

Chapter 10: Wildland Fire

Wildland Fire Threats

Fremont County, because of its semi-arid climate and rural character, is vulnerable to catastrophic wildland fires, and, of the all fires in Wyoming, over 50% involve wildland areas. As defined by the National Interagency Fire Center (NIFC), a “wildland fire” is any non-structure fire, other than prescribed fire, that occurs in the wildland.

As the population and the wildland/urban interface in Wyoming increases, the more significant the risk of wildland fire hazard. Fremont County has an exceptional plan called the Fremont County Wildland Fire Management Program (Firewise), which expands on this population/wildfire relationship:

“During the past few decades, population growth in the wildland/urban interface has increased greatly. Subdivisions and other high-density developments have created a situation where wildland fires can involve more buildings than any amount of fire equipment can possibly protect.

The past 100 years of wildland fire suppression has led to heavy vegetation growth and thus has greatly increased the potential fuel-load for a wildfire to burn. As the wildland/urban interface has grown into these densely packed forests, the potential for catastrophic wildland fires has increased as well.”

Despite the rural nature of the County, this statement remains unquestionably accurate. Population growth and increased areas of wildland/urban interface are prompting policy makers, fire management organizations, and mapping technology to respond to the mounting need to mitigate wildfires to protect the residents and visitors of Wyoming.

According to the Wyoming Wildfire Mitigation Coordinator, James Webster, the majority of wildfires in the State are naturally started usually by lightning, while human-caused fires are found to be the majority in other states with greater populations. Webster also mentioned that the State boasts 97 percent of all wildfires—both by human and natural caused—in Wyoming are extinguished by firefighters within a 10-acre threshold of burning.

Although different reports, assessments, plans, and programs have been developed by different organizations at all levels of government, interagency coordination has been proven to be more effective, and today Wyoming wildland fires are managed and supported to varying extents through a cooperative effort by the:

- Bureau of Land Management (BLM) Wyoming Fire Program
- Geospatial Multi-Agency Coordination ([GeoMAC](#)) Wildland Fire Support Maps
- Wyoming Fire Academy
- Wyoming Wildland Fire Plan Action Team

- National Park Service (NPS) Fire Management Program
- US Fish and Wildlife Service (FWS) Fire Management Branch
- National Interagency Fire Center (NIFC)
- Bureau of Indian Affairs (BIA) Fire and Aviation Management – NIFC
- USDA Forest Service (USFS) Fire and Aviation Management
- Wyoming State Forestry Division

Before discussing wildland fire hazard in Fremont County, some key terms should be identified. The term “wildland/urban interface” or WUI is widely used within the wildland fire management community to describe any area where man-made buildings are constructed close to or within a boundary of natural terrain and fuel, where high potential for wildland fires exist. “Aspect” refers to the direction in which a slope faces. “Fuel” consists of combustible material, including vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire.

Currently, the principal action plan for the State is the Wyoming Wildland Urban Interface Hazard Assessment produced by a joint venture of the Wyoming State Forestry Division, USFS, BLM, NPS, and other interested parties, with the BLM hosting the data. This is a Geographic Information System (GIS)-based mapping mission building on The Front Range Redzone Project in Colorado—the first fire hazard mapping program of its kind. The Assessment maps fire hazard incorporating population density against slope, aspect, and fuels. With the mapping analysis evaluating areas of varying wildfire vulnerability, the final output will result in a Risk, Hazard and Value (RHV) map displaying areas of concern (Redzones) for catastrophic wildland fires (Figure 17.3). The Wyoming Wildland Urban Interface Hazard Assessment builds on the work of earlier hazard methodologies and provides new and updated data to further enhance accuracy and scale.

History

As one of the most arid states in the United States, Wyoming has experienced catastrophic fires. One of the earliest recorded such fires was in the summer of 1876 when the Sioux Indians retreated into the Big Horn Mountains, setting fire to the land, burning an estimated 500,000 acres to keep General Crook from pursuing them. Today, equivalent fires can and have occurred. However, because of the interface, the risk to human life and property has increased dramatically.

Fuel types in Wyoming’s wildland/urban interface include sagebrush, juniper, ponderosa and lodge-pole pine, Englemann spruce, Douglas fir, sub-alpine fir, aspen, and oak brush. When this vegetation is down, dead, and dry it acts as an excellent fuel, and increases fire hazard, especially where it is near structures. Historically, these fuels have been ignited by natural causes, with only 50% of all fires resulting from human-related effects. Table 10.1 is a chronological history of fires and the number of acres burned, highlighting both the figures for federal land, state and private lands, and their totals between 1960 and 2007. November 2007 is the most current statistical data available for this report. Fremont County data has not yet been analyzed.

