8/9/1997	(NSFHA)	\$26,091.08	6	39	\$11,963,500.00	-	-
Meagher	11/13/1985	(NSFHA)	\$78,057.59	5	12	\$4,979,300.00	2	\$56,021.23
Mineral	11/1/1996	11/01/96(L)	\$10,767.53	5	15	\$3,228,900.00	-	-
Missoula	8/15/1983	3/7/2019	\$976,035.33	174	259	\$71,288,900.00	27	\$252,928.28
Park	1/1/1987	10/18/2011	\$2,227,355.08	141	87	\$22,226,700.00	17	\$523,276.91
Powell	6/3/1981	9/30/1994	\$66,563.83	17	19	\$3,049,800.00	-	-
Ravalli	7/19/1982	1/16/2015	\$115,488.85	36	116	\$115,488.85	3	\$32,577.63
Sanders	3/1/1996	6/5/2012	\$223,489.63	10	32	\$6,619,000.00	-	-
Sweet Grass	8/2/1982	5/18/2015	\$5,092,200.00	12	15	\$431,523.91	-	-
<b>Total</b>			<b>\$10,763,726.24</b>	<b>807</b>	<b>1,788</b>	<b>\$415,509,657.60</b>	<b>83</b>	<b>\$1,238,217.82</b>



# Flooding Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Significant	Likely	Critical	High
Anaconda-Deer Lodge	Significant	Likely	Moderate	Medium
Beaverhead	Significant	Highly Likely	Critical	High
Broadwater	Significant	Highly Likely	Moderate	Medium
Butte-Silver Bow	Significant	Likely	Moderate	Medium
CSKT	Significant	Likely	Moderate	Medium
Flathead	Significant	Highly Likely	Critical	High
Granite	Significant	Likely	Moderate	Medium
Jefferson	Significant	Likely	Moderate	Medium
Lake	Significant	Highly Likely	Moderate	Medium
Lewis and Clark	Significant	Likely	Critical	High
Lincoln	Significant	Likely	Moderate	Medium
Madison	Significant	Highly Likely	Moderate	Medium
Meagher	Significant	Likely	Moderate	Medium
Mineral	Significant	Likely	Moderate	Medium
Park	Significant	Likely	Critical	High
Powell	Significant	Likely	Moderate	Medium
Ravalli	Significant	Likely	Moderate	Medium
Sanders	Significant	Likely	Moderate	Medium
Sweet Grass	Significant	Likely	Moderate	Medium



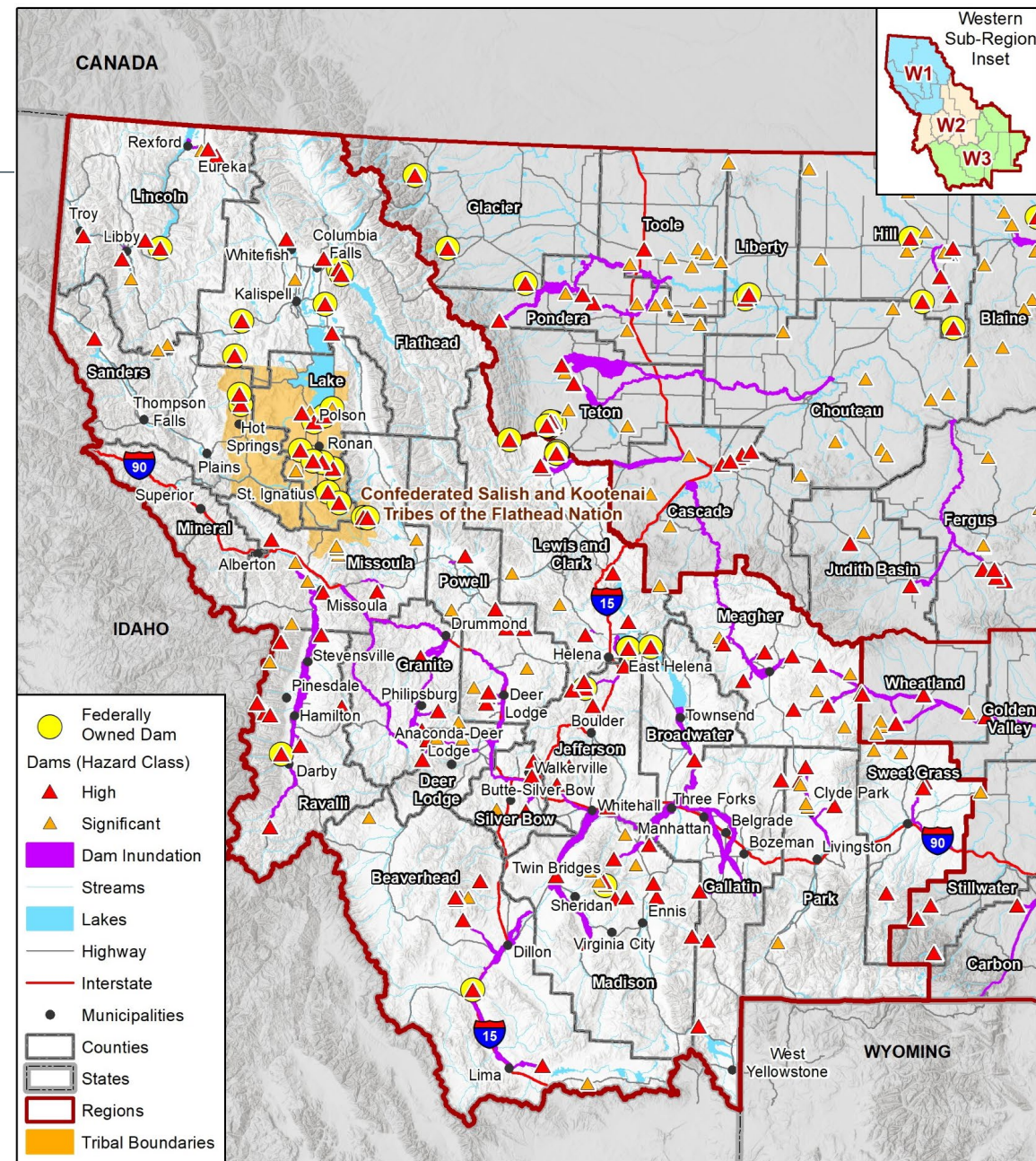
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**What do you think the significance of flooding is for your jurisdiction?**

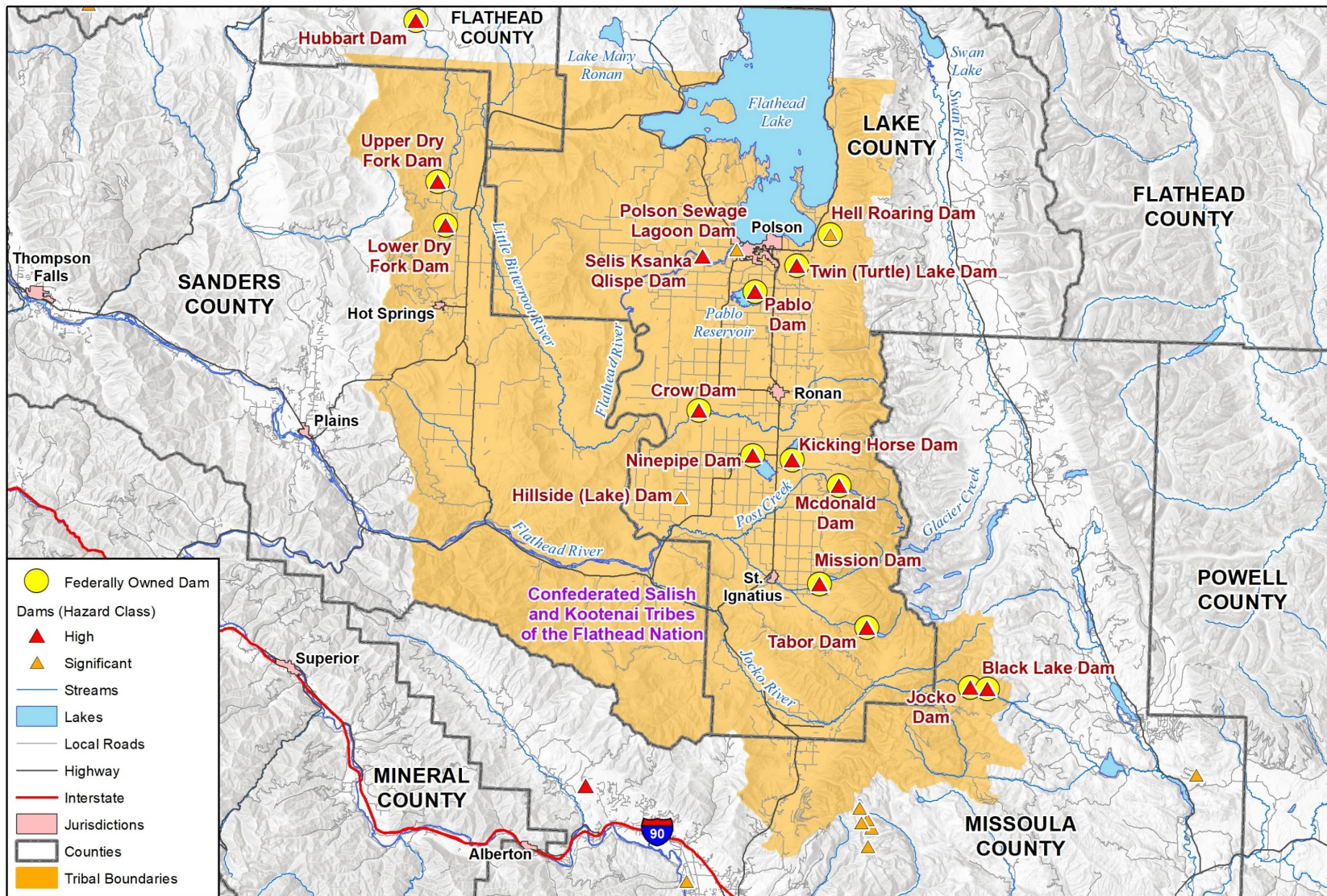
# Dam Failure

- Can be a complete failure, or an unexpected release causing rapid downstream flooding
- Dams classified as:
  - **High Hazard** – failure would likely cause loss of life downstream
  - **Significant Hazard** – failure could result in significant property damage
  - **Low Hazard** – failure would result only in minimal property damage
- According to the National Inventory of Dams (NID), there are **393 total dams** in the region
  - 119 High Hazard
  - 51 Significant Hazard
  - 223 Low Hazard (Not Shown in Risk Map)
- **2 past occurrences** in Region
  - Hauser Dam 1908
  - Mike Horse Dam 1975





# Dam Failure – Flathead Reservation



- There are **13 High hazard dams** within the Reservation
  - 12 are federally owned
- **One Significant hazard dam** (Hell Roaring Dam)
  - Federally owned

# Dam Failure - Parcels at Risk to Dam Inundation by County

County	Improved Parcels	Improved Value	Content Value	Total Value	Population
Anaconda-Deer Lodge	180	\$25,369,769	\$13,640,621	\$39,010,390	336
Beaverhead	1,127	\$209,193,549	\$121,547,348	\$330,740,897	2,230
Broadwater	932	\$140,902,771	\$81,546,010	\$222,448,781	2,160
Butte-Silver Bow	3,013	\$579,428,201	\$310,064,536	\$889,492,737	6,603
Flathead	78	\$12,525,896	\$6,262,948	\$18,788,844	197
Gallatin	3,460	\$1,279,159,431	\$747,875,409	\$2,027,034,840	7,476
Granite	483	\$81,862,687	\$50,061,976	\$131,924,663	974
Jefferson	617	\$105,867,180	\$64,739,148	\$170,606,328	1,407
Lake	-	-	-	-	-
Lewis and Clark	730	\$97,548,034	\$55,650,363	\$153,198,397	1,572
Lincoln	1,268	\$175,232,031	\$97,456,940	\$272,688,971	2,786
Madison	733	\$123,458,040	\$80,021,933	\$203,479,973	1,353
Meagher	308	\$46,826,218	\$33,175,174	\$80,001,392	604
Mineral	-	-	-	-	-
Missoula	2,129	\$514,837,938	\$278,087,750	\$792,925,688	4,763
Park	82	\$32,849,148	\$20,808,199	\$53,657,347	126
Powell	384	\$41,666,335	\$26,606,713	\$68,273,048	726
Ravalli	1,857	\$513,540,043	\$345,267,242	\$858,807,285	3,836
Sanders	-	-	-	-	-
Sweet Grass	13	\$2,392,251	\$1,827,521	\$4,219,772	12
<b>Total</b>	<b>17,394</b>	<b>\$3,982,659,522</b>	<b>\$2,334,639,827</b>	<b>\$6,317,299,349</b>	<b>37,161</b>

# Dam Failure Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Significant	Unlikely	Negligible	Low
Anaconda-Deer Lodge	Significant	Unlikely	Negligible	Low
Beaverhead	Significant	Unlikely	Negligible	Low
Broadwater	Significant	Unlikely	Negligible	Low
Butte-Silver Bow	Significant	Unlikely	Negligible	Low
CSKT	Significant	Unlikely	Critical	Medium
Flathead	Significant	Unlikely	Negligible	Low
Granite	Significant	Unlikely	Negligible	Low
Jefferson	Significant	Unlikely	Negligible	Low
Lake	Significant	Unlikely	Critical	Medium
Lewis and Clark	Significant	Unlikely	Negligible	Low
Lincoln	Significant	Unlikely	Negligible	Low
Madison	Significant	Unlikely	Negligible	Low
Meagher	Significant	Unlikely	Negligible	Low
Mineral	Significant	Unlikely	Negligible	Low
Park	Significant	Unlikely	Negligible	Low
Powell	Significant	Unlikely	Negligible	Low
Ravalli	Significant	Unlikely	Negligible	Low
Sanders	Significant	Unlikely	Negligible	Low
Sweet Grass	Significant	Unlikely	Negligible	Low

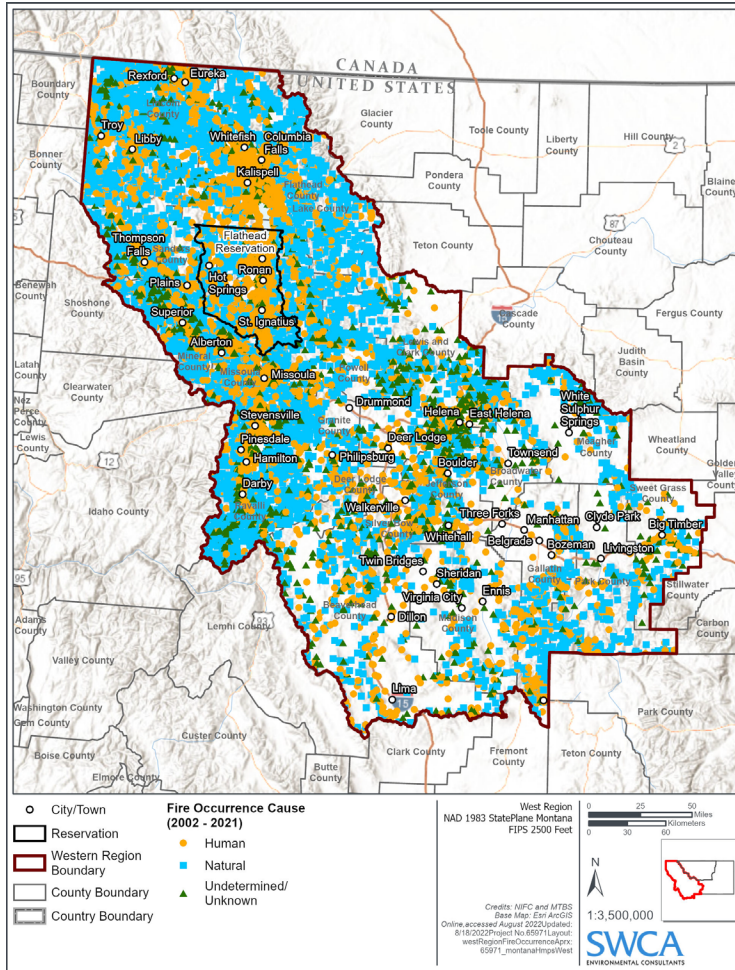


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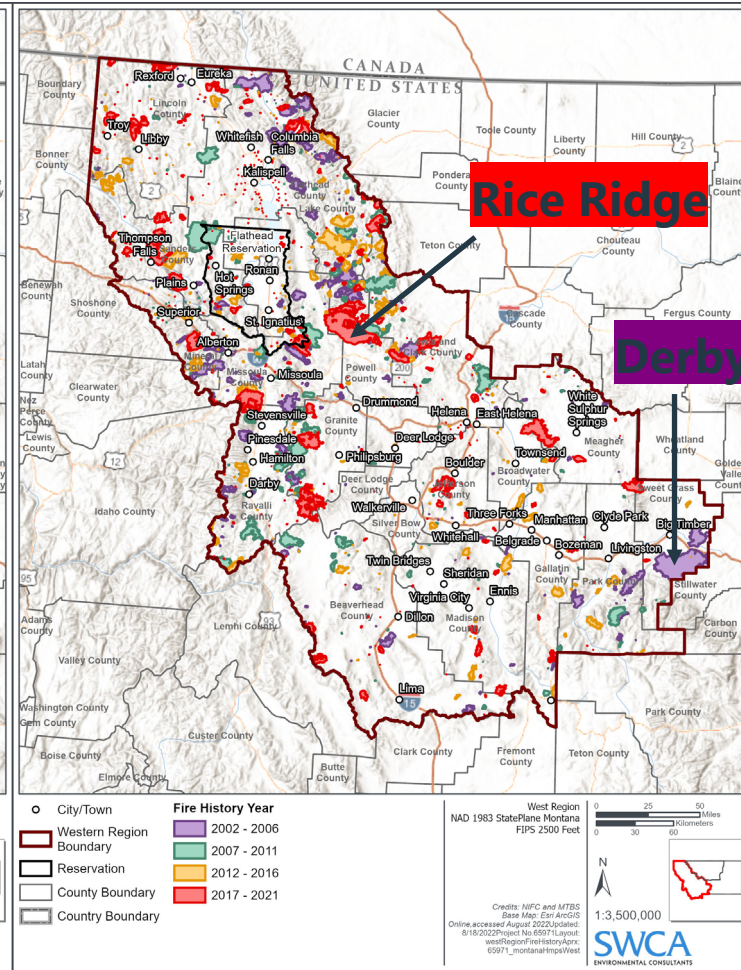


**What do you think the significance of dam failure is for your jurisdiction?**

# Wildland and Rangeland Fire



Fire Occurrence



Fire History

**Location:** Can occur anywhere in the Western Region in wildland and rangelands.

**Extent:** Can be small (less than 10 acres) with minimal damage, or very large and destructive (Rice Ridge Complex in 2017 burned 160,193 acres and Derby fire in 2006 burned 207,431 acres). Hot and/or dry years are more likely to have larger wildfires.

**Probability:** Highly likely throughout the planning area, 15,702 fire ignitions and 278 notable wildfire incidents from 2002-2021 in the Western Region

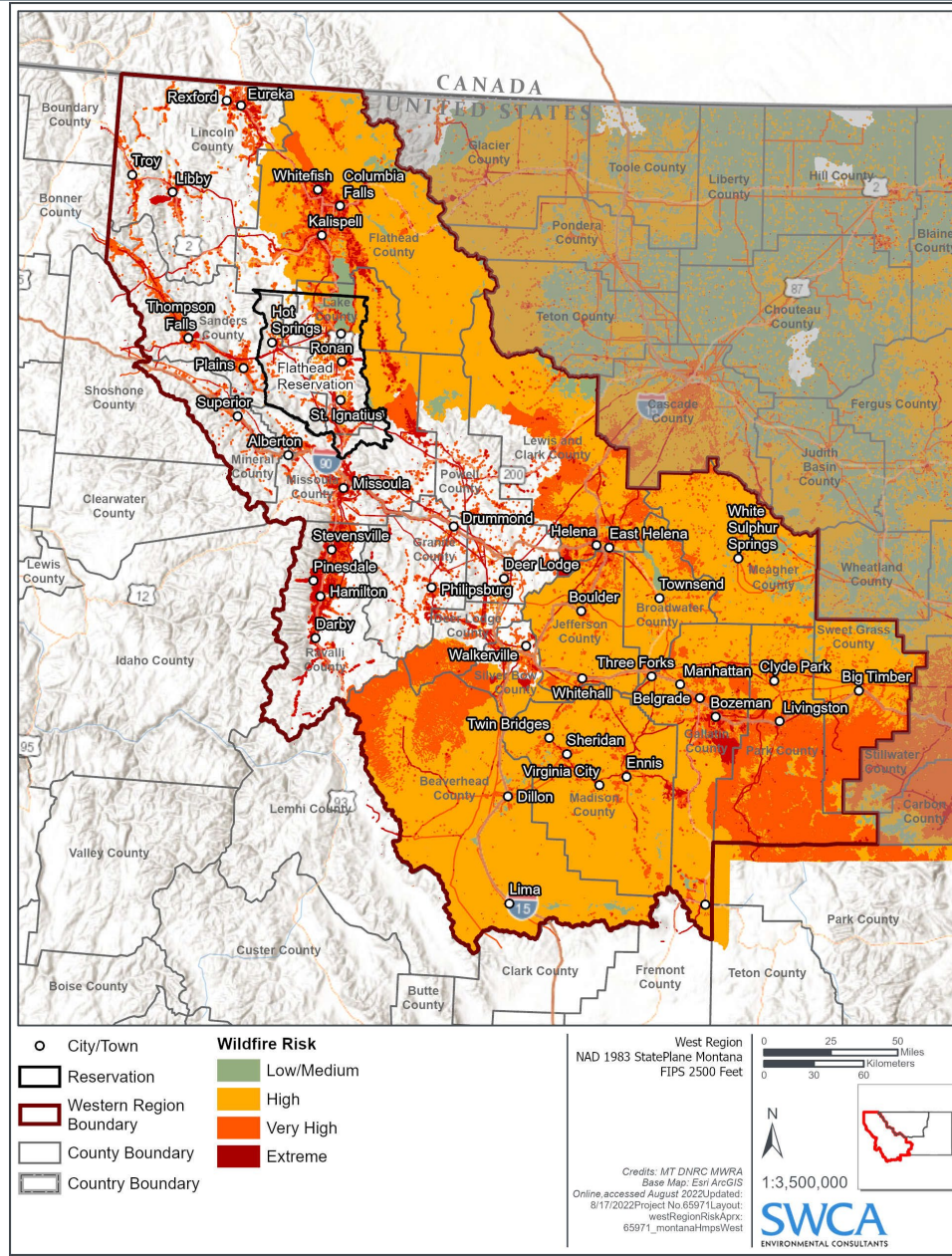
**Impacts:**

- Health and safety of people
- Large scale structural damage
- Road closures
- Power and communication failure
- Damage to rivers and streams, reduced water quality from ash and debris
- Erosion that can lead to increased flooding
- Significant economic damages from repairs and business interruption
- Loss of biodiversity
- Loss of forestry resources