Table 10.1 Wyoming Number of Wildland Fires and Acres Burned (1960 – 2007)

YEAR	INTENSITY TYPE	AMOUNT		
		FEDERAL LAND	STATE & PRIVATE LAND	TOTAL
1960 ¹	NUMBER OF FIRES	159	39	198
	NUMBER OF ACRES BURNED	2,533	840	3,373
1961 ¹	NUMBER OF FIRES	147	57	204
	NUMBER OF ACRES BURNED	1,193	16	1,209
1962 ¹	NUMBER OF FIRES	116	20	136
	NUMBER OF ACRES BURNED	241	44	285
1963 ¹	NUMBER OF FIRES	141	31	172
	NUMBER OF ACRES BURNED	1,367	764	2,131
1964 ¹	NUMBER OF FIRES	143	24	167
	NUMBER OF ACRES BURNED	3,650	393	4,043
1965 ¹	NUMBER OF FIRES	68	15	83
	NUMBER OF ACRES BURNED	228	94	322
1966 ²	NUMBER OF FIRES	261	243	504
	NUMBER OF ACRES BURNED	2,391	4,908	7,299
1967 ²	NUMBER OF FIRES	135	156	291
	NUMBER OF ACRES BURNED	325	4,490	4,815
1968 ³	NUMBER OF FIRES	163	132	295
	NUMBER OF ACRES BURNED	2,551	12,122	14,673
1969 ³	NUMBER OF FIRES	231	396	627
	NUMBER OF ACRES BURNED	2,980	25,981	28,961
1970 ³	NUMBER OF FIRES	241	413	654
	NUMBER OF ACRES BURNED	7,984	11,378	19,362
1971 ³	NUMBER OF FIRES	209	433	642
	NUMBER OF ACRES BURNED	3,406	67,567	70,973
1972 ³	NUMBER OF FIRES	183	438	621
	NUMBER OF ACRES BURNED	1,362	24,078	25,440
1973 ³	NUMBER OF FIRES	200	444	644
	NUMBER OF ACRES BURNED	2,911	10,047	12,958
1974 ³	NUMBER OF FIRES	301	772	1,073
	NUMBER OF ACRES BURNED	5,000	27,847	32,847
1975 ³	NUMBER OF FIRES	205	513	718
	NUMBER OF ACRES BURNED	6,101	15,177	21,278
1976 ³	NUMBER OF FIRES	349	589	938
	NUMBER OF ACRES BURNED	7,019	14,795	21,814
1977 ³	NUMBER OF FIRES	369	612	981
	NUMBER OF ACRES BURNED	6,045	16,885	22,930
1978 ³	NUMBER OF FIRES	301	559	860
	NUMBER OF ACRES BURNED	3,392	5,220	9,152
1979 ³	NUMBER OF FIRES	366	598	964
	NUMBER OF ACRES BURNED	12,100	16,294	28,394
1980 ³	NUMBER OF FIRES	333	603	936
	NUMBER OF ACRES BURNED	2,426	15,665	18,091
1981 ³	NUMBER OF FIRES	406	677	1,083
	NUMBER OF ACRES BURNED	30,326	6,757	37,083
1982 ³	NUMBER OF FIRES	205	555	760
	NUMBER OF ACRES BURNED	1,779	16,026	17,805
1983 ³	NUMBER OF FIRES	177	734	911
	NUMBER OF ACRES BURNED	2,294	25,136	27,430

Table 10.1 Wyoming Number of Wildland Fires and Acres Burned (1960 – 2007), continued

YEAR	INTENSITY TYPE	AMOUNT		
		FEDERAL LAND	STATE & PRIVATE LAND	TOTAL
1984 ²	NUMBER OF FIRES	169	607	776
	NUMBER OF ACRES BURNED	658	13,305	13,963
1985 ²	NUMBER OF FIRES	352	1,252	1,604
	NUMBER OF ACRES BURNED	11,227	56,185	67,412
1986 ²	NUMBER OF FIRES	202	546	748
	NUMBER OF ACRES BURNED	6,385	15,325	21,710
1987 ²	NUMBER OF FIRES	201	816	1,017
	NUMBER OF ACRES BURNED	7,872	21,123	28,995
1988 ²	NUMBER OF FIRES	504	1,456	1,960
	NUMBER OF ACRES BURNED	1,413,175	124,127	1,537,302
1989 ²	NUMBER OF FIRES	278	738	1,016
	NUMBER OF ACRES BURNED	4,331	25,088	29,419
1990 ²	NUMBER OF FIRES	353	492	845
	NUMBER OF ACRES BURNED	2,221	31,499	33,720
1991 ⁴	NUMBER OF FIRES	379	836	1,215
	NUMBER OF ACRES BURNED	16,106	61,944	78,050
1992 ⁴	NUMBER OF FIRES	407	872	1,279
	NUMBER OF ACRES BURNED	6,750	33,727	40,477
1993 ⁴	NUMBER OF FIRES	163	303	466
	NUMBER OF ACRES BURNED	4,283	4,628	8,911
1994 ⁴	NUMBER OF FIRES	584	1,027	1,611
	NUMBER OF ACRES BURNED	44,207	58,480	102,687
1995 ⁴	NUMBER OF FIRES	250	597	847
	NUMBER OF ACRES BURNED	2,846	12,697	15,525
1996 ⁴	NUMBER OF FIRES	516	1,506	2,022
	NUMBER OF ACRES BURNED	105,687	417,310	522,997
1997 ⁴	NUMBER OF FIRES	171	738	909
	NUMBER OF ACRES BURNED	8,420	20,016	28,436
1998	NUMBER OF FIRES	112 ⁷	446 ⁶	558 ⁵
	NUMBER OF ACRES BURNED	17,569 ⁷	5,373 ⁶	22,942 ⁵
1999	NUMBER OF FIRES	158 ⁷	574 ⁶	732 ⁵
	NUMBER OF ACRES BURNED	37,204 ⁷	47,097 ⁶	84,301 ⁵
2000 ⁶	NUMBER OF FIRES	339	909	1,248
	NUMBER OF ACRES BURNED	261,967	358,697	620,664
2001	NUMBER OF FIRES	486 ⁷	219 ⁶	705 ⁵
	NUMBER OF ACRES BURNED	138,696 ⁷	18,414 ⁶	157,110 ⁵
2002 ⁶	NUMBER OF FIRES	303	815	1,118
	NUMBER OF ACRES BURNED	60,007	163,227	223,234
2003 ⁶	NUMBER OF FIRES	283	727	1,010
	NUMBER OF ACRES BURNED	44,797	22,888	67,685
2004	NUMBERS OF FIRES	185	665	850
	NUMBER OF ACRES BURNED	2,665	23,909	26,574
2005	NUMBERS OF FIRES	190	697	887
	NUMBER OF ACRES BURNED	8,695	17,104	25,779
2006	NUMBERS OF FIRES	289	1,008	1,297
	NUMBER OF ACRES BURNED	57,893	262,152	320,045
2007 (1-07 TO 11-07)(9)	NUMBERS OF FIRES	429	230	659
	NUMBER OF ACRES BURNED	86,713	20,792	107,505

- ¹ USDA Forest Service, Annual Fire Report for the National Forests
- ² USDA Forest Service, Summary of Forest Fire Statistics for the US (CD from USDA FS, Washington, DC)
- ³ USDA Forest Service, Wildfire Statistics
- ⁴ USDA Forest Service, Wildland Fire Statistics
- ⁵ Wyoming State Forestry Division
- ⁶ USDA Forest Service, Rocky Mountain Area and Coordination Center 1998-2003 Annual Report Figures
- ⁷ Subtracted “State and Private” from “Total”
- ⁸ Wyoming State Fire Marshal
- ⁹ Most current information available is through November 2007

Impacts

When an analysis between annual precipitation rates and acreage burned is conducted it reveals that there is a direct relationship between the variables. The average annual acres burned from 1960 to 2007 are 147,787.19, with a maximum acreage of 1,537,302 in 1988 and a minimum of 285 in 1962. Since 1999, Wyoming has been experiencing a significant drought yielding an average of 230,599 acres burned between 1999 and 2003—a considerable difference of 156,549 average acres from the 43-year span, 1960-2003—providing evidence for the precipitation/acreage burned relationship.