# Wildland and Rangeland Fire Risk Assessment

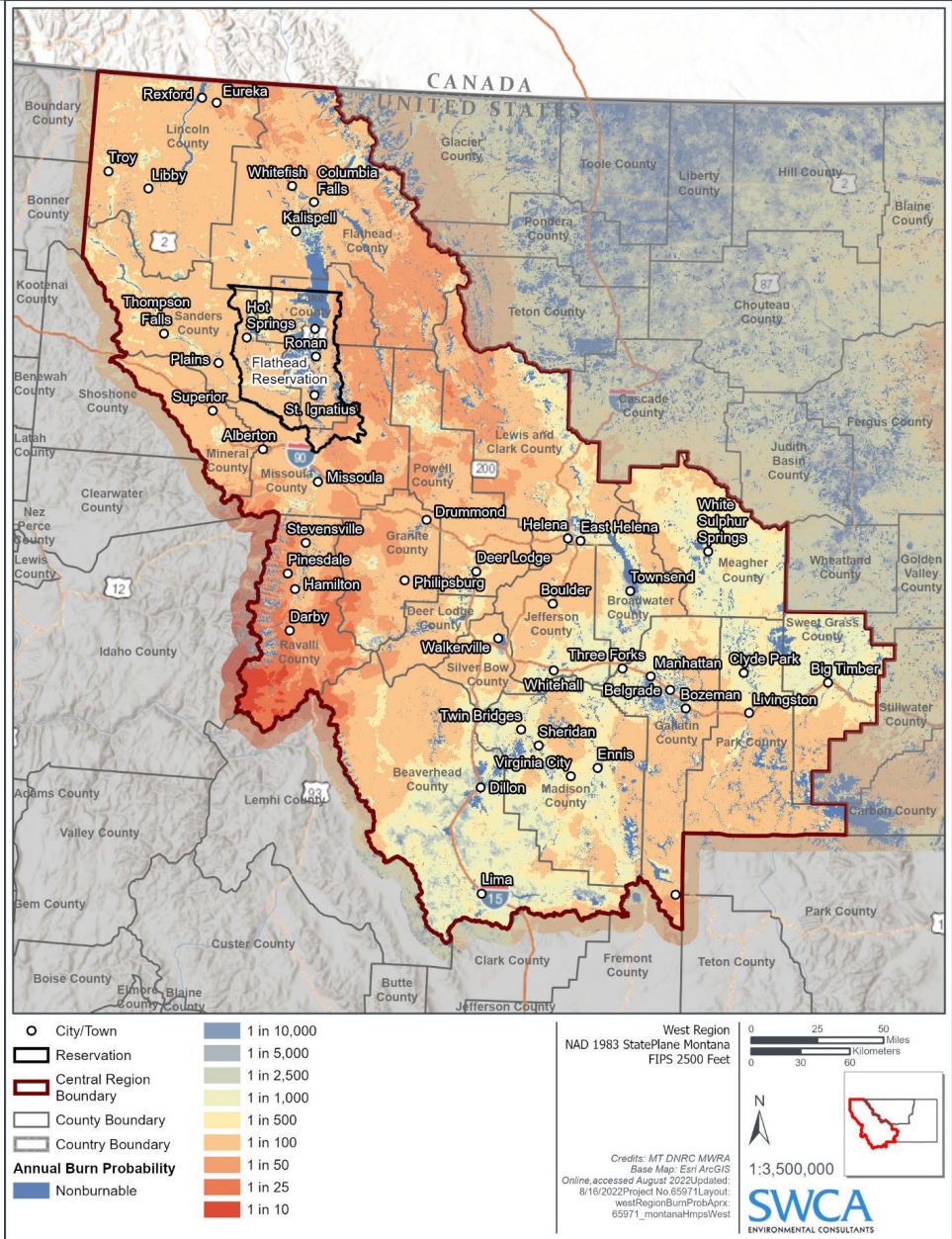
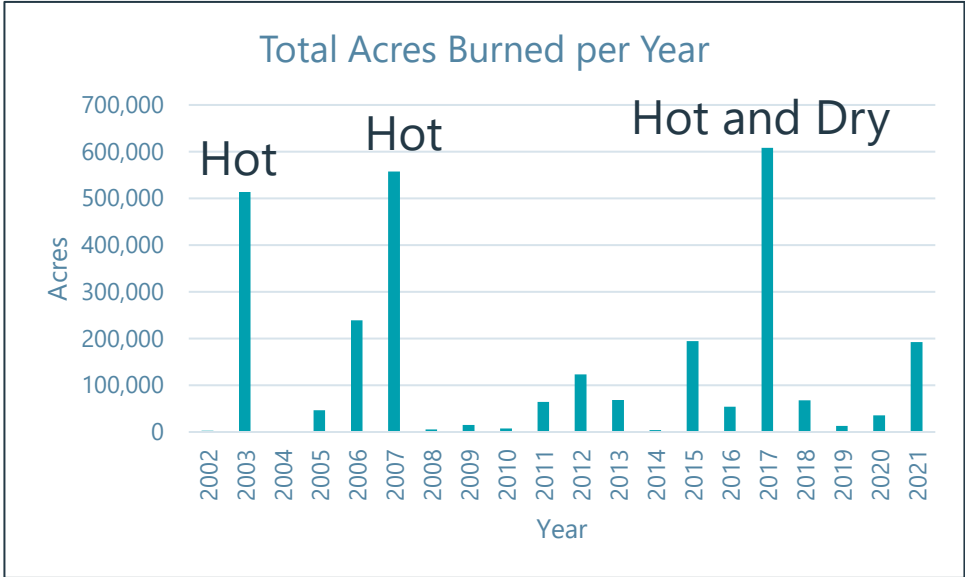
- Maps with latest Montana Wildfire Risk Assessment (MWRA) Wildfire Risk (Hazard + Values)
- Utilizes
  - likelihood of fire burning
  - the intensity of a potential fire
  - the exposure of assets and resources based on their location
  - the susceptibility of those assets and resources
- Updated with wildfire incidents
- Warmer temperatures, drier summers, and longer fire seasons are exacerbating the wildfire risk
- Invasive species, forest pathogens, and fire suppression have exacerbated hazardous fuel conditions in forests and rangelands



\*Blank areas on map represent wildland forest and rangelands that have yet to have values mapped by the MT DNRC. Risk in these area likely follows similar trends seen elsewhere in the region.

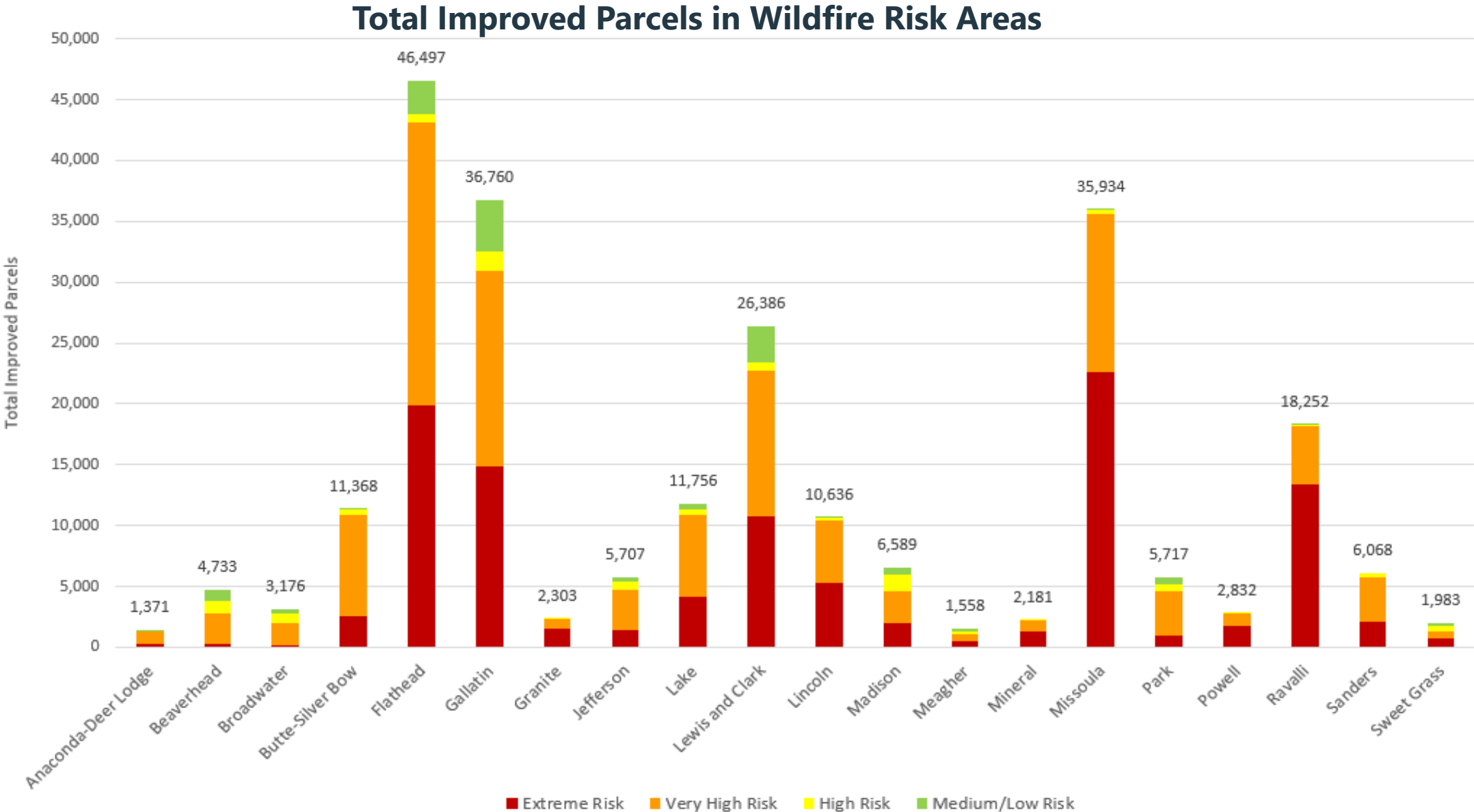
# Wildland and Rangeland Burn Probability

- Burn probability is highest in the Sapphire Mountains and the southern Bitterroot Mountains.
- Rangelands display lower annual burn probability
- Wildfire is more likely to burn more acres during years of drought and/or warmer growing season temperatures
- Wildfires are predicted to be larger under a warmer climate



\*1 in 10 = 10% chance of wildfire occurring; 1 in 50 = 2% chance of wildfire occurring

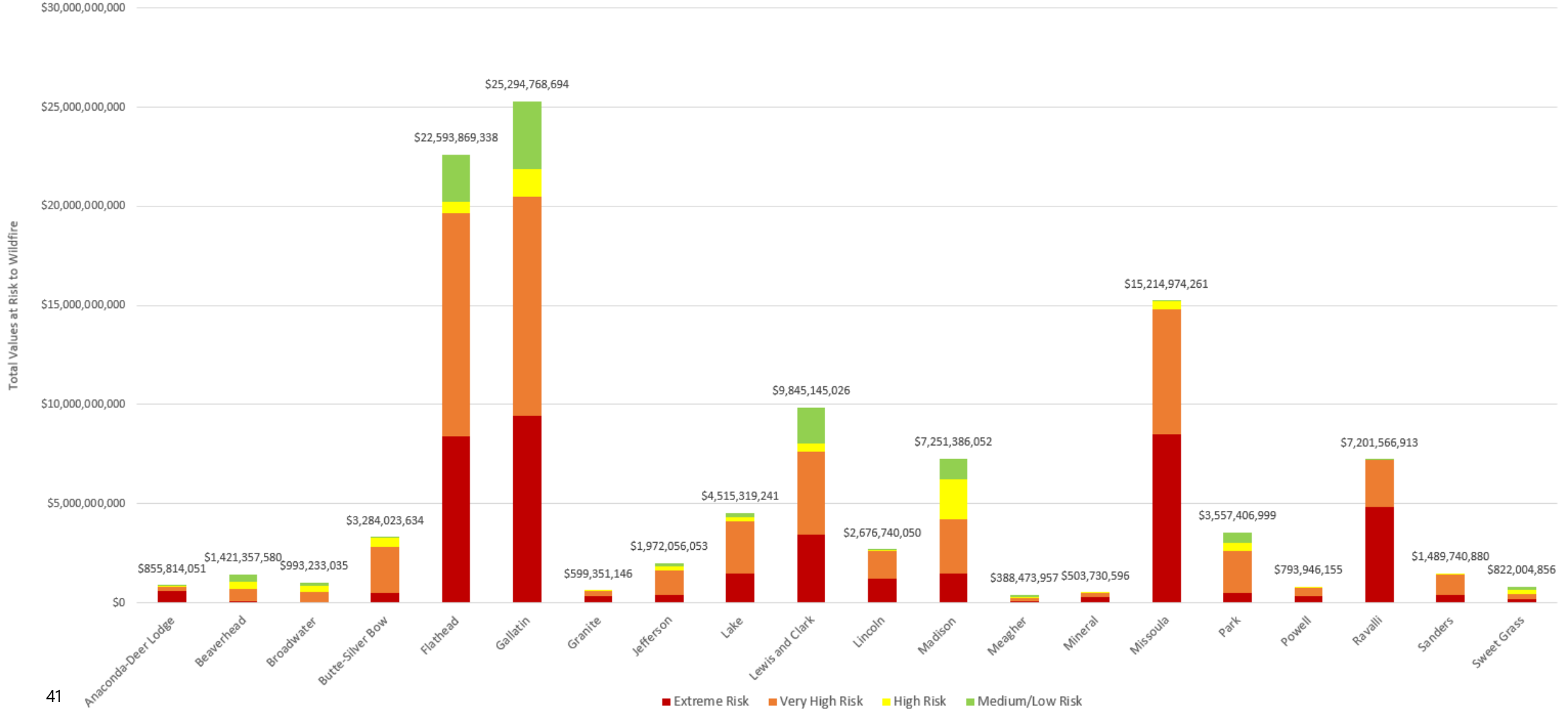
# Wildland and Rangeland Fire – County Parcel Analysis





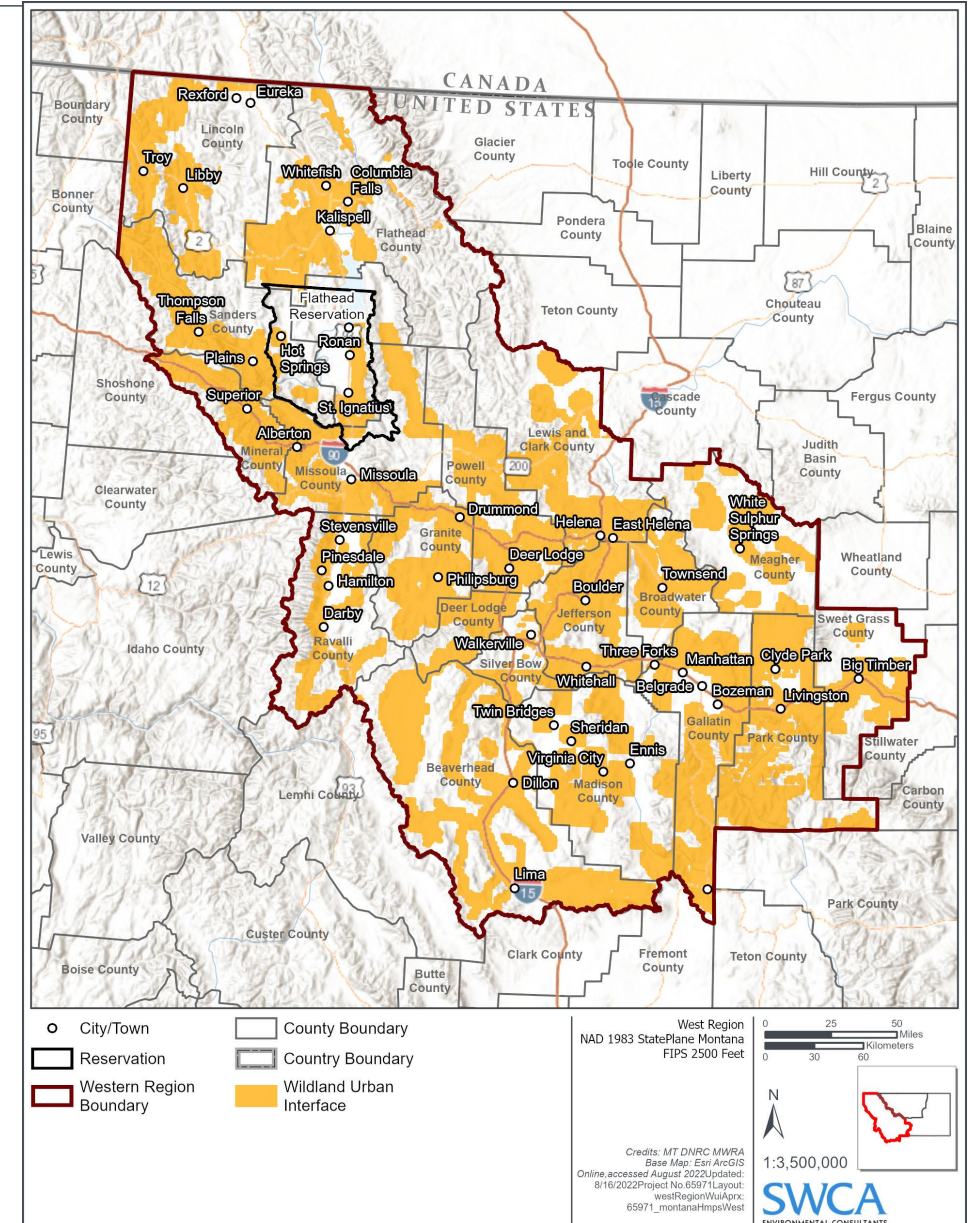
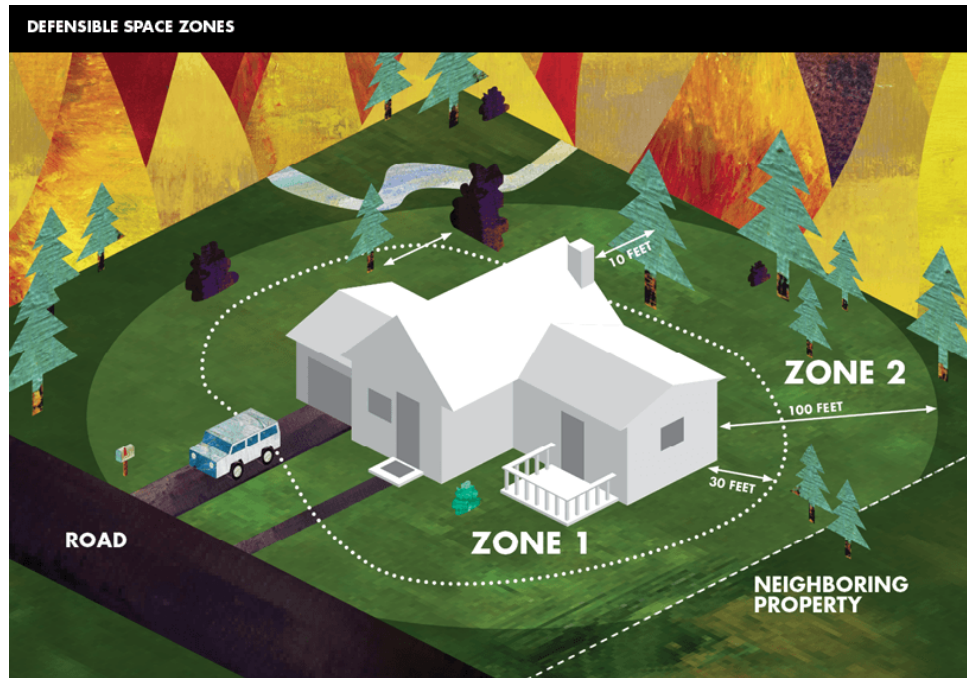
# Wildland and Rangeland Fire – County Parcel Analysis

## Total Values at Risk to Wildfire Areas



# Wildland Fire – Wildland Urban Interface (WUI)

- Zone of transition between wildland and developed land
- The municipalities most notably at risk from wildfire include most of the Bitterroot Valley, Whitefish, Thompson Falls, Troy, Missoula, Bozeman's suburban and exurban areas, Helena, Libby, and Eureka, among others



# Wildland and Rangeland Fire Risk Summary



Rice Ridge Wildfire. Source: MTPR

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Highly Likely	Critical	High
Anaconda-Deer Lodge	Significant	Highly Likely	Critical	Medium
Beaverhead	Significant	Likely	Critical	Medium
Broadwater	Significant	Highly Likely	Critical	Medium
Butte-Silver Bow	Extensive	Highly Likely	Critical	Medium
CSKT	Significant	Highly Likely	Critical	Medium
Flathead	Extensive	Highly Likely	Catastrophic	High
Granite	Significant	Highly Likely	Critical	Medium
Jefferson	Extensive	Highly Likely	Catastrophic	High
Lake	Significant	Highly Likely	Critical	Medium
Lewis and Clark	Significant	Highly Likely	Critical	Medium
Lincoln	Extensive	Highly Likely	Catastrophic	High
Madison	Significant	Likely	Critical	Medium
Meagher	Significant	Likely	Critical	Medium
Mineral	Extensive	Highly Likely	Catastrophic	High
Park	Significant	Highly Likely	Critical	Medium
Powell	Significant	Highly Likely	Critical	Medium
Ravalli	Extensive	Highly Likely	Catastrophic	High
Sanders	Extensive	Highly Likely	Critical	Medium
Sweet Grass	Significant	Likely	Critical	Medium

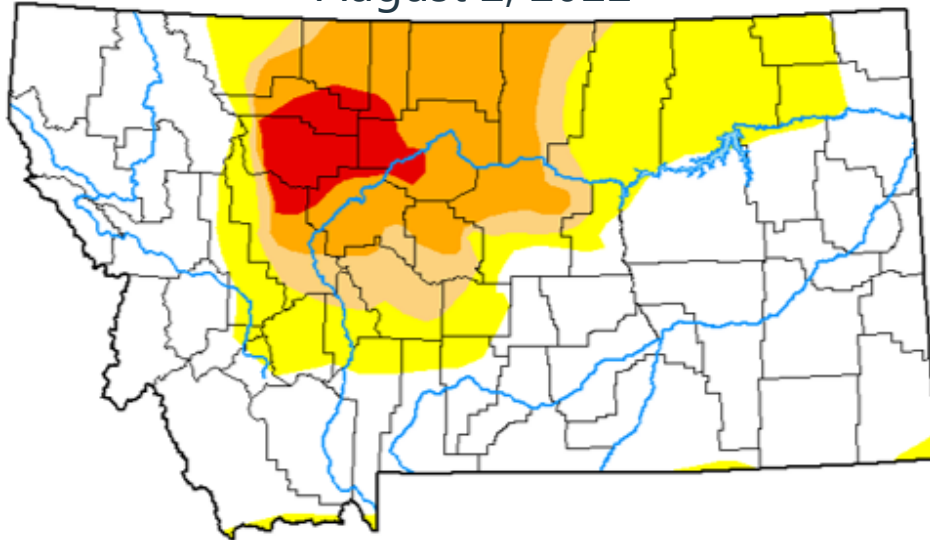
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**What do you think the significance of wildland and rangeland fire is for your jurisdiction?**

# Drought

August 2, 2022



**Intensity:**

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

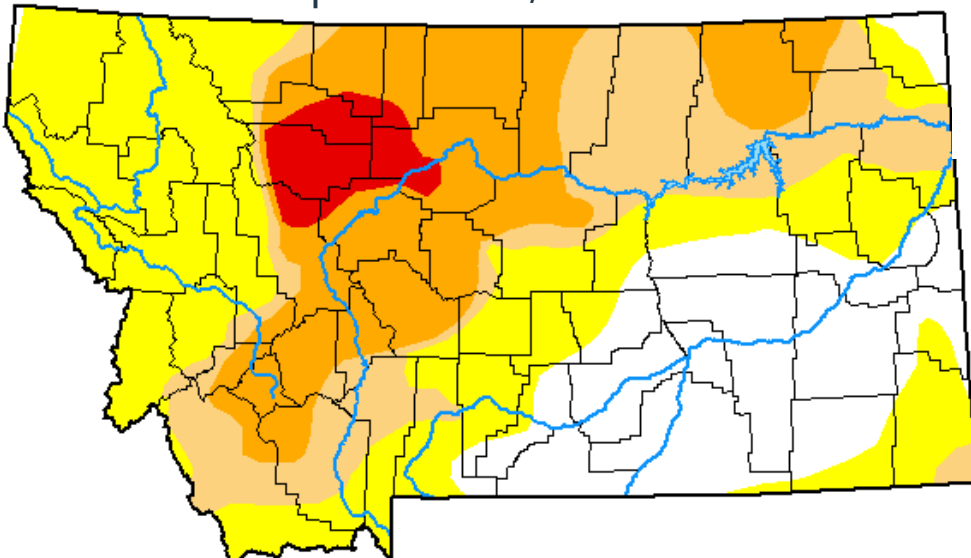
**Author:**

Curtis Riganti  
National Drought Mitigation Center



[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

September 8, 2022



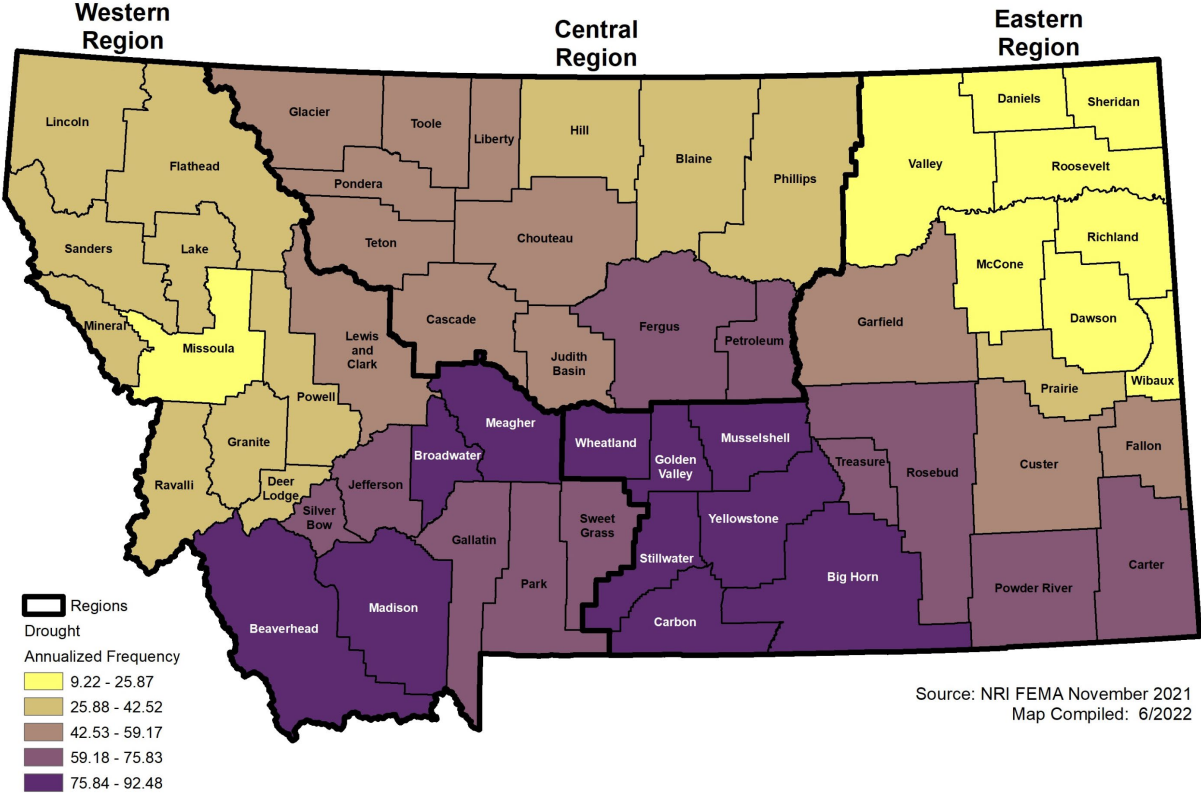
- 252 USDA Disaster Designations (2012-2021) regionwide from drought or combination of drought and other hazard
  - Greatest number of designations in 2021 (74) and 2015 (43)
- USDA RMA records 222,571 insured acres lost and \$13,247,950 indemnity payments
  - 24.7% of acres lost recorded in 2012
  - 57% losses to wheat
- Drought Impact Reporter notes most impacts since 2000:
  - Relief, Response & Restrictions
  - Water Supply & Quality
  - Fire
  - Agriculture
  - Plants & Wildlife
  - Tourism & Recreation



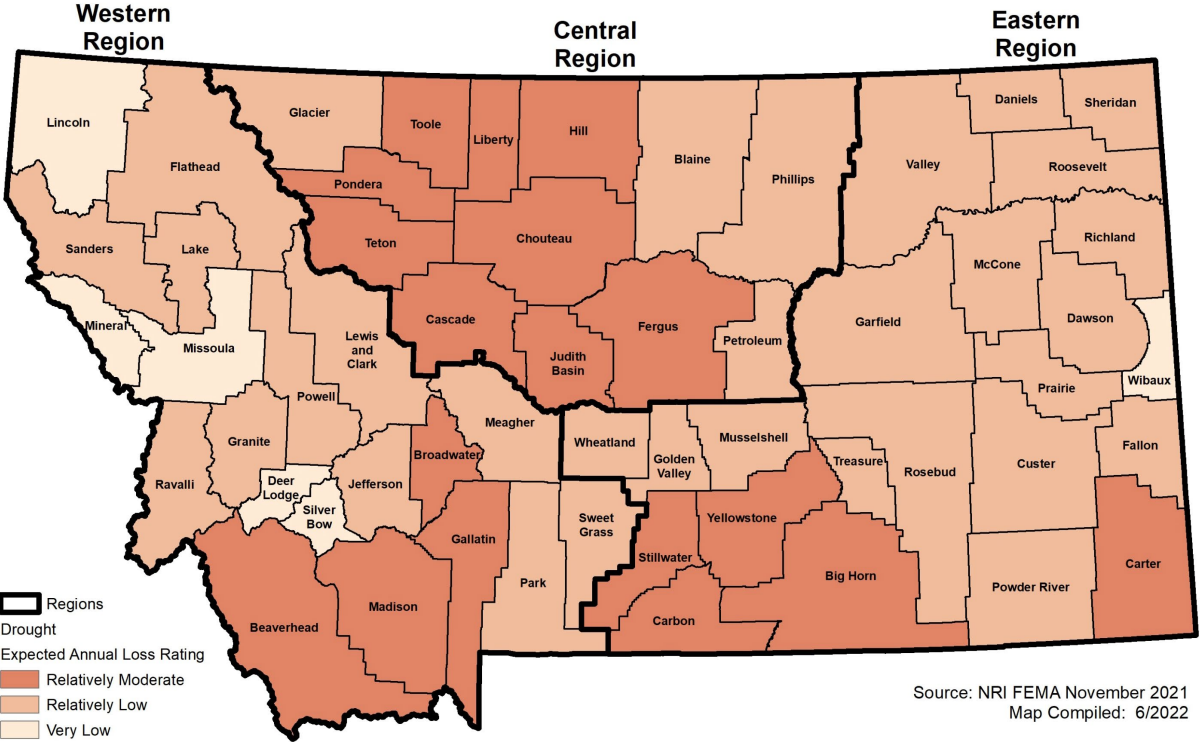
**wood.**

# Drought

## National Risk Index – Annualized Frequency



## National Risk Index – Expected Annual Loss Rating



# Drought Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Likely	Moderate	Medium
Anaconda-Deer Lodge	Extensive	Likely	Negligible	Medium
Beaverhead	Extensive	Likely	Moderate	Medium
Broadwater	Extensive	Likely	Moderate	High
Butte-Silver Bow	Extensive	Likely	Moderate	Medium
CSKT	Extensive	Likely	Moderate	High
Flathead	Extensive	Highly Likely	Critical	High
Granite	Extensive	Likely	Moderate	High
Jefferson	Extensive	Likely	Negligible	Medium
Lake	Extensive	Likely	Moderate	High
Lewis and Clark	Extensive	Likely	Moderate	High
Lincoln	Extensive	Likely	Moderate	Medium
Madison	Extensive	Likely	Moderate	Medium
Meagher	Extensive	Likely	Moderate	Medium
Mineral	Extensive	Likely	Moderate	Medium
Park	Extensive	Likely	Moderate	Medium
Powell	Extensive	Likely	Moderate	High
Ravalli	Extensive	Likely	Moderate	High
Sanders	Extensive	Likely	Moderate	Medium
Sweet Grass	Extensive	Likely	Moderate	Medium



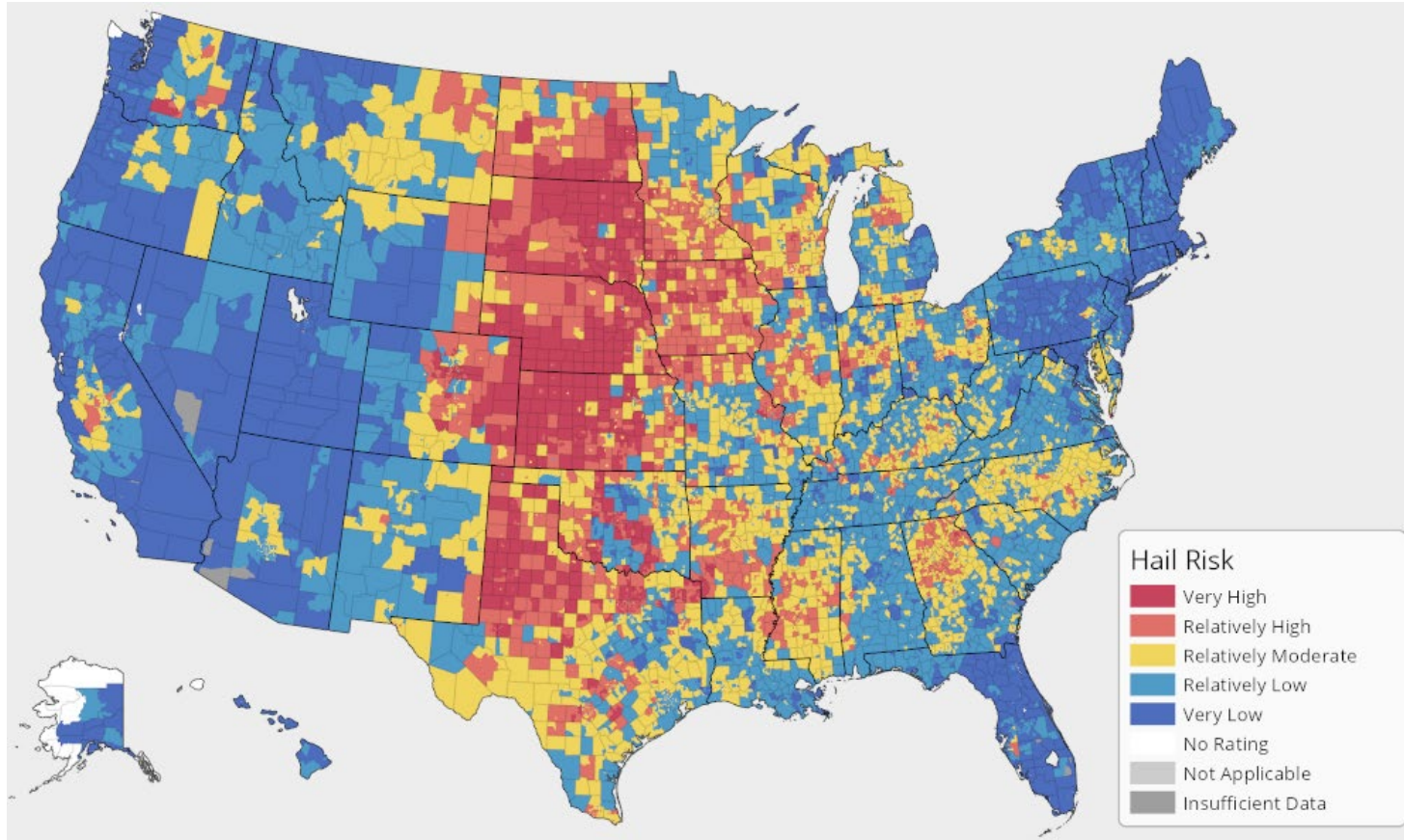
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**What do you think the significance of drought is for your jurisdiction?**



# Severe Summer Weather



Source: FEMA

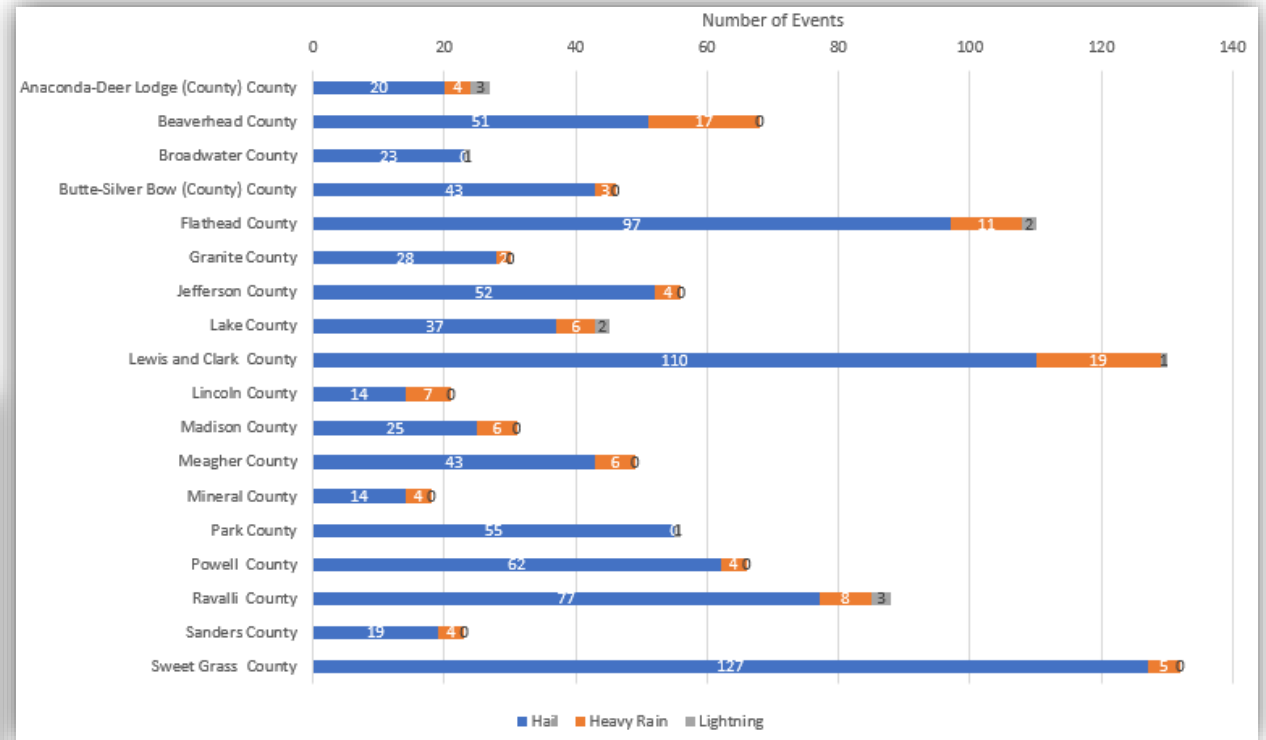
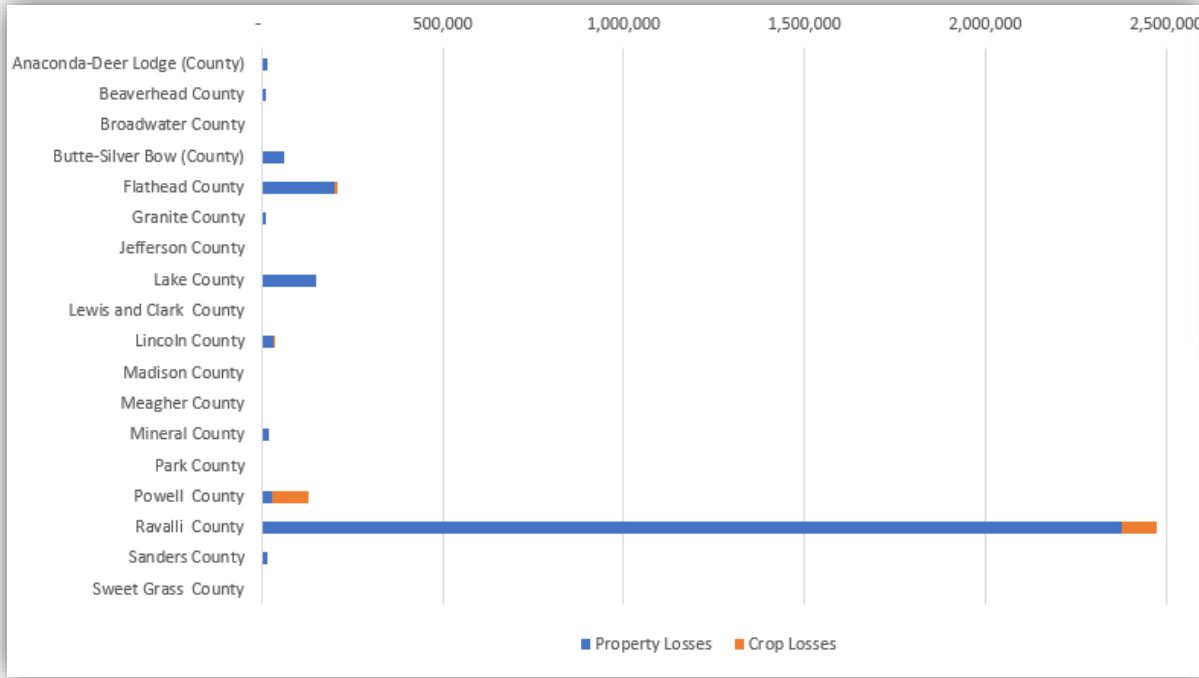
	Deaths	Injuries	Property Loss	Crop Loss	Days with Events	Total Events
Excessive Heat	0	0	\$0	\$0	4	9
Hail	0	0	\$2,394,100	\$210,100	368	897
Heavy Rain	0	0	\$42,000	\$0	51	110
Lightning	1	12	\$492,000	\$0	16	17
<b>Total</b>	<b>1</b>	<b>12</b>	<b>\$2,928,100</b>	<b>\$210,100</b>	<b>439</b>	<b>1,033</b>

Source: NCEI

- **Location:** All counties in the Western Region
- **Extent:** Can cause extensive damage to property and environment, as well as threaten human life.
  - Hail is the most damaging summer event
- **Probability:** Highly likely with **1,033 reported events in 439 days over 72 years.**
  - Hail is the most reported event
- **Impacts:**
  - Injury to people and fatalities
  - Property damage (roofs, cars, and windows)
  - Road closure and flash flooding due to hail accumulation and heavy rain
  - Power and communication failure due to lightning
  - Economic losses due to repairs - hail is the costliest insured hazard in MT
  - Damaged crops, landscape, and other vegetation
  - Structure fires and wildfires ignited by lightning

# Severe Summer Weather

**Sweet Grass, Lewis and Clark, and Flathead Counties** experience the **highest frequency** of summer weather events



**Ravalli County** has experienced the **most significant losses** from severe summer weather - hail hazard events to be more specific

# Severe Summer Weather Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Highly Likely	Moderate	Medium
Anaconda-Deer Lodge	Extensive	Highly Likely	Moderate	Medium
Beaverhead	Extensive	Highly Likely	Moderate	Medium
Broadwater	Extensive	Highly Likely	Moderate	Medium
Butte-Silver Bow	Extensive	Highly Likely	Moderate	Medium
CSKT	Extensive	Highly Likely	Moderate	Medium
Flathead	Extensive	Highly Likely	Moderate	Medium
Granite	Extensive	Highly Likely	Moderate	Medium
Jefferson	Extensive	Highly Likely	Moderate	Medium
Lake	Extensive	Highly Likely	Moderate	Medium
Lewis and Clark	Extensive	Highly Likely	Moderate	Medium
Lincoln	Extensive	Highly Likely	Moderate	Medium
Madison	Extensive	Highly Likely	Moderate	Medium
Meagher	Extensive	Highly Likely	Moderate	Medium
Mineral	Extensive	Highly Likely	Moderate	Medium
Park	Extensive	Highly Likely	Moderate	Medium
Powell	Extensive	Highly Likely	Moderate	Medium
Ravalli	Extensive	Highly Likely	Critical	High
Sanders	Extensive	Highly Likely	Moderate	Medium
Sweet Grass	Extensive	Highly Likely	Moderate	Medium