Figure A displays a direct relationship between annual precipitation and the number of acres burned from wildland fires from 1960 to 2006. It is apparent that a precipitation decrease yields an increase in acreage burned. The most dramatic example is in 1988 where a total of 1,537,302 acres were burned and 8.55 inches of precipitation fell that year. Both figures are a record high and low, respectively, between the years 1960 and 2006.

Future impacts can be determined by weather analysis and prediction with drought and precipitation, and continuing studies with this relationship can be pursued further.

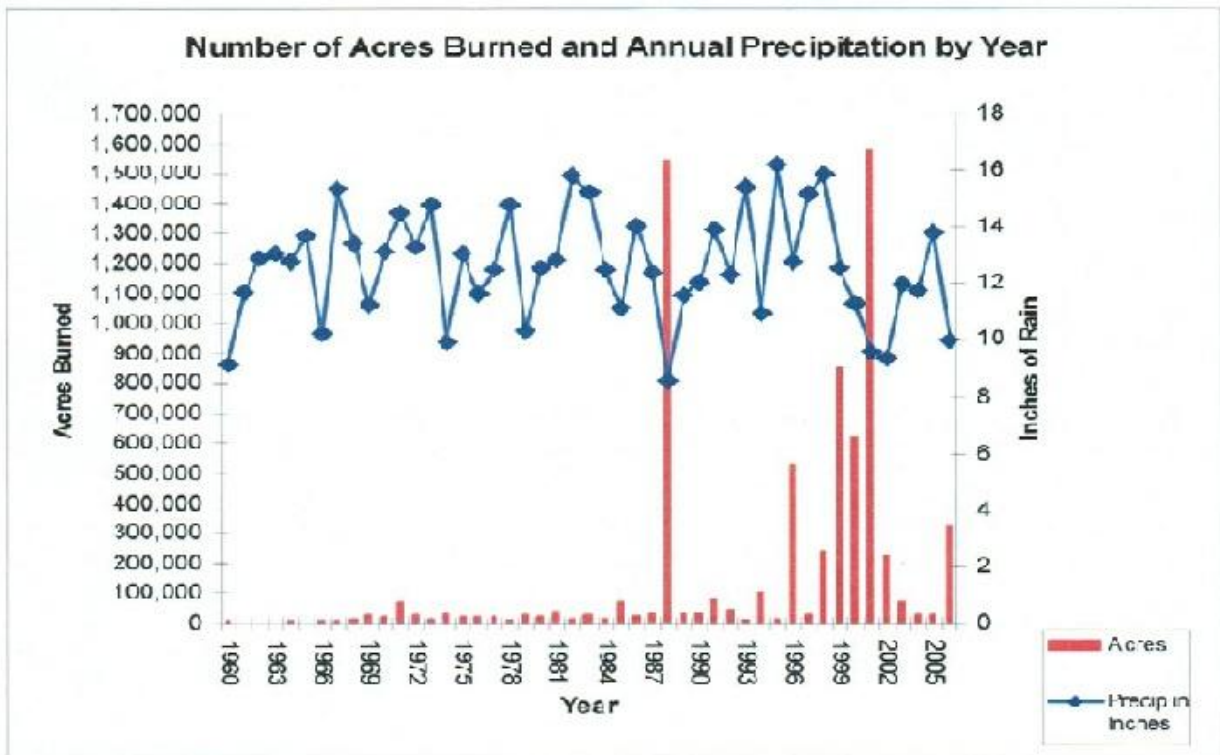


Figure A: Relationship between annual precipitation and number of wildland area burned.

EXISTING MITIGATION EFFORTS

Wyoming Wildland Urban Interface Hazard Assessment

Mitigation of wildland fire hazard in Wyoming has been undertaken through various efforts of technology, public education and awareness, and projects to reduce or eliminate fuels. The Wyoming Wildland Urban Interface Hazard Assessment is the primary statewide mapping project to determine areas of wildfire-prone areas. Apart from statewide ventures, individual communities and counties are also working to protect their areas from severe fires through the Firewise Program with assistance of the Wyoming State Forestry Division and the National Fire Plan.

The Wyoming Wildland Urban Interface Hazard Assessment is the primary statewide mapping project to determine areas of wildfire-prone areas. Because of the importance of Wyoming Wildland Urban Interface Hazard Assessment and the platform on which it is built—GIS, a segment of this report will discuss its use in wildfire management. **Figure B** is the Fremont County base map that identifies areas of wildland fire hazard ranking.

GIS is a tool that is used to compare, capture, input, output, store, manipulate, analyze, model, and display spatial data. In the case of the Wildland Urban Interface Hazard Assessment, wildfire hazard vulnerability is determined by comparing values such as slope, vegetation, housing density, and aspect. The following is from the *Wyoming Wildland Urban Interface Hazard Assessment Methodology*—a report written by the Wyoming State Forestry Division:

The Wildland Urban Interface Hazard Assessment uses three main layers to determine fire danger—Risk, Hazard, and Values. The following lists include the data used to create each of the three layers.

Risk – Probability of Ignition

- Lightning Strike density
- Road density
- Historic fire density

Hazard – Vegetative and topological features affecting intensity and rate of spread

- Slope
- Aspect
- Fuels – Interpreted from GAP Vegetation information.

Values – Natural or man-made components of the ecosystem on which a value can be placed.

- Housing Density – Life and property

Non-flammable areas Mask – a mask was created to aid in the analysis for areas that will not carry fire such as water and rock areas. These areas show in the final assessment as a zero value for hazard.

The statewide Wildland Urban Interface Hazard Assessment and its resultant outputs serve two primary purposes: assisting in prioritizing and planning mitigation projects and creating a communications tool to which agencies can relate to for common information and data.

Firewise is an educational project developed by the National Wildland/Urban Interface Fire Program, sponsored by the National Wildfire Coordinating Group (NWCG), and directed by the NWCG's Wildland/Urban Interface Working Team to assist communities in wildfire-prone areas with awareness and project development to mitigate wildland fire hazard.

In Wyoming, three areas have been recognized as Firewise communities by the Firewise Program, but more are applying for this status. There are 36 states that have a total of 288 recognized communities, placing Wyoming at an approximate average with its two communities. Currently, Homestead Park in Fremont County, Story in Sheridan County and Union Pass in Sublette County have been recognized. Other potential Firewise communities according to the Wyoming Wildfire Mitigation Coordinator, James Webster, include Star Valley Ranch in Lincoln County, Casper Mountain in Natrona County, and Canyon Creek in Washakie County.

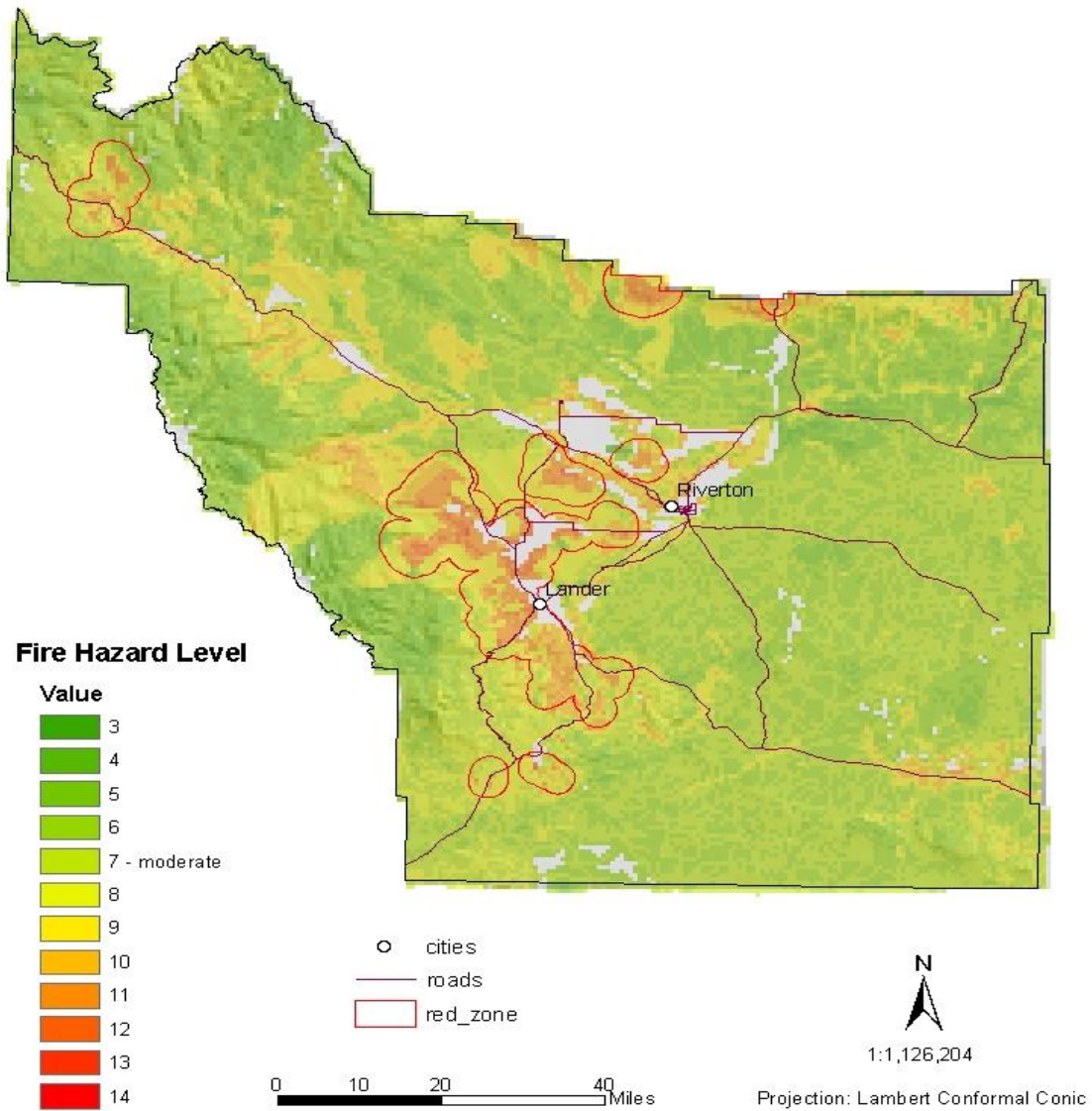
The State of Wyoming Forestry Division has established a website called Firewise Wyoming <http://www.firewisewyoming.com> that includes wildfire mitigation measures for homeowners residing in forested areas, as well as useful links to associated organizations involved in wildland fire management.