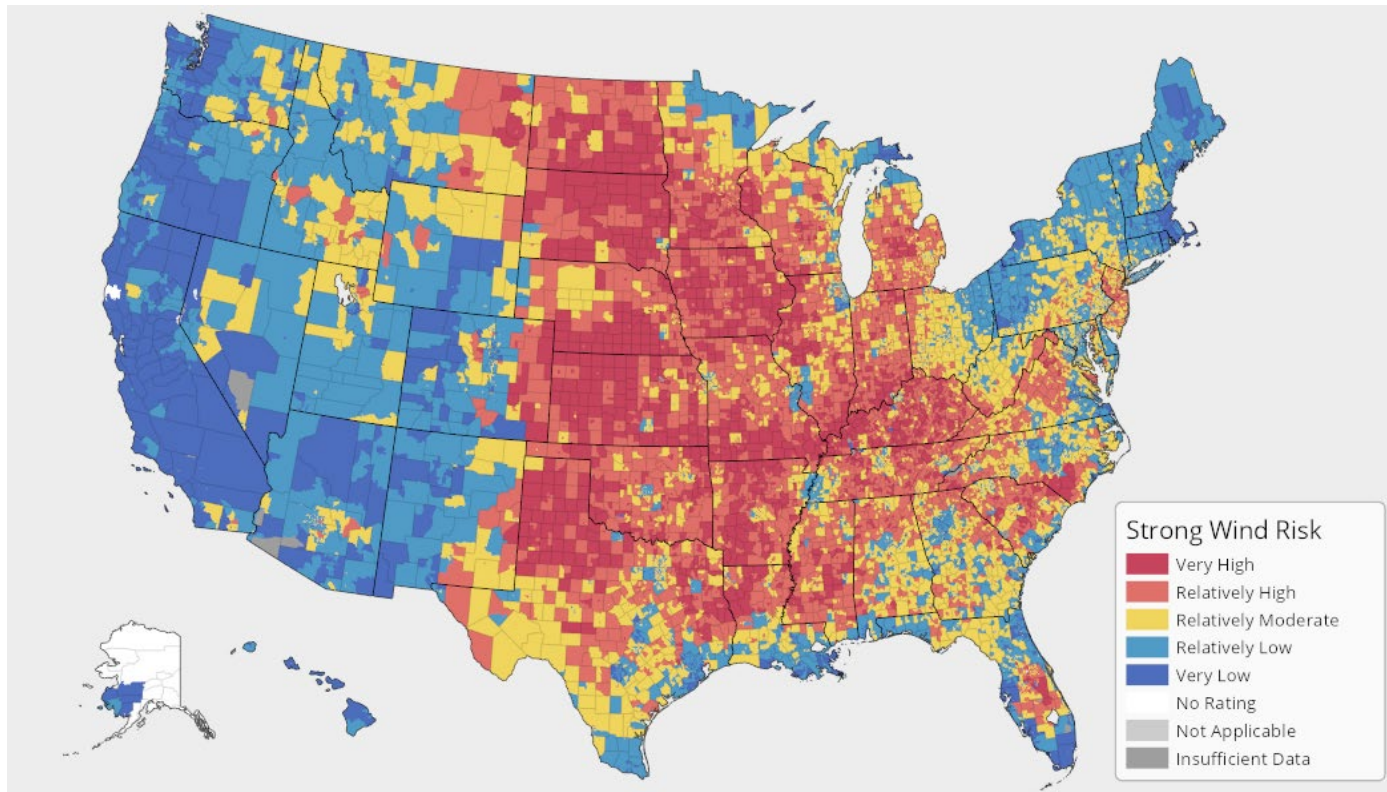


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**What do you think the significance of severe summer weather is for your jurisdiction?**

# Tornadoes & Windstorms



Source: FEMA

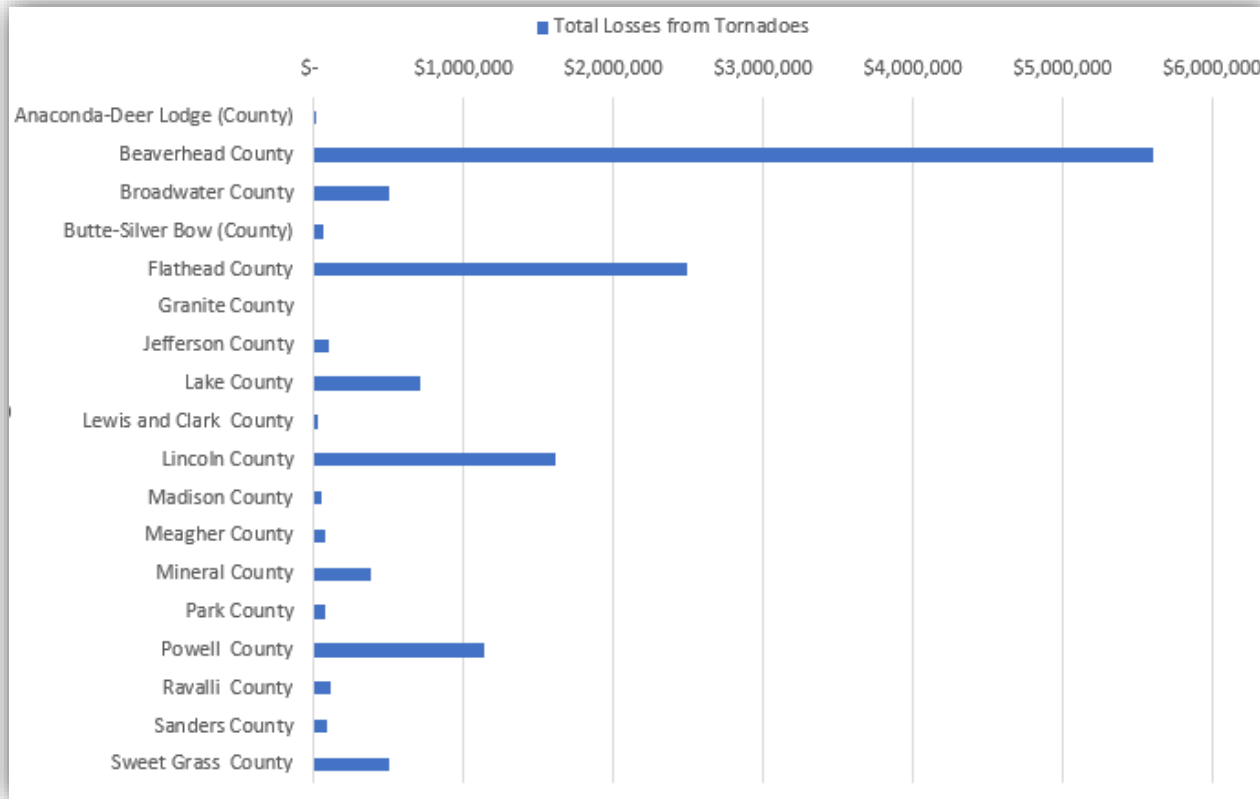
	Deaths	Injuries	Property Loss	Crop Loss	Days with Events	Total Events
High Wind	1	9	\$4,597,200	\$216,900	621	1,478
Strong Wind	0	0	\$2,431,350	\$86,900	5	12
Thunderstorm Wind	1	18	\$7,654,000	\$36,000	412	728
Tornadoes	0	1	\$2,931,060	\$0	41	42
<b>Total</b>	<b>2</b>	<b>28</b>	<b>\$17,613,610</b>	<b>\$339,800</b>	<b>1,079</b>	<b>2,260</b>

Source: NCEI

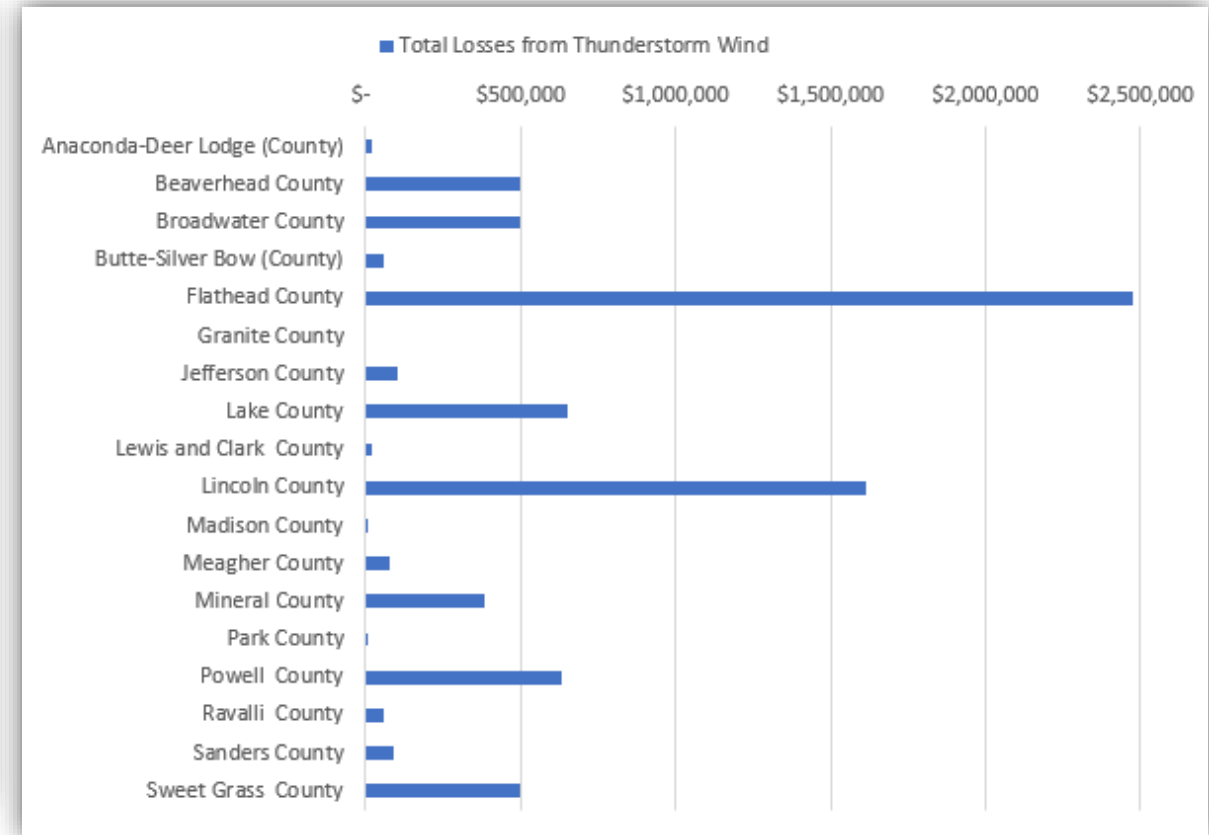
- **Location:** Can occur anywhere in the Western Region.
  - Most reported events in **Lewis and Clark, Park, Beaverhead** and **Broadwater** Counties
- **Extent:** Wind/tornadoes can cause extensive damage to property, crops, and threaten human life
- **Probability:** Highly likely that a wind event or tornado event will occur annually,
  - 2,260 reported events in 1,079 days in the past 72 years
- **Impacts:**
  - Threatened life and safety of people
  - Structural and property damage
  - Road closures from debris
  - Power and communication failure
  - Damages to critical facilities such as water treatment plants
  - Economic losses from repair and business interruptions

# Tornadoes & Windstorms

Greatest losses from tornadoes in Beaverhead County and Flathead County



Greatest losses from thunderstorm wind in Flathead County and Lincoln County



# Tornadoes & Windstorms Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Highly Likely	Moderate	Medium
Anaconda-Deer Lodge	Extensive	Highly Likely	Moderate	Medium
Beaverhead	Extensive	Highly Likely	Critical	High
Broadwater	Extensive	Highly Likely	Moderate	Medium
Butte-Silver Bow	Extensive	Highly Likely	Moderate	Medium
CSKT	Extensive	Highly Likely	Moderate	Medium
Flathead	Extensive	Highly Likely	Critical	High
Granite	Extensive	Highly Likely	Moderate	Medium
Jefferson	Extensive	Highly Likely	Moderate	Medium
Lake	Extensive	Highly Likely	Moderate	Medium
Lewis and Clark	Extensive	Highly Likely	Moderate	Medium
Lincoln	Extensive	Highly Likely	Critical	High
Madison	Extensive	Highly Likely	Moderate	Medium
Meagher	Extensive	Highly Likely	Moderate	Medium
Mineral	Extensive	Highly Likely	Moderate	Medium
Park	Extensive	Highly Likely	Moderate	Medium
Powell	Extensive	Highly Likely	Moderate	Medium
Ravalli	Extensive	Highly Likely	Moderate	Medium
Sanders	Extensive	Highly Likely	Moderate	Medium
Sweet Grass	Extensive	Highly Likely	Moderate	Medium



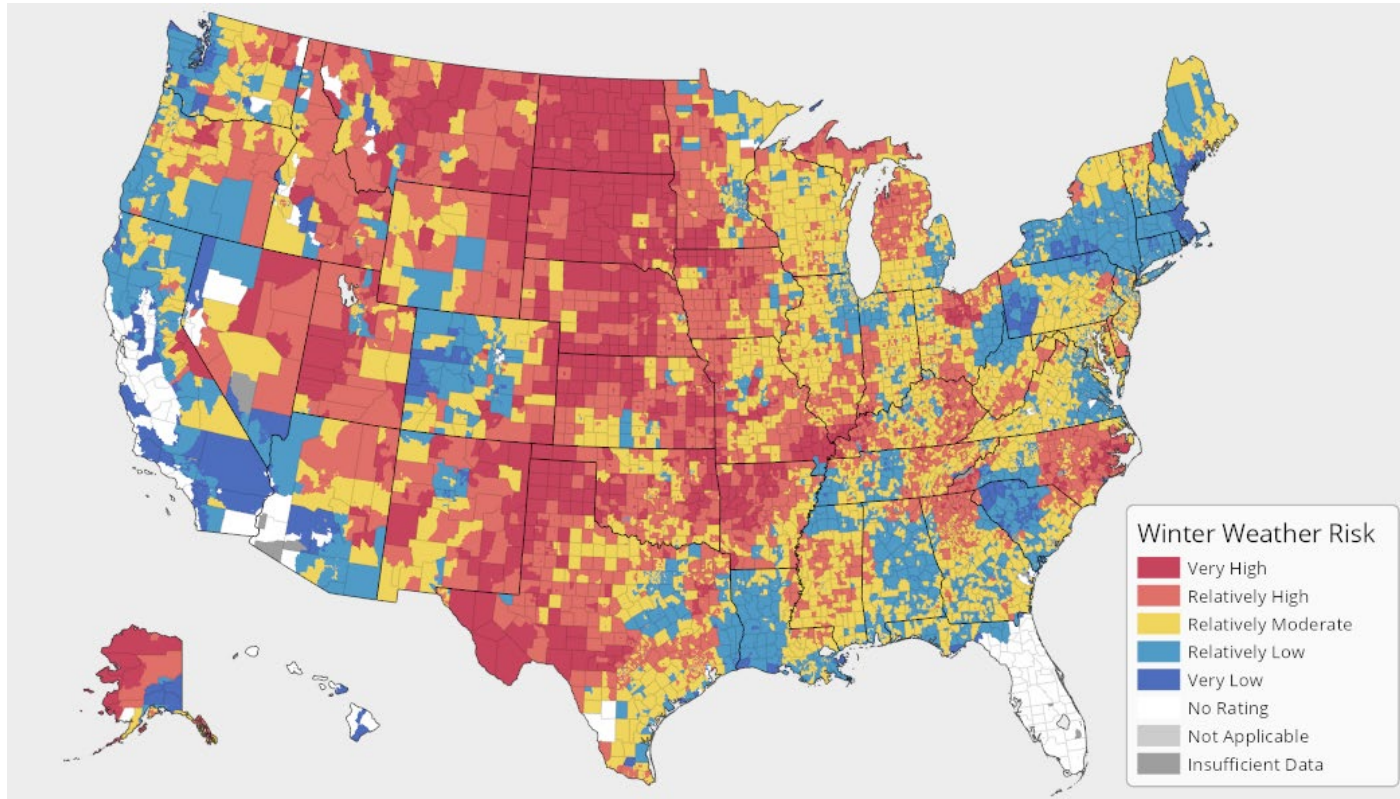
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**What do you think the significance of tornadoes & windstorms is for your jurisdiction?**



# Severe Winter Storm



Source: FEMA

	Deaths	Injuries	Property Loss	Days with Events	Total Events
Blizzard	1	0	\$460,000	33	64
Cold/Wind Chill	2	0	\$1,400	61	117
Heavy Snow	2	4	\$1,600,800	610	1,301
Ice Storm	2	0	\$30,000	7	10
Winter Storm	4	1	\$5,515,000	409	1,110
Winter Weather	4	14	\$5,000	143	267
<b>Total</b>	<b>15</b>	<b>19</b>	<b>\$7,612,200</b>	<b>1,263</b>	<b>2,869</b>

Source: NCEI

- **Location:** All counties in the Western Region experience severe winter storm events
- **Extent:** Can cause significant property losses, injuries, and fatalities.
- **Probability:** Highly likely to occur every year in the Western Region
  - 2,869 reported events in 1,263 days over 26 years
- **Impacts:**
  - Structural damage from snow and ice accumulation
  - Isolation due to road closures and increased car accidents/pileups
  - Power and communication failure
  - Threatens health and safety of humans, livestock, and animals caught outside
  - Tree and vegetation damages



# Severe Winter Storm Risk Summary



Heavy snow in the Butte/Blackfoot Region, Montana, Source: NBC, November 2020

Historic early season snowstorm hitting western Montana, Source: NBC, September 2019



Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Highly Likely	Moderate	<b>Medium</b>
Anaconda-Deer Lodge	Extensive	Highly Likely	Moderate	<b>Medium</b>
Beaverhead	Extensive	Highly Likely	Moderate	<b>Medium</b>
Broadwater	Extensive	Highly Likely	Moderate	<b>Medium</b>
Butte-Silver Bow	Extensive	Highly Likely	Moderate	<b>Medium</b>
CSKT	Extensive	Highly Likely	Moderate	<b>Medium</b>
Flathead	Extensive	Highly Likely	Moderate	<b>Medium</b>
Granite	Extensive	Highly Likely	Moderate	<b>Medium</b>
Jefferson	Extensive	Highly Likely	Moderate	<b>Medium</b>
Lake	Extensive	Highly Likely	Moderate	<b>Medium</b>
Lewis and Clark	Extensive	Highly Likely	Moderate	<b>Medium</b>
Lincoln	Extensive	Highly Likely	Moderate	<b>Medium</b>
Madison	Extensive	Highly Likely	Moderate	<b>Medium</b>
Meagher	Extensive	Highly Likely	Moderate	<b>Medium</b>
Mineral	Extensive	Highly Likely	Moderate	<b>Medium</b>
Park	Extensive	Highly Likely	Moderate	<b>Medium</b>
Powell	Extensive	Highly Likely	Moderate	<b>Medium</b>
Ravalli	Extensive	Highly Likely	Moderate	<b>Medium</b>
Sanders	Extensive	Highly Likely	Moderate	<b>Medium</b>
Sweet Grass	Extensive	Highly Likely	Moderate	<b>Medium</b>

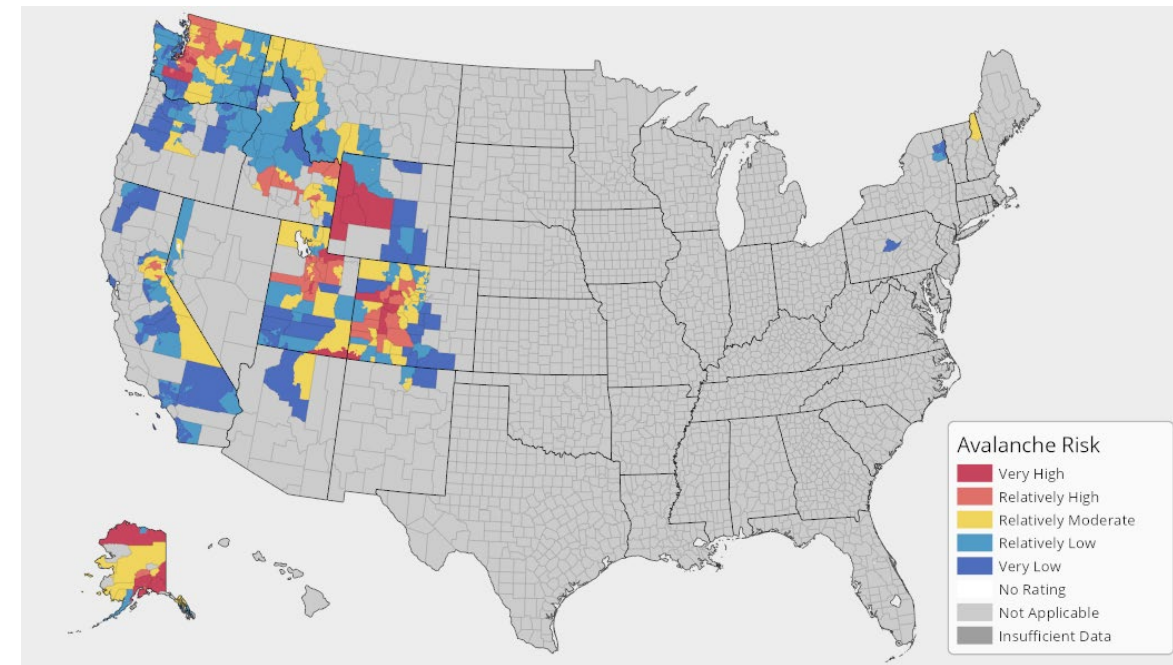
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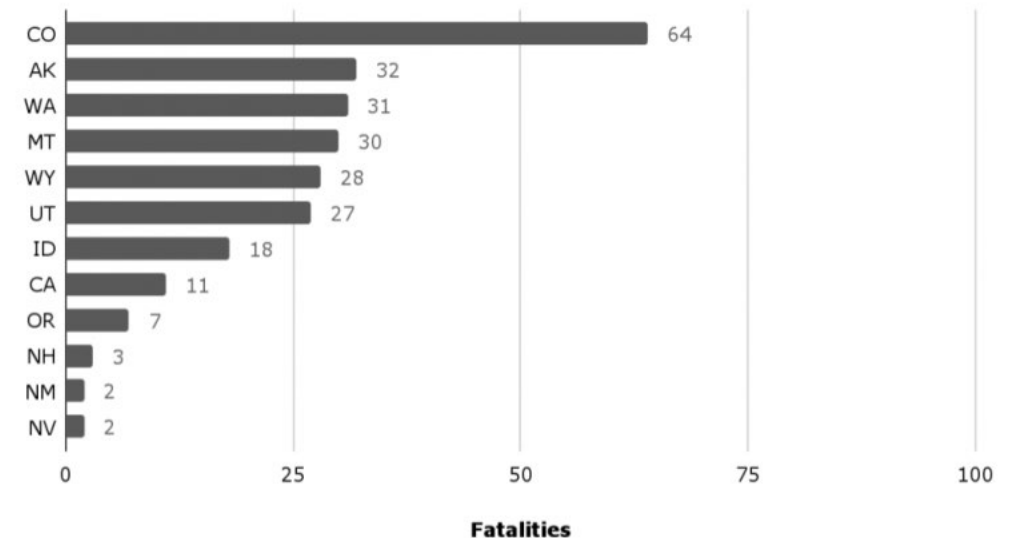
**What do you think the significance of severe winter weather is for your jurisdiction?**