Webster stated that mitigation projects are primarily funded by the National Fire Plan, and emphasize fuel reduction in wildland/urban interface areas. This is accomplished through means of mechanical removal of dead forest litter and thinning of trees. Ironically, as the Fremont County Firewise Website mentions, fire suppression for the last 100 years has led to a buildup of forest litter increasing the fuel load for potential fires.

In nature, fires occur regularly assisting in removing dead material in forested areas, allowing for new growth and rejuvenation of healthy old growth. For example pyrophytic cones require high temperatures to open and reseed. Unfortunately, fires cannot be allowed to burn naturally because of its encroachment on humans and their property. Therefore, forest litter must be removed through artificial methods.

Such projects to mitigate wildfire hazard, specifically fuel removal and tree thinning, are occurring in 17 Wyoming counties (all except Big Horn, Sweetwater, Carbon, Campbell, Niobrara, and Goshen). Wildland fire hazard is a more significant concern in forested areas than in the prairie because of the greater amounts of fuel. Consequently, counties where the majority of land is forest are more susceptible and require greater attention. In addition to decreasing fuel load, fire management organizations are increasing the awareness of forest home fire safety. This includes creating wildfire defensible zones and fire-resistant landscaping.

FREMONT COUNTY WILDLAND FIRE HAZARD MAP



Data derived from Wyoming State Forestry Division and the U.S. Forest Service

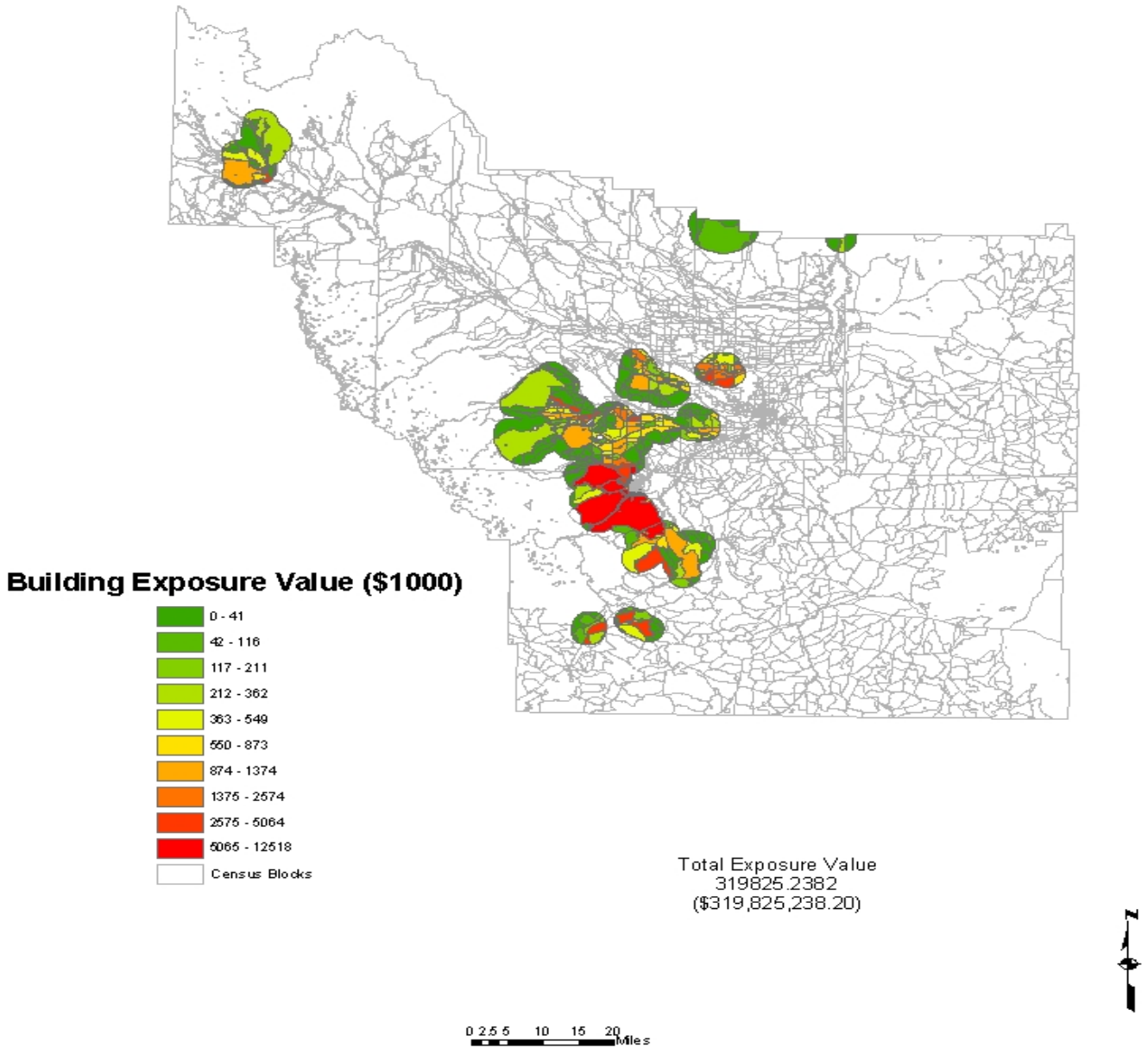
Figure B. Fremont County Wildland Fire Base Map with Redzones (Wyoming Wildland – Urban Interface Hazard Assessment)

Wildland Fire Building Exposure Value

Wildland fire building exposure value is the value of buildings that can be potentially damaged by wildland fire in an area (**Table 10.2 and Figure C**). The total estimated building exposure value for the entire state of Wyoming is over \$8.5 billion, thus placing wildland fire as a critical hazard in the state. The five counties with the highest building exposure values are Teton, Sheridan, Laramie, Natrona, and Campbell, totaling over \$5.8 billion. Fremont County is seventh highest with \$319,825,328 in building exposure value. The least building exposure values, totaling over \$61 million, are in five counties—Big Horn, Niobrara, Washakie, Platte, and Hot Springs. A wildland fire usually occurs every year in Fremont County.

County	Amount of damage
Big Horn	1,090,772
Niobrara	4,852,748
Washakie	11,368,310
Platte	18,264,504
Hot Springs	25,587,017
Goshen	37,962,569
Carbon	83,931,249
Sublette	95,442,304
Uinta	105,943,675
Converse	132,529,212
Lincoln	171,746,619
Crook	184,102,247
Park	194,432,223
Albany	261,395,171
Sweetwater	279,772,342
Weston	311,602,160
Fremont	319,825,328
Johnson	451,817,404
Campbell	741,143,167
Natrona	894,951,685
Laramie	1,107,754,091
Sheridan	1,544,049,533
Teton	1,546,011,448