# Avalanche

- Most of Western Montana is at some risk of avalanches, ranging from relatively low to very high.
- Due to the remote nature of avalanches, many incur no damages.
- Those most at risk from avalanches are winter recreationists.
- 22 incidents in the Region since 2010
  - All resulted in casualties. 21 resulted in at least 1 fatality



US Avalanche Fatalities by State  
2011-12 to 2020-21



# Avalanche Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Limited	Likely	Negligible	Low
Anaconda-Deer Lodge	Limited	Likely	Negligible	Low
Beaverhead	Significant	Likely	Negligible	Low
Broadwater	Limited	Likely	Negligible	Low
Butte-Silver Bow	Limited	Occasional	Negligible	Low
CSKT	Limited	Occasional	Negligible	Low
Flathead	Limited	Likely	Negligible	Low
Granite	Significant	Likely	Negligible	Low
Jefferson	Limited	Likely	Negligible	Low
Lake	Significant	Likely	Negligible	Low
Lewis and Clark	Limited	Likely	Negligible	Low
Lincoln	Limited	Likely	Negligible	Low
Madison	Significant	Likely	Negligible	Low
Meagher	Limited	Likely	Negligible	Low
Mineral	Significant	Likely	Negligible	Low
Park	Significant	Likely	Negligible	Low
Powell	Significant	Likely	Negligible	Low
Ravalli	Significant	Likely	Negligible	Low
Sanders	Significant	Likely	Negligible	Low
Sweet Grass	Limited	Likely	Negligible	Low

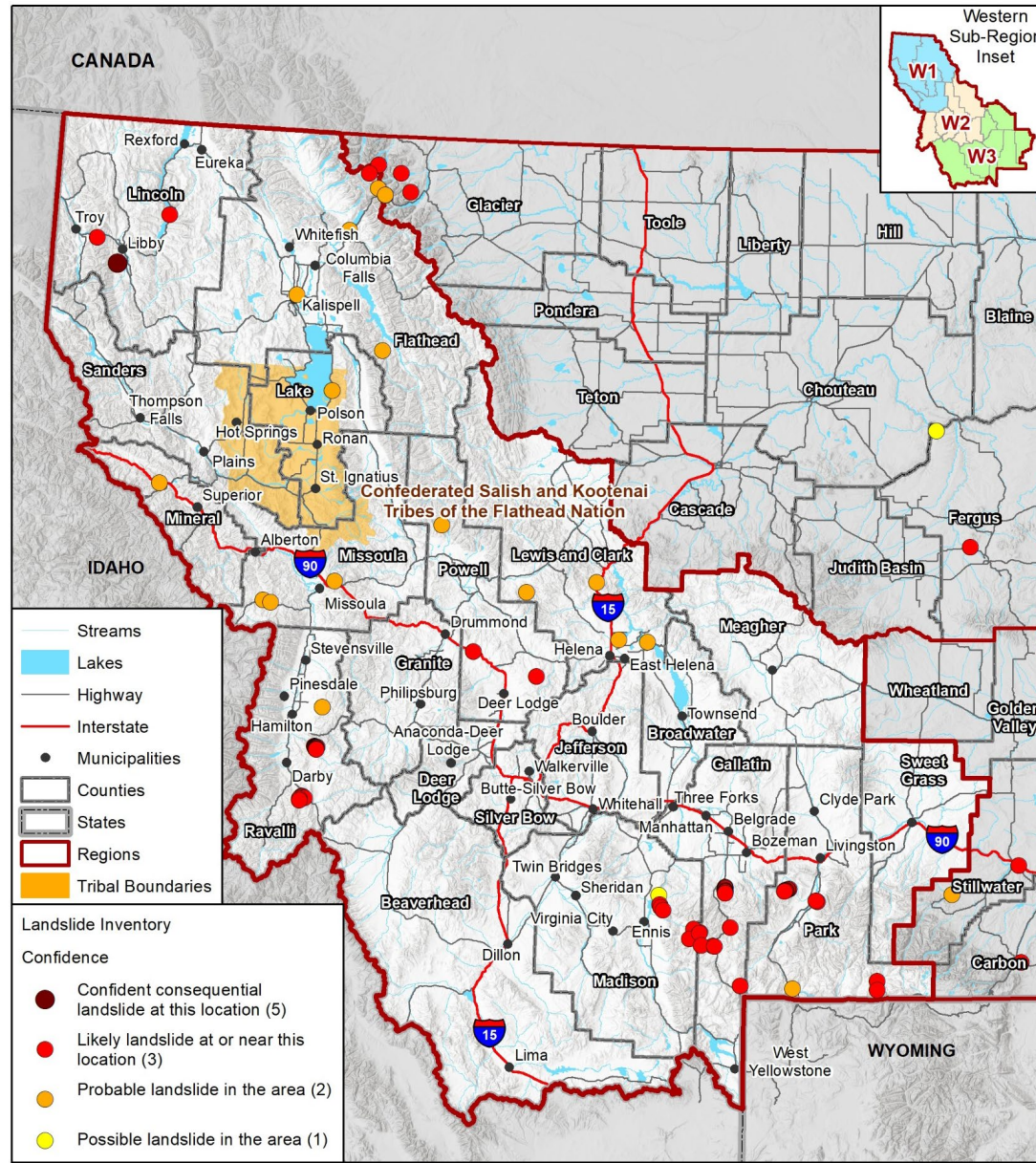


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**What do you think the significance of avalanche is for your jurisdiction?**

# Landslide/Rockfall/Debris Flow



- **Location:** There are **several likely and probable landslide locations** throughout the Region where landslides are confident to occur.
  - **Highest concentration of confidence areas** being in Flathead, Lincoln, Madison, and Park counties. Deer Lodge, Flathead, Lincoln, Mineral, Missoula, Powell, and Sanders (All have been included on past Disaster Declarations)
- **Extent:** Can be massive or disturb only a few cubic feet
- **Probability:**
  - **Likely** - Lincoln, Madison, Park, and Ravalli counties;
  - **Occasional** - Flathead, Lewis and Clark, and Powell counties.
  - Unlikely, but still possible, in other counties based on past events.
- **Impacts:**
  - Structural Damage
  - Road Closure
  - Power and Communication Failure
  - Damage to Rivers and Streams, reduced water quality
  - Erosion and Deposition
  - Flooding



# Landslide Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Limited	Occasional	Negligible	Low
Anaconda-Deer Lodge	Limited	Unlikely	Negligible	Low
Beaverhead	Limited	Unlikely	Negligible	Low
Broadwater	Limited	Occasional	Negligible	Medium
Butte-Silver Bow	Limited	Unlikely	Negligible	Low
CSKT	Limited	Likely	Moderate	High
Flathead	Limited	Occasional	Negligible	Medium
Granite	Limited	Unlikely	Negligible	Low
Jefferson	Limited	Unlikely	Negligible	Low
Lake	Limited	Unlikely	Negligible	Medium
Lewis and Clark	Limited	Occasional	Negligible	Medium
Lincoln	Limited	Likely	Moderate	Low
Madison	Limited	Likely	Moderate	Low
Meagher	Limited	Unlikely	Negligible	Low
Mineral	Limited	Occasional	Negligible	Medium
Park	Limited	Likely	Moderate	Low
Powell	Limited	Occasional	Negligible	Low
Ravalli	Limited	Likely	Moderate	Medium
Sanders	Limited	Unlikely	Negligible	Low
Sweet Grass	Limited	Unlikely	Negligible	Low





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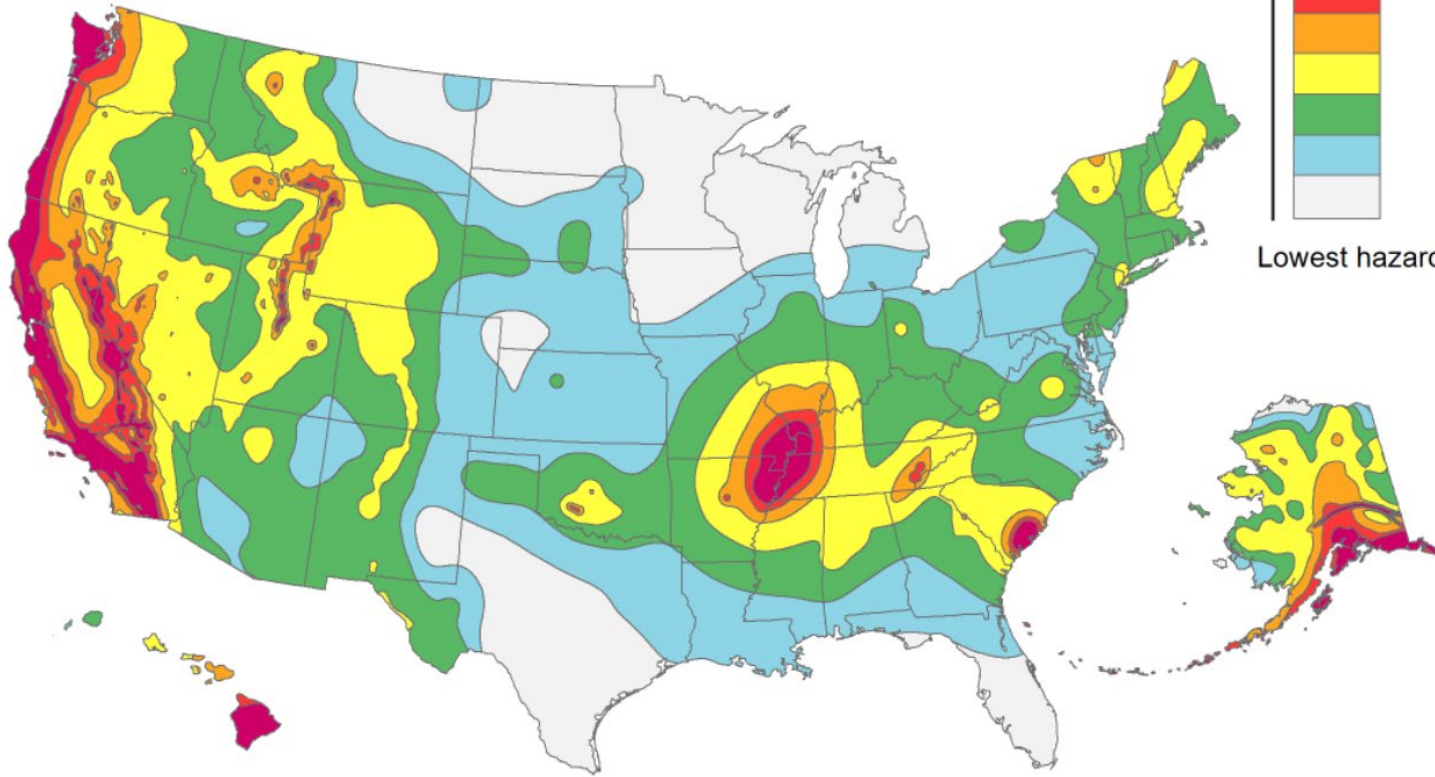


**What do you think the significance of landslide is for your jurisdiction?**

# Earthquake



Long Term Probabilistic Seismic Hazard Map 2018



Highest hazard



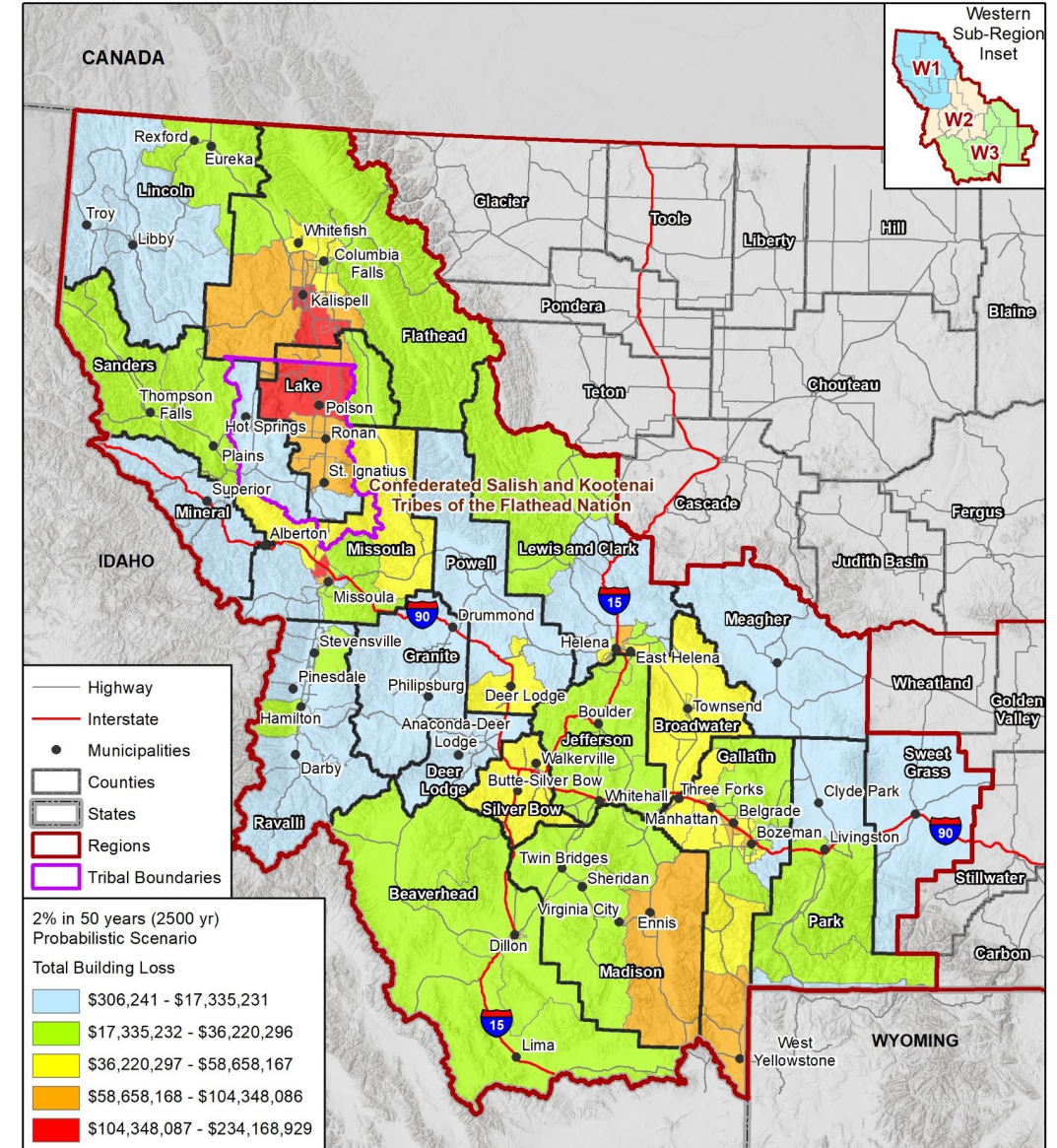
Lowest hazard

- Montana is one of the most seismically active states in the U.S according to USGS
- Much of this activity has been concentrated in the Intermountain Seismic Belt in the western third of the state
- Largest known event in the state was the M7.2 Hebgen Lake event in 1959
- Likelihood of occurrence is occasional (>1% probability each year) but impacts could be significant

# Earthquake

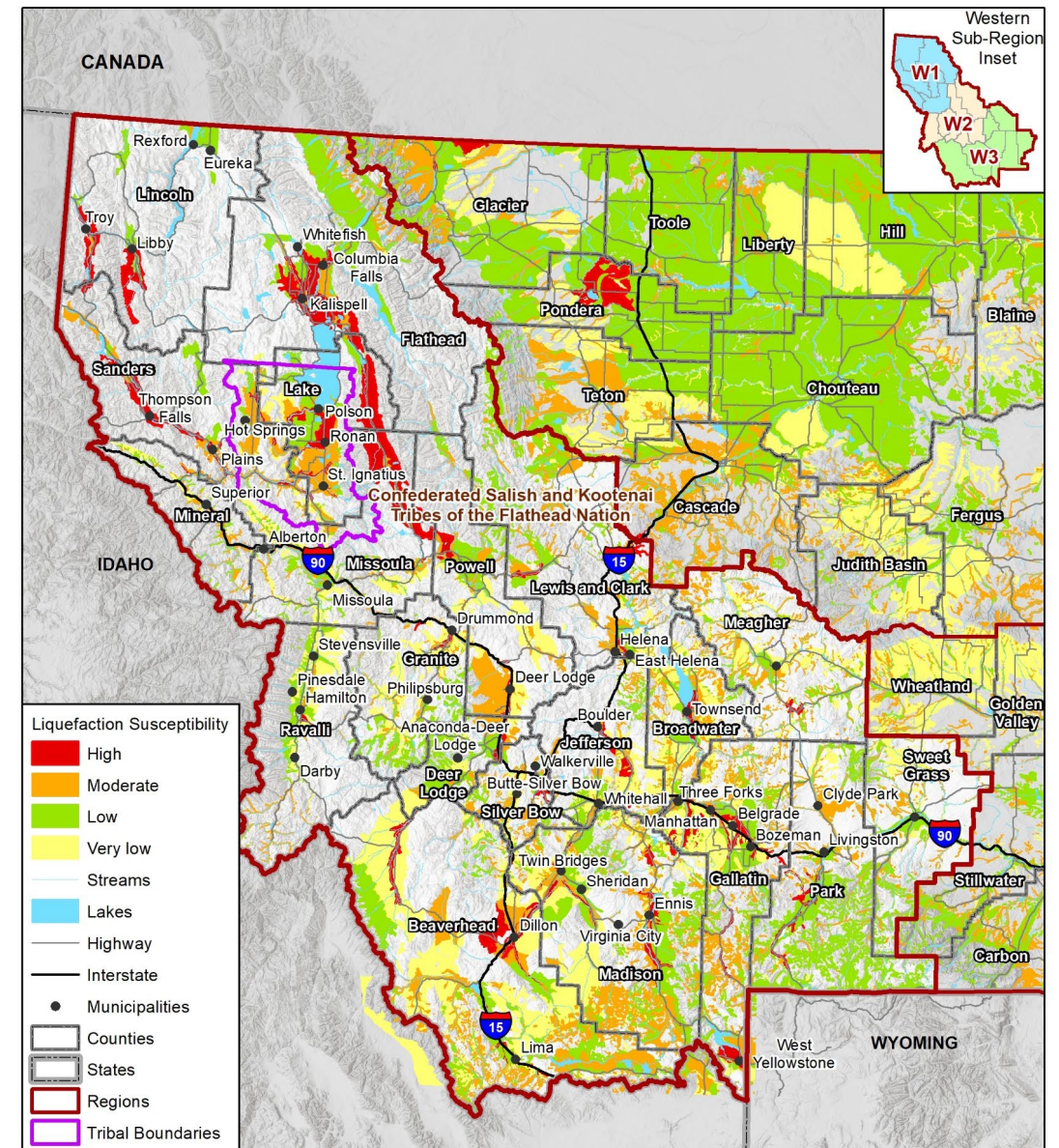
- Hazus 2,500-year M5.0 Probabilistic Scenario conducted
- Model uses USGS probabilistic seismic hazard maps to model ground shaking with a 2 percent probability of being exceeded in 50 years
- Western Region Totals:
  - 1,823 injuries, 147 fatalities
  - \$9.1 billion in total economic losses
  - 97,370 buildings with some damage, 11,123 of them extensively damaged and 2,616 destroyed
  - 2,809 displaced households
  - 1,219,000 tons of debris generated
- Several related/cascading hazards: Landslide, Rockfall, Liquefaction, Fire

Western Region Hazus 2% in 50 years (2500 yr) as the Probabilistic Scenario Direct Economic Loss



# Earthquake - Liquefaction

- Liquefaction can occur during an earthquake when vibrations cause soil particles to lose contact with one another and act as a liquid (*geology.com*)
- Liquefaction can cause property damage, harm to human life, fracturing, and sliding of the ground surface
- **Highest risk** for liquefaction in Western Region is in the valleys along the **Northern Rocky Mts, Cabinet Mts, Crazy Mts, and Pioneer Mts**
  - *Beaverhead, Flathead, Lake, Lincoln, Madison, Missoula, Powell, and Sanders Counties, as well as CSKT, at highest risk*



Map compiled 8/2022; intended for planning purposes only.  
 Data Source: DEM source data from the Montana State Library - Liquefaction susceptibility source data modified from Li, Y., Stickney, M., Sadeghi, M., Yakovlev, P., and Thale, P., 2021, Liquefaction susceptibility in Montana: Montana Bureau of Mines and Geology Digital Publication 4

# Earthquake Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Significant	Unlikely	Negligible	Low
Anaconda-Deer Lodge	Significant	Unlikely	Negligible	Low
Beaverhead	Significant	Unlikely	Negligible	Low
Broadwater	Significant	Unlikely	Negligible	Low
Butte-Silver Bow	Significant	Occasional	Moderate	Medium
CSKT	Significant	Unlikely	Negligible	Low
Flathead	Significant	Occasional	Critical	High
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Powell	Significant	Unlikely	Negligible	Low
Ravalli	Significant	Occasional	Moderate	Medium
Sanders	Significant	Unlikely	Negligible	Low
Sweet Grass	Significant	Unlikely	Negligible	Low

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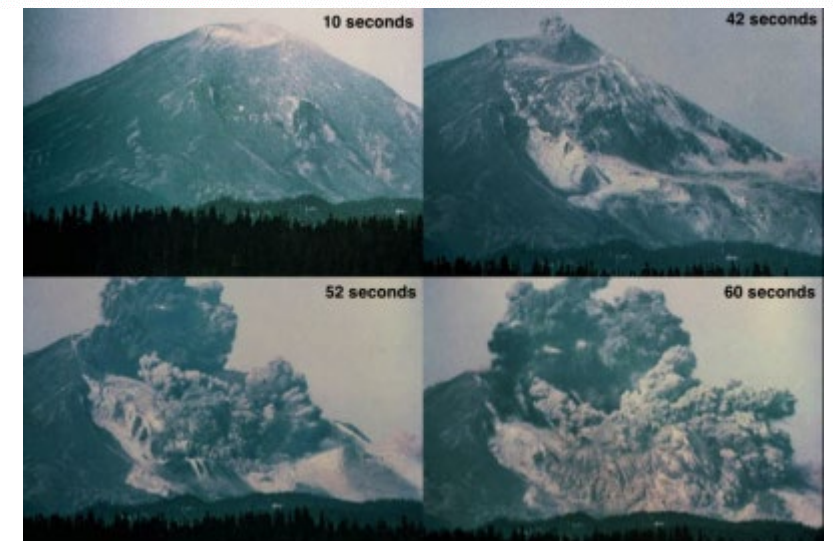
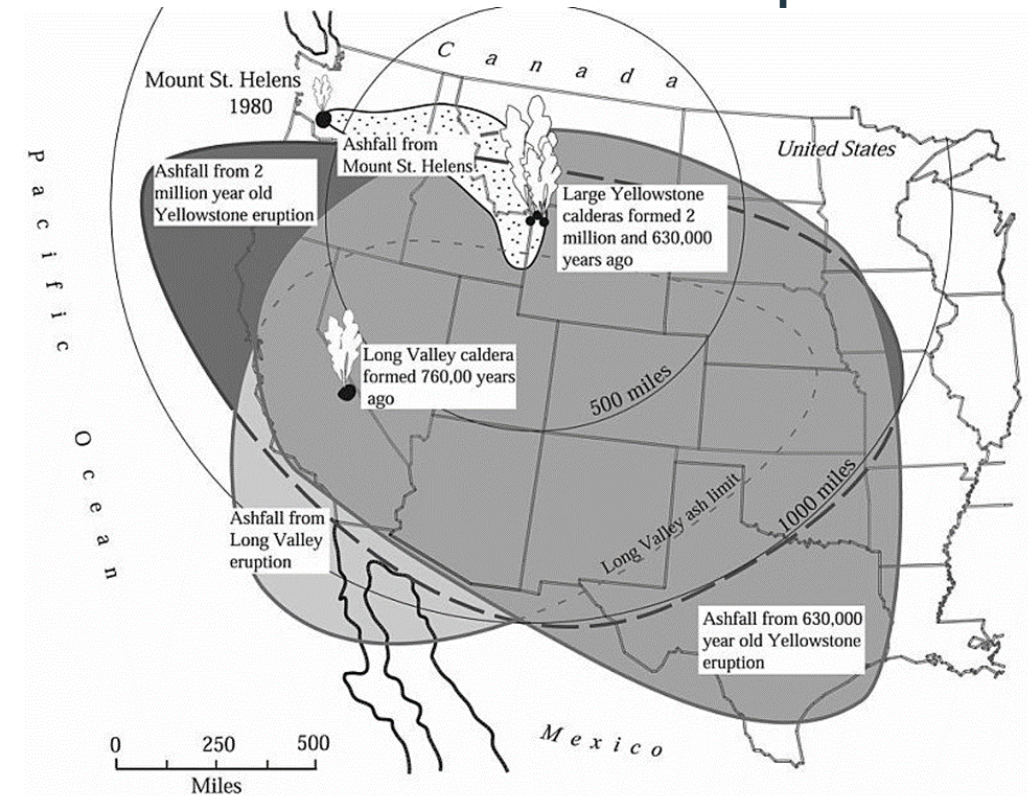


**What do you think the significance of earthquake is for your jurisdiction?**

# Volcanic Ash

- Major concern for Montana is ashfall after an eruption, most likely from the Cascades in WA, OR, and CA
  - Yellowstone Caldera in WY and ID presents some risk, although much less likely based on the geologic record
  - **1980 Mt. St Helens eruption** is best recent example
- Unlike ash from fires, volcanic ash is hard, does not dissolve in water, is extremely abrasive, and can conduct electricity when wet
  - Leads to massive damage to machinery
  - Can scratch skin and eyes; create a cement-like mixture in the lungs if inhaled
  - Massive cleanup costs, as ash must be collected and trucked away
  - Can collapse roofs under weight if too much accumulates
  - Large scale ejections of ash can even alter the global climate

## Areas of US with volcanic ash deposits



# Volcanic Ash Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Unlikely	Moderate	Low
Anaconda-Deer Lodge	Extensive	Unlikely	Moderate	Low
Beaverhead	Extensive	Unlikely	Moderate	Low
Broadwater	Extensive	Unlikely	Moderate	Low
Butte-Silver Bow	Extensive	Unlikely	Moderate	Low
CSKT	Extensive	Unlikely	Moderate	Low
Flathead	Extensive	Unlikely	Moderate	Low
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Jefferson	Extensive	Unlikely	Moderate	Low
Lake	Extensive	Unlikely	Moderate	Low
Lewis and Clark	Extensive	Unlikely	Moderate	Low
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Meagher	Extensive	Unlikely	Moderate	Low
Mineral	Extensive	Unlikely	Moderate	Low
Park	Extensive	Unlikely	Moderate	Low
Powell	Extensive	Unlikely	Moderate	Low
Ravalli	Extensive	Unlikely	Moderate	Low
Sanders	Extensive	Unlikely	Moderate	Low
Sweet Grass	Extensive	Unlikely	Moderate	Low





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**What do you think the significance of volcanic ash is for your jurisdiction?**

# Communicable Disease

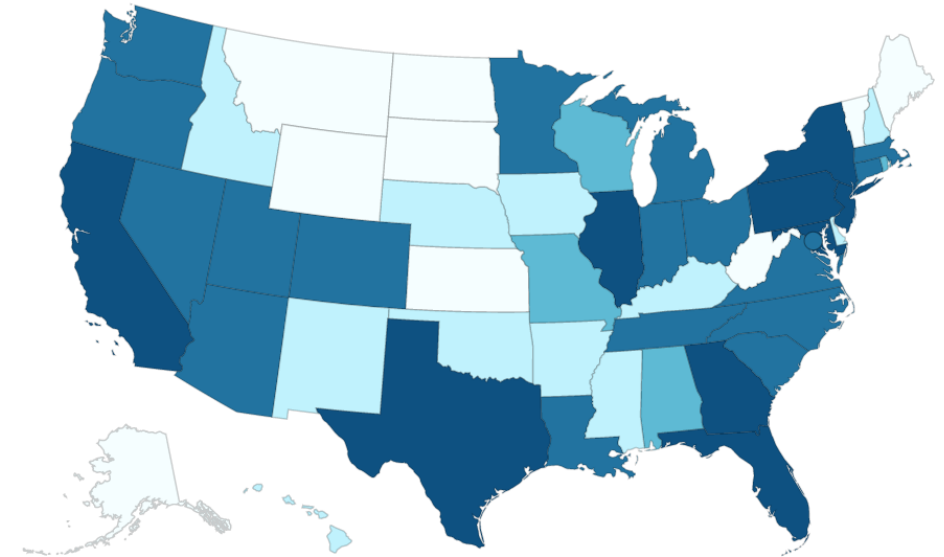
- Five pandemic in the last ~100 years
  - 1918-1919 Spanish Flu (H1N1) – 17 to 100 million deaths
  - 1957-1958 Asian Flu (H2N2) – 1 to 4 million deaths
  - 1968-1969 Hong Kong Flu (H3N2) – 1 to 4 million deaths
  - 2009 H1N1 Flu – 18,000 deaths
  - 2020-Current COVID-19
    - Worldwide: 568 million cases, 6.38 million deaths as of 7/22/22
    - United States: 90.2 million cases, 1.02 million deaths as of 7/22/22
    - State of Montana: 305,561 cases, 3,502 deaths as of 9/6/2022
    - Montana Western Region: 176,492 cases, 1,621 deaths as of 9/6/22
- Other major/popular communicable diseases in the State of Montana
  - Hantavirus Pulmonary Syndrome (deer mouse as the virus reservoir)
  - STDs, Hepatitis, Food & Water borne Diseases (according to Montana DPHHS)

- 2022 US Monkeypox Outbreak

- United States: 20,733 confirmed cases as of 9/6/22
- Montana: 5 confirmed cases as of 9/6/22

**20,733** Total confirmed monkeypox/orthopoxvirus cases

\*One Florida case is listed here but included in the United Kingdom case counts because the individual was tested while in the UK.



Territories **PR**



Case Range

○ 1 to 10

● 51 to 100

● >500

○ 11 to 50

● 101 to 500

# Communicable Disease Risk Summary

- A pandemic occurs on average roughly every 20 years
- There is a 5% chance that a pandemic that affects the entire US will occur in any given year
- New study finds climate change could spark the next pandemic
- Effects on people will vary, while the elderly, people with underlying medical conditions, and young children are usually at higher risk
- Ongoing mitigation activities should focus on disease prevention, especially during flu season
- Pre-season community outreach campaigns to educate the public about risks and available support; establish convenient vaccination centers; reach out to vulnerable populations and caregivers; and issuing advisories and warnings.

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Extensive	Occasional	Critical	Medium
Anaconda-Deer Lodge	Extensive	Occasional	Critical	Medium
Beaverhead	Extensive	Occasional	Critical	Medium
Broadwater	Extensive	Occasional	Critical	Medium
Butte-Silver Bow	Extensive	Occasional	Critical	Medium
CSKT	Extensive	Occasional	Critical	Medium
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Park	Extensive	Occasional	Critical	Medium
Powell	Extensive	Occasional	Critical	Medium
Ravalli	Extensive	Occasional	Critical	Medium
Sanders	Extensive	Occasional	Critical	Medium
Sweet Grass	Extensive	Occasional	Critical	Medium

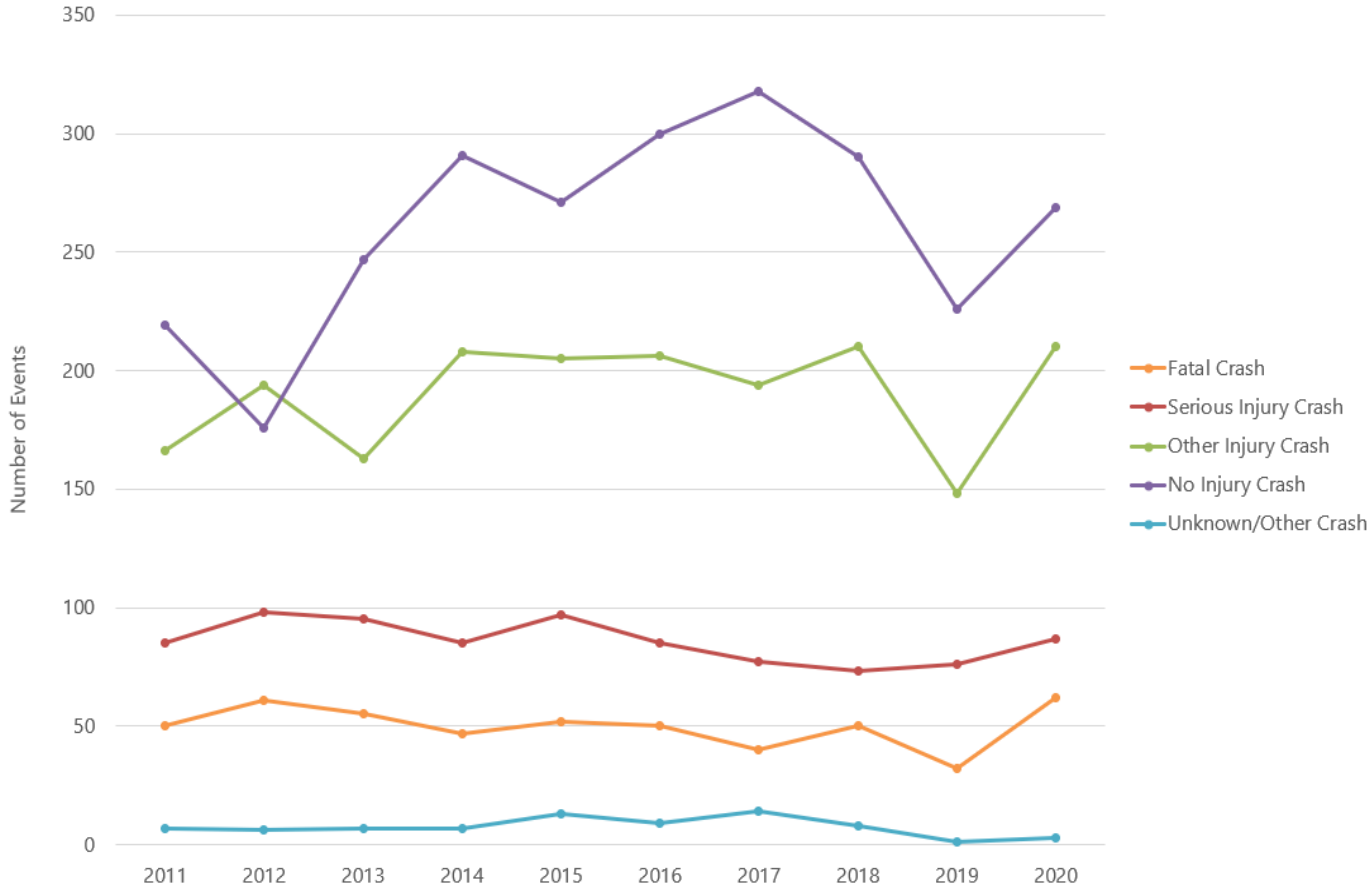
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**What do you think the significance of communicable disease is for your jurisdiction?**

# Transportation Accidents

Crash Severity in Montana 2011-2020



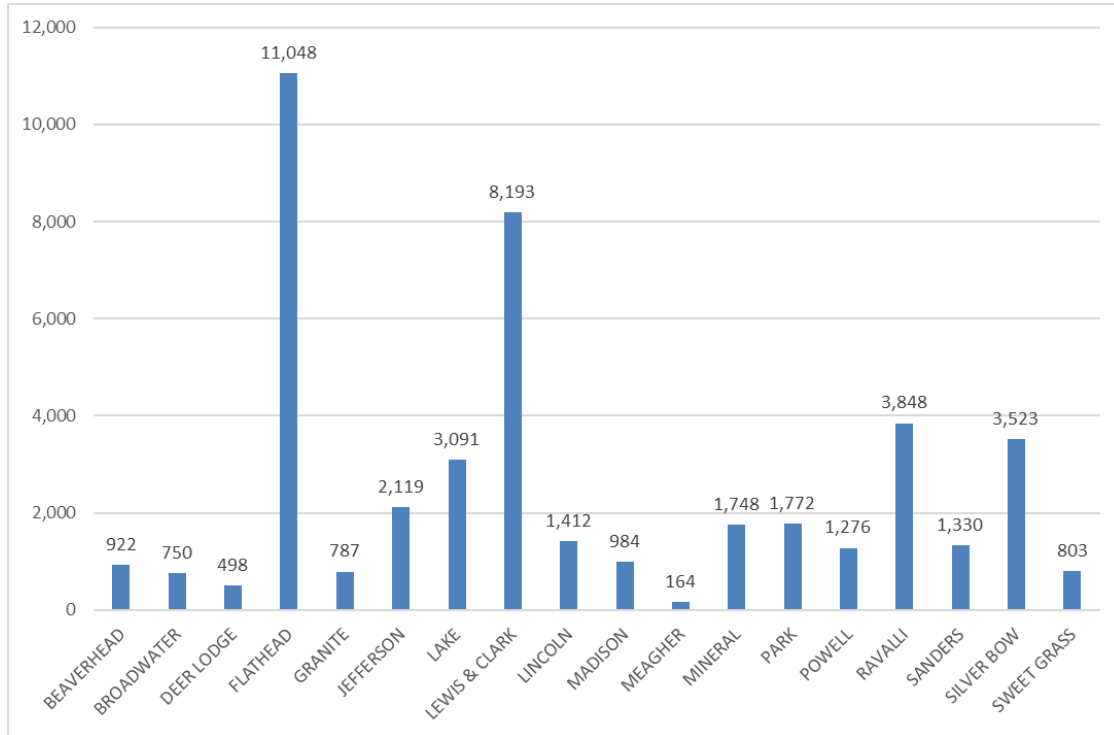
Source: MT DOT

- **Location:** All counties in the Western Region can experience transportation accidents, often along **Interstates 15 and 90, US 93, US 12, US 2, US 287**
- **Extent:** Can cause significant property losses, injuries, and fatalities to those involved in the accident.
- **Probability:** Highly likely
  - 9 aircraft accidents per year in the state
  - **13,502 annual average roadway crashes** from 2016-2020 in the **Western Region** (Includes all counties)
  - **7,163 annual average roadway crashes due to wildlife** in the **state** (most often caused by white-tailed deer in the month of Nov.)
  - 82 boating accidents from 2017-2021 in the state
  - **39 reported train accidents** in the **Western Region** from 2017-2021
- **Impacts:**
  - Isolation/delayed emergency response due to road closure
  - Property damage
  - Threaten to life and safety



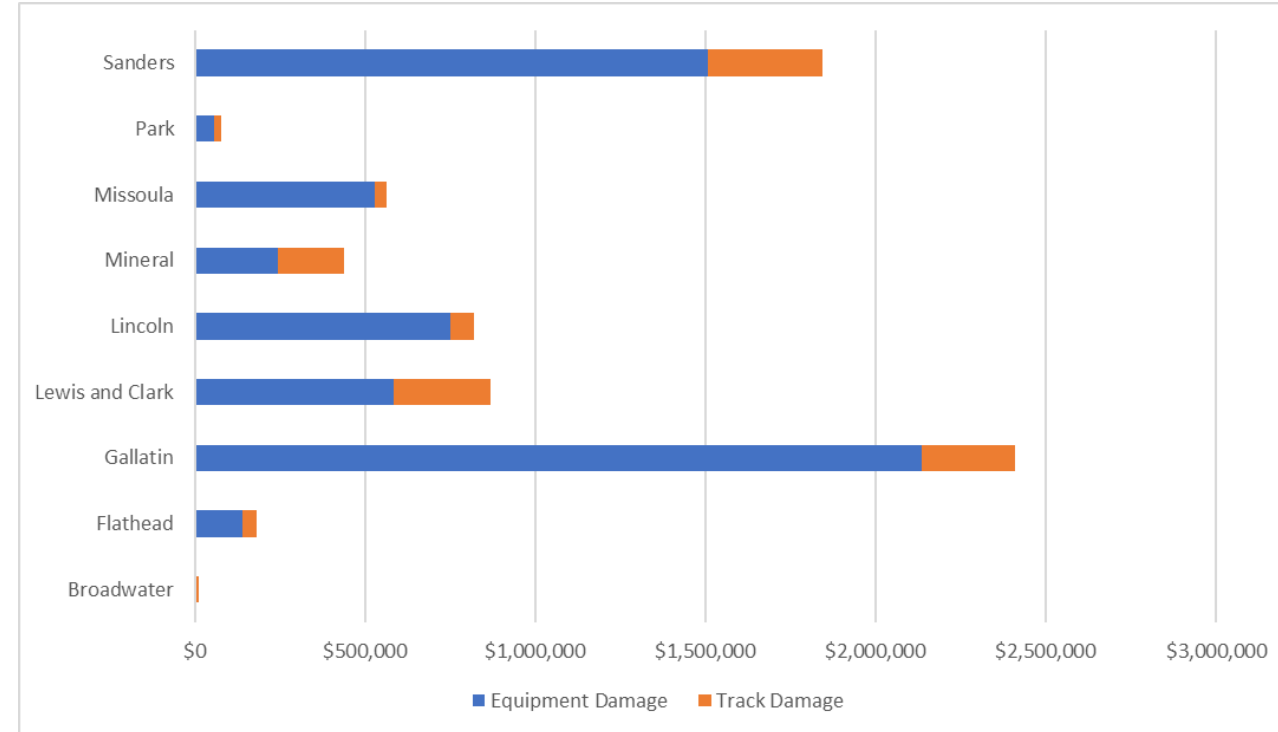
# Transportation Accidents

## Western Region Roadway Crashes 2016-2020



Source: MT DOT

## Western Region Railway Accidents 2017-2021



Source: Federal Railway Administration

# Transportation Accidents Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Significant	Highly Likely	Negligible	Low
Anaconda-Deer Lodge	Significant	Highly Likely	Negligible	Medium
Beaverhead	Significant	Highly Likely	Negligible	Low
Broadwater	Significant	Highly Likely	Negligible	Low
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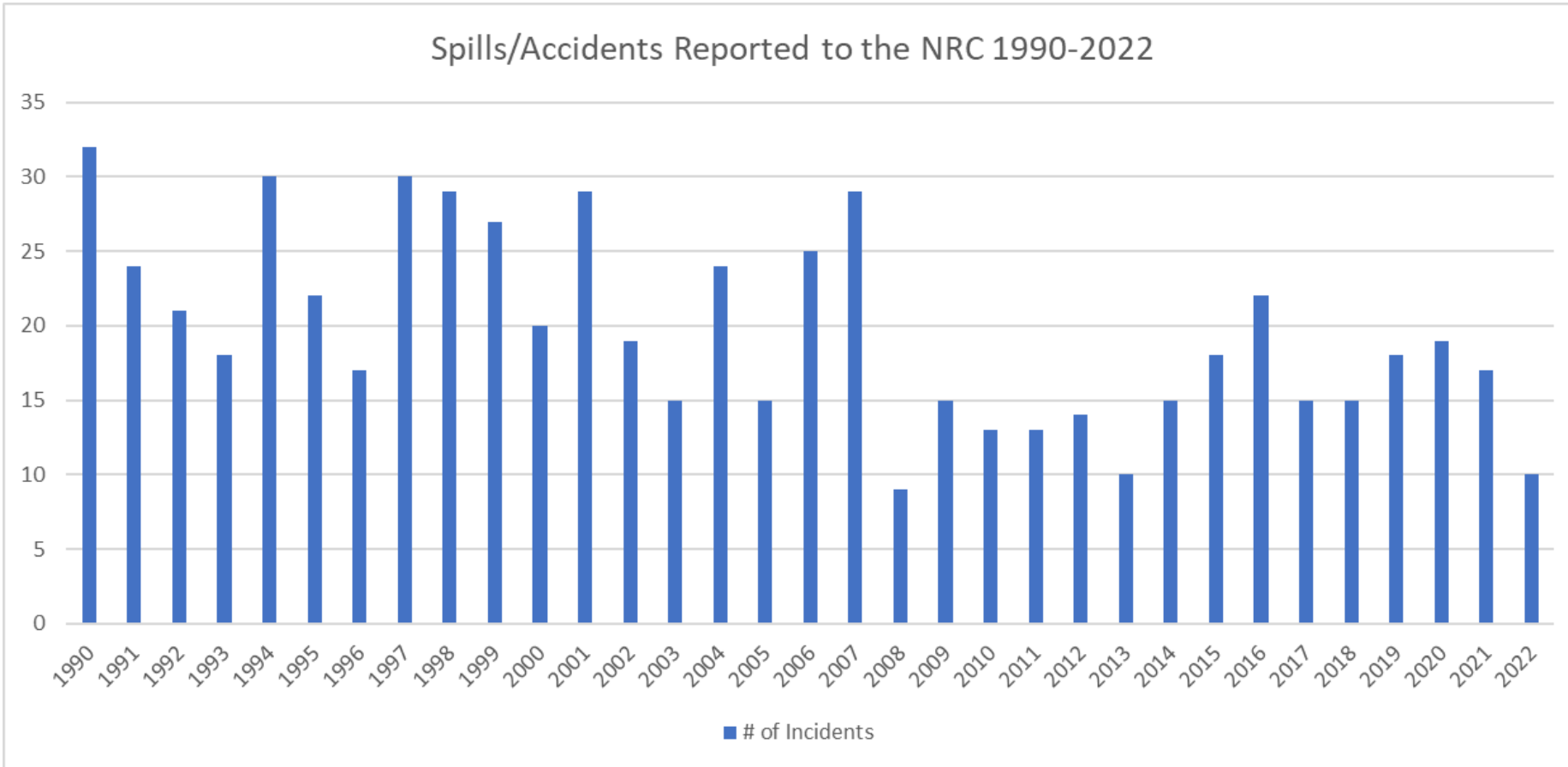
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**What do you think the significance of transportation accidents is for your jurisdiction?**