Fremont County Wildland Fire Critical Hazard Area Building Exposure Values (Thousands of Dollars)



Data derived from Wyoming State Forestry Division and U.S. Forest Service

Projection: Lambert Conformal Conic

Figure C. Building Exposure Values For Red-zones in Fremont County

WILDFIRE MITIGATION ACTION ITEMS

Union Pass FireWise

Through the Firewise program and citizen participation and excellent program of ownership and residence characteristics has been developed for the Union Pass Area. The local citizens formed a group known as the Union Pass Emergency Preparedness Council. This group has been instrumental in gathering the information pertaining to the subdivisions in the area. As they have worked through the landownership and occupancy, the committee has developed information for local emergency services such as medical needs and special considerations that the homeowner may have.

The Union Pass Emergency Preparedness Council along with the Firewise program instituted the cleanup of property as well as removal of downed timber, ladder fuels, evacuation routes and notification of the citizens in the area in case of an emergency.

This evacuation plan has been tested several times, including exercises and actual incidents. In June 2006 a neighboring ranch lost control of a slash pile burning and emergency services evacuated the area due to the wildland fire which resulted. This was a "training exercise" for the Purdy Fire which began in August and ran through September of 2006. The Purdy Fire became a Type 2 incident managed through the Shoshone National Forest with the incident Command Post finally based in Dubois, Wyoming.

With the installation of a weather repeater site in the Dubois area, Fremont County Emergency Management and the National Weather Service has made it possible to communicate with the citizens in the area for notification of a hazardous situation or if an evacuation were needed. We have tested the National Oceanic and Atmospheric Administration Weather Alert Radios and they will allow us to broadcast warnings into the rough area where the communities and subdivisions are located. This appears to be the best method to contact the citizens since not all residents have cellular phone coverage on the mountain.

Homestead Park FireWise

The Homestead Park FireWise program began in 2001. Mitigation work to improve the area has been ongoing since 2002. This includes the cleanup of property as well as removal of downed timber, ladder fuels, evacuation routes and notification of the citizens in the area in case of an emergency. A phone notification scheme acting as a notification phone tree was developed in March 2005 has been put in place to help neighbors notify in case of a fire.

River Bottom Fires Riverton & the Big Wind River

Several times in the recent past, including September of 2004, wildland grass fires have entered the river bottom of the Big Wind River. In the heavier fuel loading of the river bottom area, the fires have grown and threatened the southern populated areas of Riverton. Along with the

damage of the fire in the area, this is also the only access across the Big Wind River south of Riverton for all traffic.

During this event in 2004, 130 citizens had to be evacuated and moved out of harms way with fifty- three individuals being given shelter. Several businesses were affected and the damage was in the area of \$1,000,000 with seven injuries and no deaths.

Because of the limited access across the river, and being that this is the only route of travel for emergency services at this end of the reservation, any event that affects access to this end of the reservation is a concern for safety of people as well as property.

Ft. Washakie River Bottom Fire 2005

In April 2005 this fire entered the river bottom and heavy fuel loading above Fort Washakie. Fort Washakie is the location for the Bureau of Indian Affairs, Wind River Agency headquarters for the Wind River Indian Reservation. With increased spring winds and heavy fuels this fire resulted in the evacuation of the Ft. Washakie Detention Facility, Morning Star Nursing home, Public Health Service Health Center and most of the residents in the area. The fire was contained with minimal damage to the facilities in the area.

WILDLAND FIRE RESOURCE DIRECTORY

Fremont County Wildland-Urban Interface Wildfire Mitigation Plan Committee, in cooperation with Northwest Management, Inc. is currently in the process of writing, adopting and receiving public comment on the Wildland-Urban Interface Wildfire Mitigation Plan.

Through this document, the committee hopes to achieve the following vision:

Institutionalize and promote a countywide wildfire hazard mitigation ethic through leadership, professionalism and excellence, leading the way to a safe, sustainable Fremont County.

The Fremont County Emergency Management Agency will assist the fire service in any help we could provide through the current resource listings. However, the fire service is a leading agency for the establishment of mutual aid agreements and contracting for needed resources. If the item needed is not available in the county, assistance will be requested through the adjoining counties and the Wyoming Office of Homeland Security.

SUMMARY

PROPERTY AFFECTED:	high
POPULATION AFFECTED:	medium
PROBABILITY:	high
JURISDICTION AFFECTED:	county wide