# Hazardous Materials Incidents

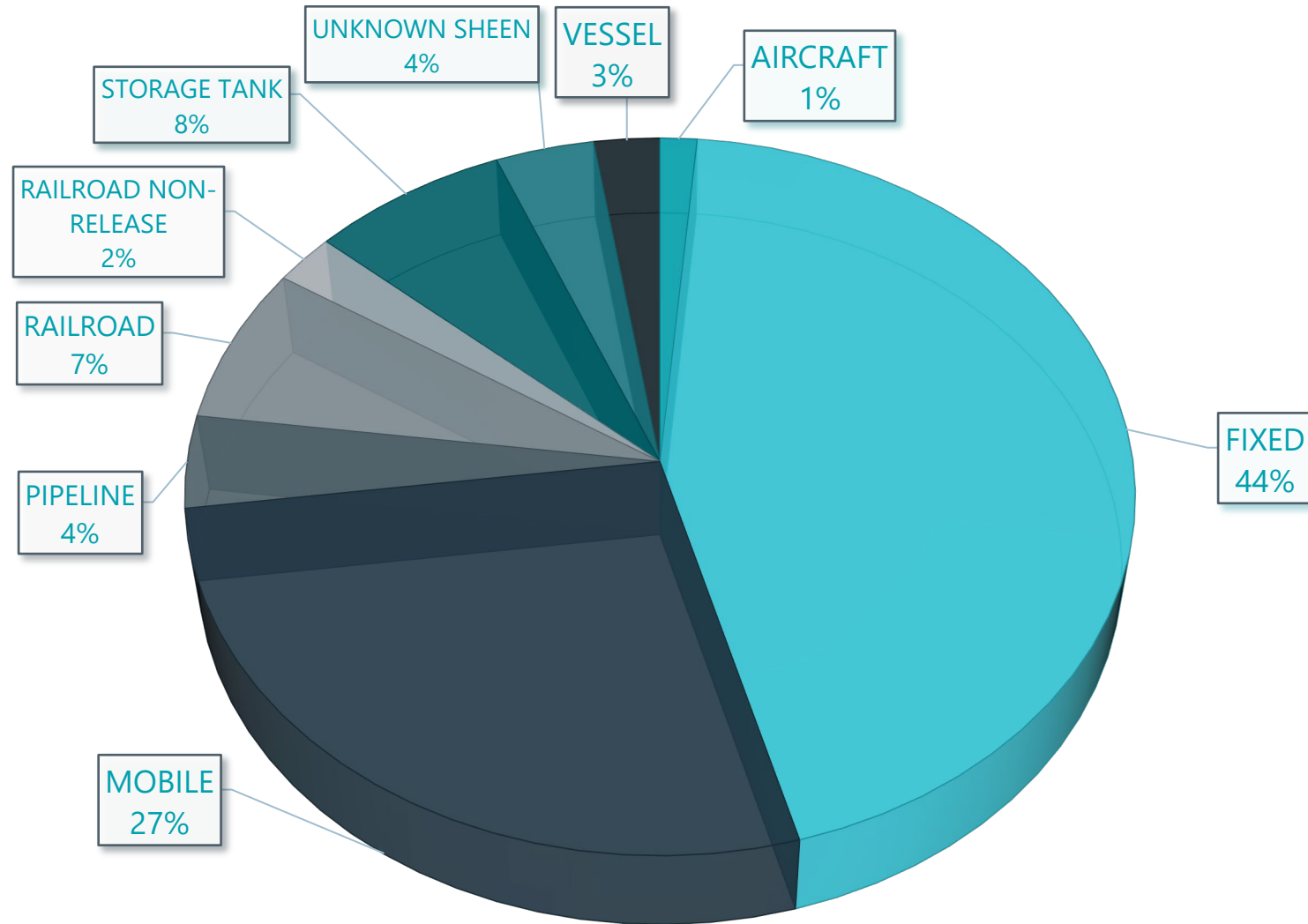


**Location:** Hazmat incidents can occur at a **fixed facility** or during **transportation**. Hazardous materials facilities are identified and mapped by the counties they reside in, along with the types of materials stored there; facilities generally reside in and around communities.

- Probability:** Likely throughout the planning area
- Montana’s Western Region has had **649 Hazmat Spill incidents in 32 years**.
  - The 1990s generally saw consistently higher rates of incidents in this timeframe.

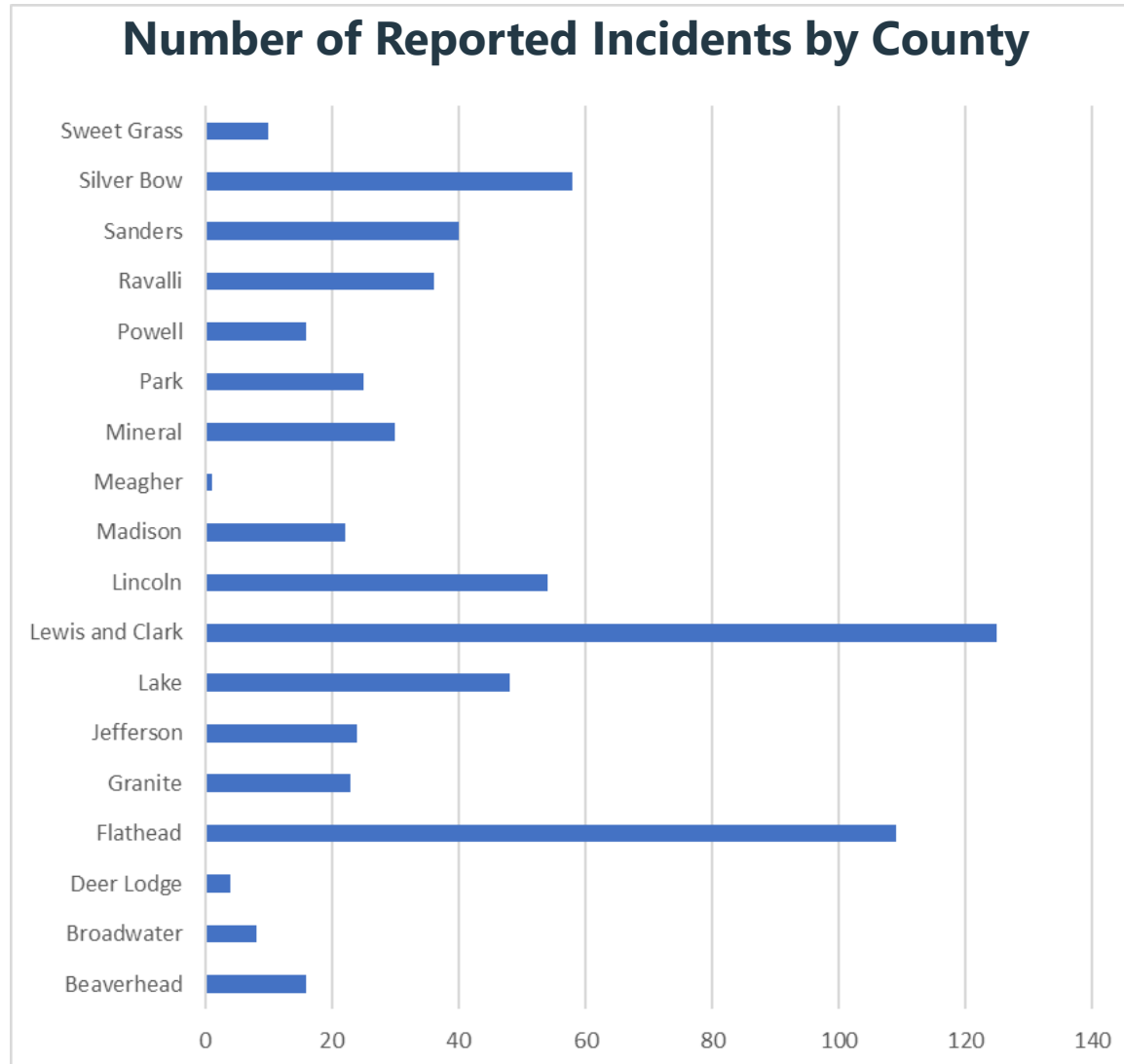


# Hazardous Materials Incidents



- The **greatest number of incidents** reported to the NRC by type are **fixed** with 44% of the 649 events reported.
  - Fixed Facilities such as Tier II and RMP facilities are common places where hazardous material incidents occur.
- The second are **mobile incidents** with 27%.
  - When Hazardous Materials are being transported and accidents occur.
- The third largest amount is **storage tank incidents** with 8%.
  - Involves leaks or spills from sources where materials are stored

# Hazardous Materials Incidents



- Between 1990 and 2022 the Western Region has seen an **average of 20** NRC-reported **incidents per year**
- **Lewis & Clark** and **Flathead** counties have had the greatest number of hazmat incidents and spills

# Hazardous Materials Incidents Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Limited	Likely	Negligible	Low
Anaconda-Deer Lodge	Limited	Likely	Negligible	Low
Beaverhead	Limited	Likely	Negligible	Low
Broadwater	Limited	Likely	Negligible	Low
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Park	Limited	Likely	Negligible	Low
Powell	Limited	Likely	Negligible	Low
Ravalli	Limited	Likely	Negligible	Low
Sanders	Limited	Likely	Negligible	Low
Sweet Grass	Limited	Likely	Negligible	Low

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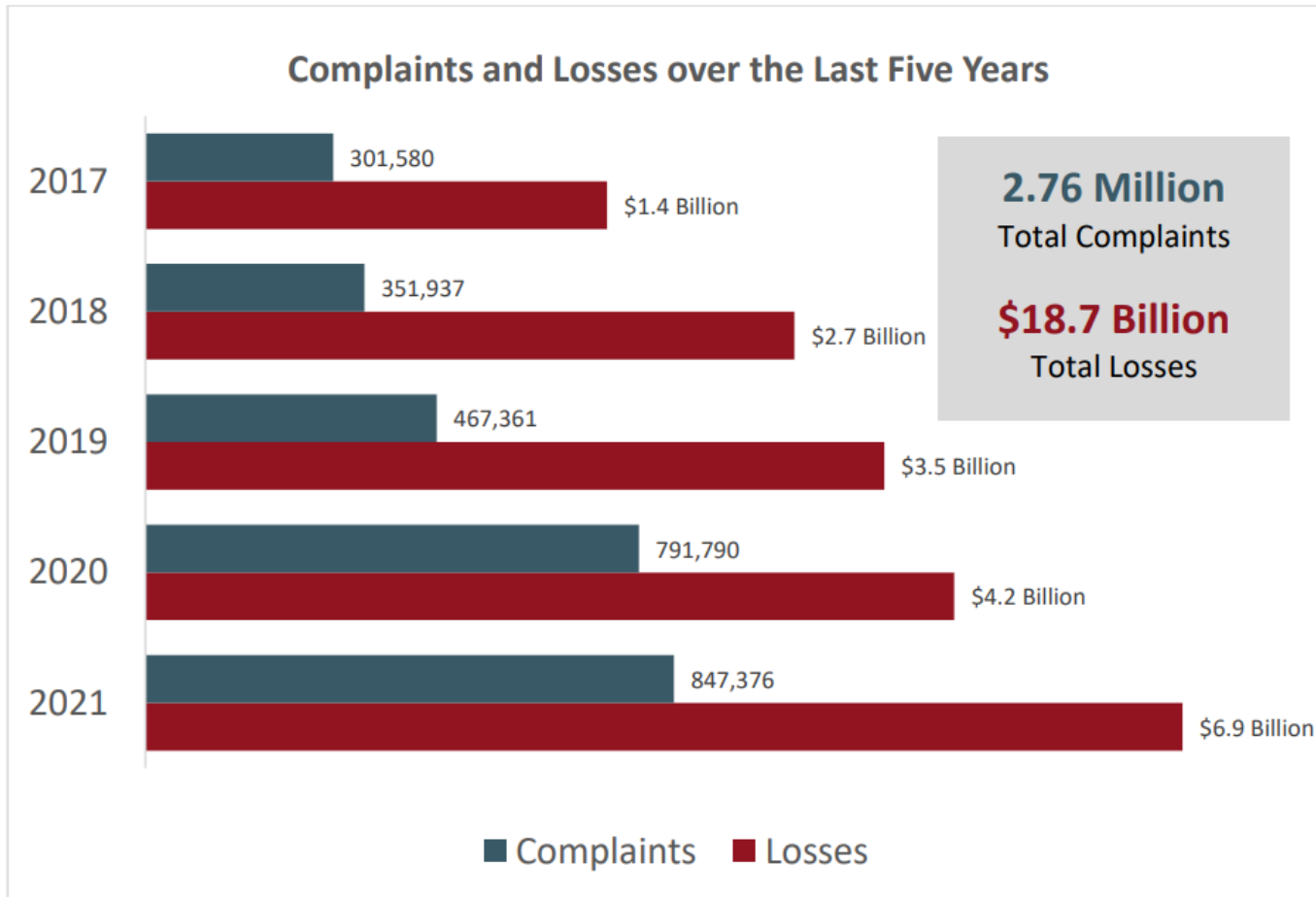
**What do you think the significance of hazardous material incidents is for your jurisdiction?**

# Cyber Attack

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- **DDoS attacks:** frequent, minimal impacts
- **Data breaches:** 9,741 in U.S. 2005-2019
  - 35 in Montana
- **Malware:** 1 in 131 emails contains malware
  - **Supply Chain Attack:** Solar Winds
- **Ransomware:** attacks on gov't servers are increasing
  - Ryuk ransomware on Havre Public Schools Computer System 2020
  - Atlanta 2018                      - Baltimore 2019                      - Orange County NC 2019
  - JBS 2021                              - Colonial Pipeline 2021
- **Cyber espionage:** primarily by foreign gov'ts
- **Cyber crime:** motivated by financial gain
- **Cyber terrorism:** developing threat Olympic Destroyer 2018

# Cyber Attack



Source: The FBI Internet Crime Report 2021

- **Location:** Can occur on anywhere. Both to private and government servers
- **Extent:** Can range from personal email scams to large scale theft of confidential information or interruption of critical services with a required ransom.
- **Montana ranked as 49<sup>th</sup> state in U.S. for victim losses**, with \$10,107,283 in losses and 48<sup>th</sup> for number of victims per state, with 1,188 victims.
- **Probability:** Growing rapidly in frequency every year, but difficult to predict due to high variability
- **Impacts:**
  - Power failure and blackouts
  - Communication/emergency response failure (9-1-1 attacks)
  - Personal monetary losses. Populations 60+ experience the greatest losses from cyber-attacks
  - Leaked confidential information from government servers

# Cyber Attack Risk Summary

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude/Severity	Overall Significance
Western Region	Significant	Occasional	Critical	Medium
Anaconda-Deer Lodge	Significant	Occasional	Critical	Medium
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Sanders	Significant	Occasional	Critical	Medium
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**\$6.9 Billion**

Victim losses in 2021



**2,300+**

Average complaints received daily



**552,000+**

Average complaints received per year (last 5 years)



**Over 6.5 Million**

Complaints reported since inception

Source: The FBI Internet Crime Report 2021



**wood.**



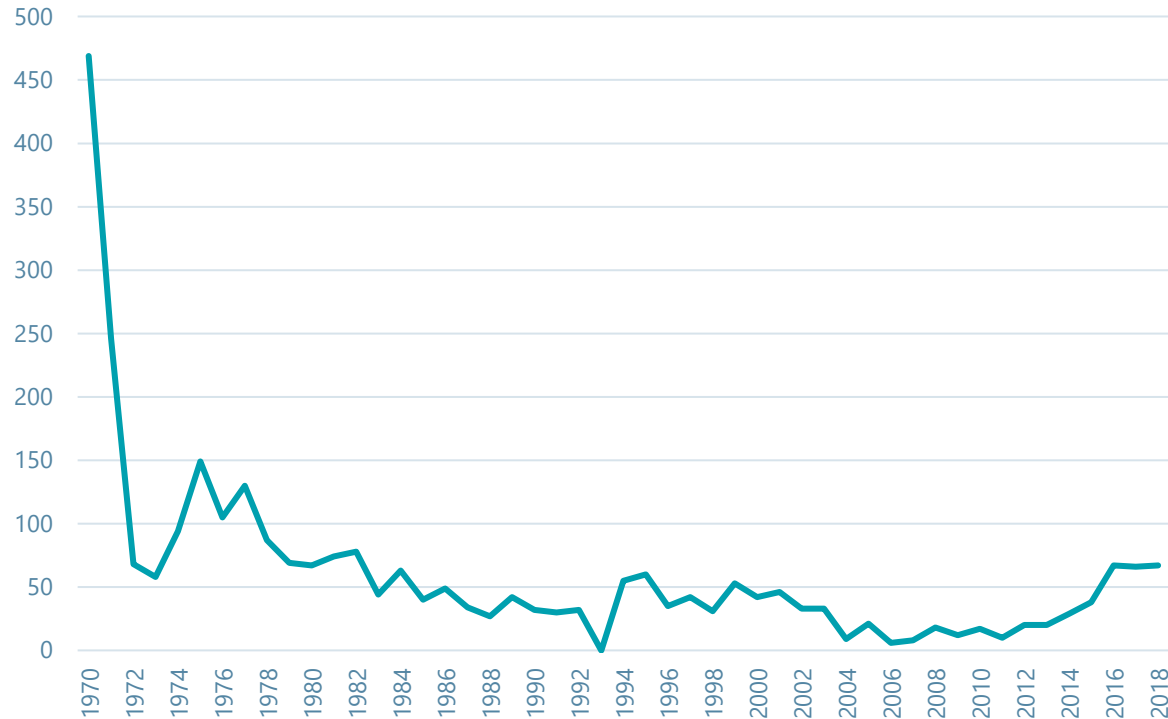
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**What do you think the significance of cyber-attack is for your jurisdiction?**

# Human Conflict (Terrorism)

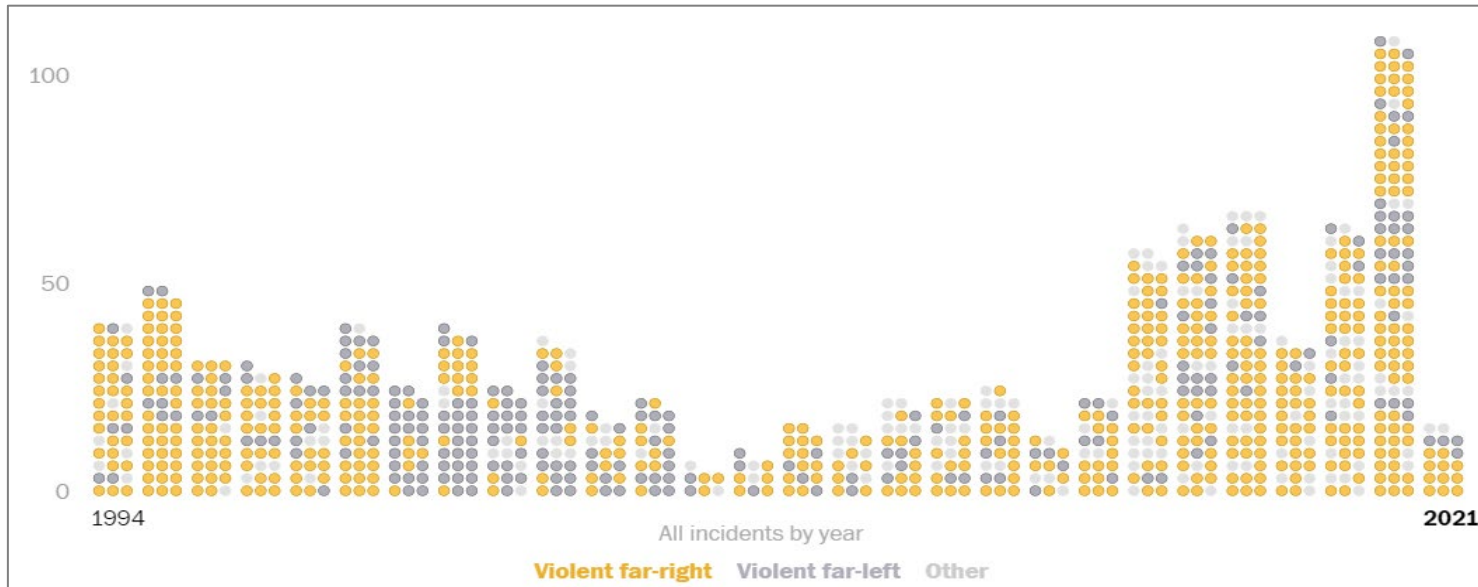
## Terrorist Attacks in the U.S. 1970-2018



### Most common targets

- Businesses: 27%
- Government: 17%
- Private Citizens & Property: 13%
- Abortion-related: 9%
- Military: 6%
- Police: 6%
- Religious: 5%

# Human Conflict (Terrorism)

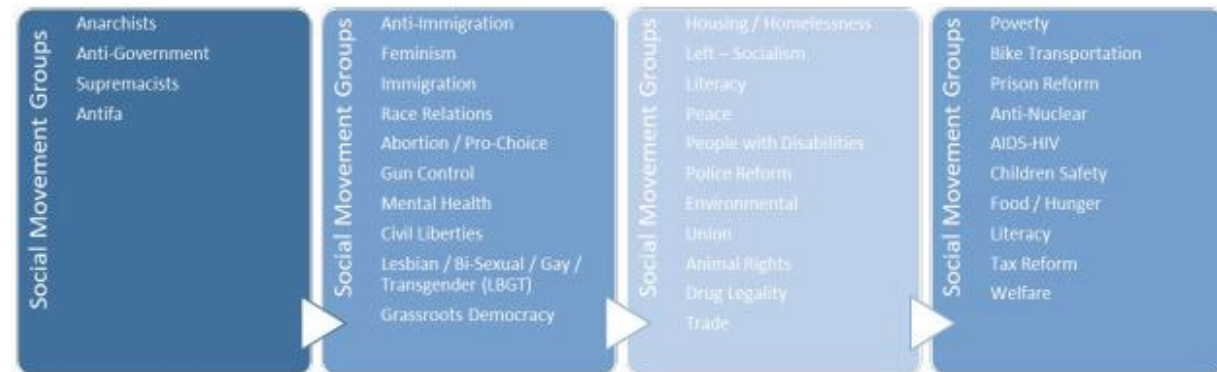
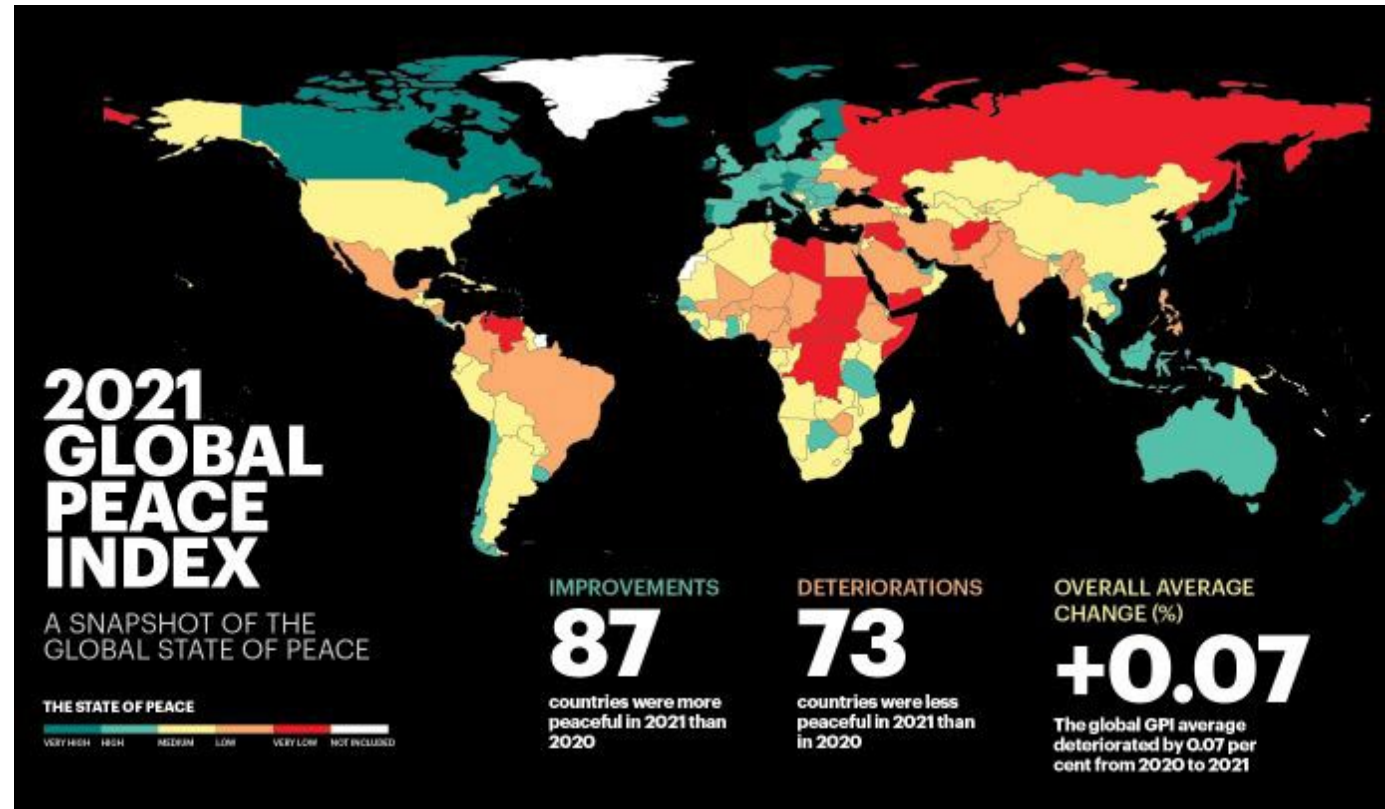


The Center for Strategic & International Studies records 980 domestic terrorist attacks in the US since 1994, with sharp growth over the last 10-15 years.



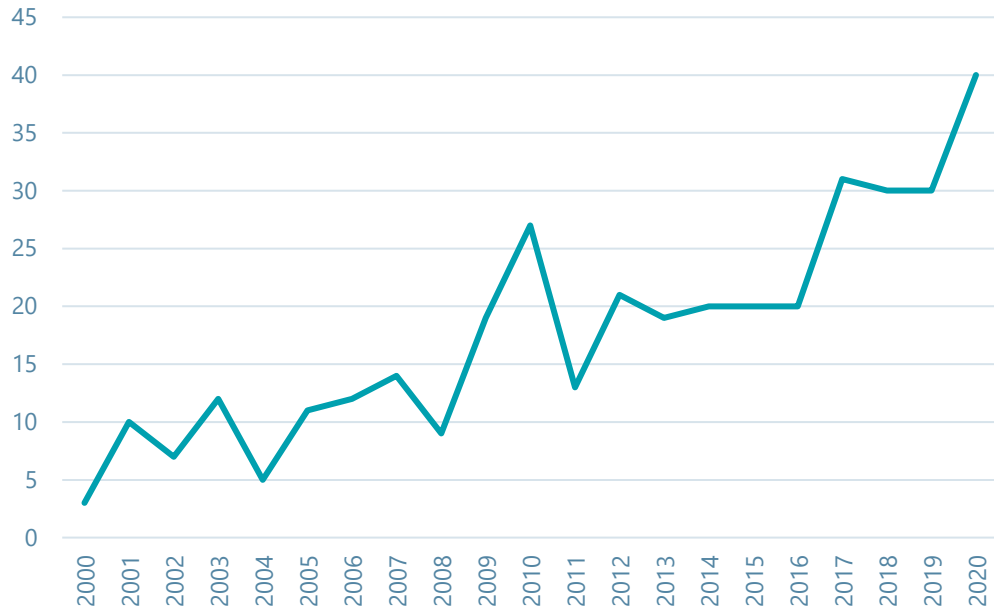
# Human Conflict (Civil Unrest)

- Defined as **any public disturbance involving acts of violence by assemblages of three or more persons, which causes an immediate danger of or results in damage or injury** to the property or person of any other individual.
- Can include riots, demonstrations, threatening individuals, or assemblies that have become disruptive and may cause harm to others.
- There can be many cascading affects of social unrest, including continuity of operations and loss of confidence in government.



# Human Conflict (Active Shooter Incidents)

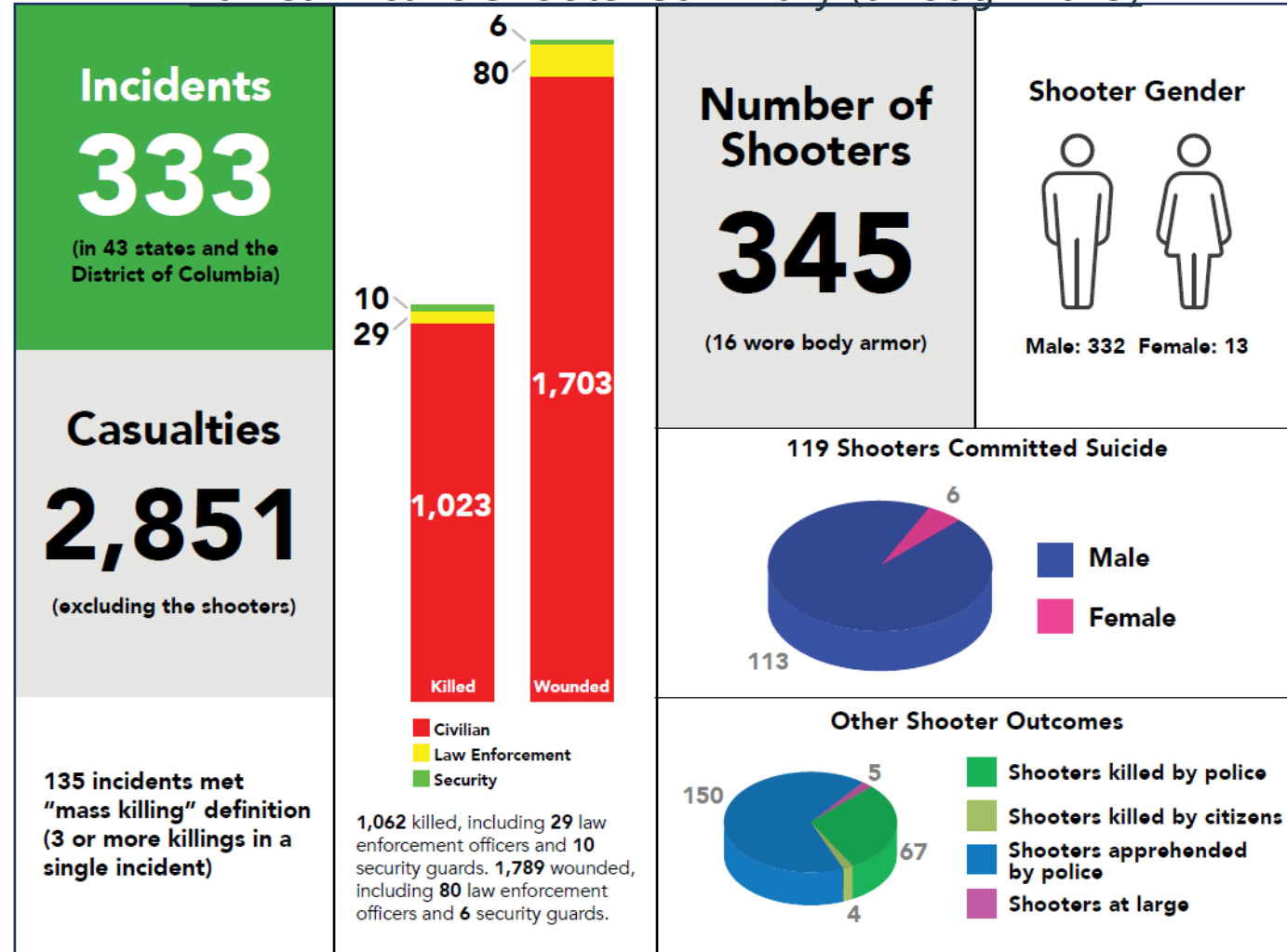
Active Shooter Incidents in the U.S. 2000-2020



Sources:

- FBI Active Shooter Incidents, 20-Year Review 2000-2019
- FBI Active Shooter Incidents in the United States 2020

20-Year Active Shooter Summary (through 2019)



# Human Conflict (Terrorism, Civil Unrest, etc.)

Jurisdiction	Geographic Extent	Probability of Future Occurrence	Potential Magnitude / Severity	Overall Significance
Western Region	Significant	Occasional	Critical	Medium
Anaconda-Deer Lodge	Significant	Occasional	Critical	Medium
Beaverhead	Significant	Occasional	Critical	Medium
Broadwater	Significant	Occasional	Critical	Medium
Butte-Silver Bow	Significant	Occasional	Critical	Medium
CSKT	Significant	Occasional	Critical	Medium
Flathead	Significant	Occasional	Critical	Medium
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Jefferson	Significant	Occasional	Critical	Medium
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Mineral	Significant	Occasional	Critical	Medium
Park	Significant	Occasional	Critical	Medium
Powell	Significant	Occasional	Critical	Medium
Ravalli	Significant	Occasional	Critical	Medium
Sanders	Significant	Occasional	Critical	Medium
Sweet Grass	Significant	Occasional	Critical	Medium

- **Location:** Can occur anywhere in the Western Region.
- **Extent:** Can result in significant damage to property and infrastructure, as well as result in injuries and fatalities at a small local scale or across the entire planning area.
- **Probability:** Occasional, **4 active hate groups reported in Montana in 2021** by the Southern Poverty Law Center, in addition to growing numbers of protests across the world in recent years.
- **Impacts:**
  - Property damage and personal injuries possible
  - Continuity of operations may be impacted
  - Economic disruptions
  - Public confidence in government can be affected

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**What do you think the significance of human conflict is for your jurisdiction?**

# MT Western Region Hazard Significance Summary Table : W1

Hazard	CSKT	Flathead	Lake	Lincoln	Mineral	Sanders
Avalanche	Low	Low	Low	Low	Low	Low
Communicable Disease	Medium	Medium	Medium	Medium	Medium	Medium
Cyber-Attack	Medium	Medium	Medium	Medium	Medium	Medium
Dam Failure	Low	Low	Low	Low	Low	Low
Drought	High	High	High	Medium	Medium	Medium
Earthquake	Low	High	Medium	Low	Low	Low
Flooding	Medium	High	Medium	Medium	Medium	Medium
Hazardous Material Incidents	Low	Medium	Low	Low	Low	Low
Human Conflict (Terrorism, Civil Unrest, etc.)	Medium	Medium	Medium	Medium	Medium	Medium
Landslide	High	Medium	Medium	Low	Medium	Low
Severe Summer Weather	Medium	Medium	Medium	Medium	Medium	Medium
Severe Winter Weather	Medium	Medium	Medium	Medium	Medium	Medium
Tornadoes & Windstorms	Medium	High	Medium	High	Medium	Medium
Transportation Accidents	Medium	Medium	Low	Low	Medium	Medium
Volcanic Ash	Low	Low	Low	Low	Low	Low
Wildland and Rangeland Fire	Medium	High	Medium	High	High	Medium



# MT Western Region Hazard Significance Summary Table : W2

Hazard	Anaconda Deer Lodge	Butte-Silver Bow	Granite	Jefferson	Lewis and Clark	Powell	Ravalli
Avalanche	Low	Low	Low	Low	Low	Low	Low
Communicable Disease	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Cyber-Attack	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Dam Failure	Low	Low	Low	Low	Low	Low	Low
Drought	Medium	Medium	High	Medium	High	High	High
Earthquake	Low	Medium	Low	Low	High	Low	Medium
Flooding	Medium	Medium	Medium	Medium	High	Medium	Medium
Hazardous Material Incidents	Low	Low	Low	Low	Medium	Low	Low
Human Conflict (Terrorism, Civil Unrest, etc.)	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Landslide	Low	Low	Low	Low	Medium	Low	Medium
Severe Summer Weather	Medium	Medium	Medium	Medium	Medium	Medium	High
Severe Winter Weather	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Tornadoes & Windstorms	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Transportation Accidents	Medium	Medium	Low	Low	Medium	Low	Medium
Volcanic Ash	Low	Low	Low	Low	Low	Low	Low
Wildland and Rangeland Fire	Medium	Medium	Medium	High	Medium	Medium	High

# MT Western Region Hazard Significance Summary Table : W3

Hazard	Beaverhead	Broadwater	Madison	Meagher	Park	Sweet Grass
Avalanche	Low	Low	Low	Low	Low	Low
Communicable Disease	Medium	Medium	Medium	Medium	Medium	Medium
Cyber-Attack	Medium	Medium	Medium	Medium	Medium	Medium
Dam Failure	Low	Low	Low	Low	Low	Low
Drought	Medium	High	Medium	Medium	Medium	Medium
Earthquake	Low	Low	Medium	Low	Low	Low
Flooding	High	Medium	Medium	Medium	High	Medium
Hazardous Material Incidents	Low	Low	Low	Low	Low	Low
Human Conflict (Terrorism, Civil Unrest, etc.)	Medium	Medium	Medium	Medium	Medium	Medium
Landslide	Low	Medium	Low	Low	Low	Low
Severe Summer Weather	Medium	Medium	Medium	Medium	Medium	Medium
Severe Winter Weather	Medium	Medium	Medium	Medium	Medium	Medium
Tornadoes & Windstorms	High	Medium	Medium	Medium	Medium	Medium
Transportation Accidents	Low	Low	Low	Low	Low	Medium
Volcanic Ash	Low	Low	Low	Low	Low	Low
Wildland and Rangeland Fire	Medium	Medium	Medium	Medium	Medium	Medium

# Next Steps



# Next Steps

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- Please return data collection guide input where outstanding
- Provide input on mitigation action status on form – when available
- Start thinking of ideas for new mitigation actions
- Stay informed by email of upcoming meetings (TBD)
- Review results public survey results
- Review draft HIRA section of plan when available
  - For yellow highlighted gaps where applicable
  - Review for jurisdiction specifics, mitigation ideas



# Project Tasks and Schedule

Project Milestones	Anticipated Timeline
Meeting #2 HIRA review	September
HIRA Draft for HMPC review	October
Meeting #3 Mitigation Strategy	January – February
HMPC Review Draft	April 2023
Public Review Draft	May 2023
MT DES Review Draft	June 2023
Final Plan for FEMA Review (estimated)	June – August 2023
Final Approved HMP for local adoption	August – October 2023

**Don't Leave without  
Typing Your Name, Title,  
and Affiliation in Chat Box!**

# Questions?

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# Appendix: Federal Disaster Declarations 1974-2022



## Disaster Declarations in the Western Region

Year	Declaration Title	Disaster Number	Area Impacted
2022	Severe Storm and Flooding	DR-4655-MT	Carbon, Park, Stillwater, Yellowstone
2020	Covid-19 Pandemic Covid-19 Montana Bridger Foothills Fire	DR-4508-MT EM-3476-MT FM-5346-MT	Statewide Statewide Gallatin
2019	Montana North Hills Fire Montana Flooding	FM-5286-MT DR-4437-MT	Lewis and Clark Lake, Park
2018	Montana Flooding	DR-4405-MT	Lewis and Clark, Missoula, Park, Powell
2017	Montana West Fork Fire Montana Rice Ridge Fire Montana Moose Peak Fire Montana Lolo Peak Fire Montana Highway 200 Fire Complex Montana Alice Creek Fire	FM-5209-MT FM-5207-MT FM-5211-MT FM-5197-MT FM-5210-MT FM-5208-MT	Lincoln Missoula, Powell Lincoln Missoula, Ravalli Sanders Lewis and Clark
2016	Montana Roaring Lion Fire	FM-5143-MT	Ravalli
2014	Montana Ice Jams and Flooding	DR-4172-MT	Broadwater, Jefferson, Lake, Park, Ravalli, Sanders
2013	Montana West Mullan Fire Montana Lolo Creek Fire Complex	FM-5035-MT FM-5047-MT	Mineral Missoula
2012	Montana Sawtooth Fire	FM-5016-MT	Ravalli
2011	Montana Nineteen Mile Fire Montana Corral Fire Montana Severe Storms and Flooding	FM-5008-MT FM-2987-MT DR-1996-MT	Jefferson Lewis and Clark Broadwater, Flathead, Missoula, Powell, Lewis and Clark, Ravalli, Granite, Deer Lodge, Silver Bow, Madison, Jefferson, Park, Meagher
2007	Montana Jocko Lakes Fire Montana Country Club Fire Montana Black Cat Fire	FM-2718-MT FM-2730-MT FM-2721-MT	Missoula Lewis and Clark Missoula
2006	Montana Derby Fire	FM-2671-MT	Stillwater, Sweet Grass
2005	Montana Hurricane Katrina Evacuation	EM-3253-MT	Statewide

## Disaster Declarations in the Western Region

Year	Declaration Title	Disaster Number	Area Impacted
2003	Montana Wedge Canyon Fire Montana Robert Fire Montana Missoula/Mineral Fire Zone Montana Lincoln Fire Complex Montana Hobble Fire Montana Flathead Fire Zone Montana Cherry Creek Fire	FM-2485-MT FM-2484-MT FM-2490-MT FM-2492-MT FM-2488-MT FM-2494-MT FM-2489-MT	Flathead Flathead Mineral, Missoula Lewis and Clark, Powell Sweet Grass Flathead Sanders
2001	Montana Severe Storms	DR-1385-MT	Gallatin, Missoula, Powell
2000	Montana Wildfires  Montana SW Zone 2 Fire Complex Montana South Central Zone 4 Fire Complex Montana Northwest Zone 1 Fire Complex Montana Central Zone 3c Fire Complex Montana Central Zone 3b Fire Complex	DR-1340-MT  FSA-2317-MT FSA-2321-MT FSA-2320-MT FSA-2318-MT FSA-2314-MT	Beaverhead, Broadwater, Deer Lodge, Flathead, Gallatin, Granite, Jefferson, Lake, Lewis & Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Powell, Ravalli, Sanders, Silver Bow, Sweet Grass Deer Lodge, Granite, Mineral, Missoula, Powell, Ravalli, Silver Bow Gallatin, Park Flathead, Lincoln, Lake, Sanders Beaverhead, Madison Broadwater, Jefferson, Lewis and Clark, Meagher
1997	Montana Severe Storms, Ice Jams, Snowmelt, Flooding, Extreme Soil Saturation	DR-1183-MT	Broadwater, Deer Lodge, Flathead, Madison, Meagher, Missoula, Park, Ravalli, Sanders, Stillwater, Sweetgrass
1996	Montana Flooding	DR-1113-MT	Blaine, Flathead, Hill, Lincoln, Phillips, Toole
1986	Montana Heavy Rains, Flooding, Landslides	DR-761-MT	Deer Lodge, Powell, Sanders
1981	Montana Severe Storms, Flooding	DR-640-MT	Broadwater, Gallatin, Granite, Jefferson, Lewis and Clark, Meagher, Missoula, Powell, and Silver Bow
1977	Montana Drought	EM-3050-MT	Lincoln, Missoula
1975	Montana Rains, Snowmelt, Storms, Flooding	DR-472-MT	Broadwater, Flathead, Jefferson, Lewis and Clark, Meagher, Powell
1974	Montana Severe Storms, Flooding, Landslides	DR-417-MT	Deer Lodge, Flathead, Lincoln, Mineral, Missoula, Sanders