# REGION 1 HAZARD MITIGATION PLAN

# CROOK COUNTY ANNEX

## 1 Mitigation Planning and Crook County Planning Team

This annex has been created during the development of the 2018 Region 1 Hazard Mitigation Plan (referred to as the Main Plan or Base Plan herein). This County Annex builds upon previous versions of the Crook County Multi-Hazard Mitigation Plan completed in 2013. The plan is the result of a collaborative effort between Crook County Government, municipal governments, citizens, public agencies, non-profit organizations and the private sector. The Local Emergency Planning Committee (LEPC) held responsibility for implementation and maintenance of the plan. Crook County Emergency Management was responsible for updating the plan in coordination with a multi-jurisdictional Hazard Mitigation Planning Committee (HMPC) which was formed for the creation of the 2017-8 Regional Plan. The following jurisdictions participated in the planning process:

- Crook County
- Town of Hulett
- City of Moorcroft
- Town of Pine Haven
- City of Sundance

More details on the planning process followed and how the counties, municipalities and stakeholders participated can be referenced in Chapter 3 of the base plan, as well as how the public was involved during the 2018 update.

## 2 Geography and Climate

The county of Crook covers about 2,854 square miles of land in the northeast corner of Wyoming, sharing a border with the States of South Dakota and Montana.

The Belle Fourche and Little Missouri Rivers, including numerous tributaries, drain the county. The highest mountainous points reach about 6,600 feet in the Bear Lodge Mountain Range on the Black Hills National Forest, present in a northeast-southwest fashion through the center of the county. The lowest points in the county reach a little over 3,400 feet and are located in the northeast corner.

Interstate 90 runs through the county in a central-east to southwest fashion, traversing Sundance, Moorcroft, and unincorporated areas such as Beulah. State highway 14 branches

from I-90, connecting Moorcroft and Sundance by traversing through the center of the county in a half loop. Highways 24, 112, 116, 585, and 212 are others which cross through Crook County in various ways towards the northeast, southeast, and center portions primarily.

Land use types in the County primarily consist of grasslands, shrublands, mixed croplands and forest, water areas, other lands, and urban lands/developed areas such as the towns and cities. Land use types and land ownership summaries are shown in Table 2-1 and Table 2-2, respectively.

## Table 2-1 Crook County Land Types (2006)

| Land Type | Acres | Percent of Total |
|---|---|---|
| Total Acres | 1,833,832 | -- |
| Grassland | 1,081,961 | 59% |
| Shrubland | 256,736 | 14% |
| Forest | 220,060 | 12% |
| Mixed Cropland | 220,060 | 12% |
| Other | 18,338 | 1% |
| Water | 8,633 | 1% |
| Urban | 247 | 0% |

Source: NASA MODIS Land Cover Type Yearly L3 Global 1km MOD12Q1, 2006.

## Table 2-2 Crook County Land Ownership (2016)

| Land Use Types | Acres | Percent of Total |
|---|---|---|
| Total Acres | 1,833,832 | -- |
| Private Lands | 1,439,338 | 78.5% |
| *Conservation Easement* | *12,163* | *0.7%* |
| Federal Lands | 276,114 | 15.1% |
| *Forest Service* | *170,305* | *9.3%* |
| *BLM* | *88,617* | *4.8%* |
| *National Park Service* | *1,348* | *0.1%* |
| *Military* | *0* | *0.0%* |
| *Other Federal* | *15,844* | *0.9%* |
| State Lands | 118,280 | 6.4% |
| *State Trust Lands** | *118,280* | *6.4%* |
| *Other State* | *0* | *0.0%* |
| Tribal Lands | 0 | 0.0% |
| City, County, Other | 100 | 0.0% |

Source: U.S. Geological Survey, Gap Analysis Program. 2016. Protected Areas Database of the United States (PADUS)

The climate of Crook County is semi-arid in some parts, and continental in others. Precipitation is about 20 inches per year. Summer high temperatures are about 84 degrees Fahrenheit. Winters average an annual low of 12 degrees. Crook County gets a mean of 51 inches of snow per year, which is higher than the national average.

# 3 Population Trends

As of the July 2017 United States Census Bureau estimates, there were a total of 7,410 people living in Crook County. The population has grown about 4.62%, as in 2010 there were 7,083 people. There are 2.5 inhabitants per square mile. The county seat is the City of Sundance.

### Table 3-1 Crook County Population Distribution

| Jurisdiction | 2017 Estimated Population | % of County Total |
|---|---|---|
| Crook County | 7,410 | --- |
| Hulett | 416 | 5.6% |
| Moorcroft | 1,054 | 14.2% |
| Pine Haven | 522 | 7.0% |
| Sundance | 1,265 | 17.1% |
| Unincorporated | 4,153 | 56.0% |

Source: US Census Bureau

### Table 3-2 Crook County Population Change, 2010-2017

| Community | 2010 Census | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | % Change |
|---|---|---|---|---|---|---|---|---|---|
| Crook County | 7,083 | 7,123 | 7,141 | 7,153 | 7,245 | 7,432 | 7,497 | 7,410 | 4.6% |
| Hulett | 383 | 385 | 390 | 397 | 401 | 411 | 414 | 416 | 8.6% |
| Moorcroft | 1,009 | 1,019 | 1,021 | 1,023 | 1,034 | 1,058 | 1,068 | 1,054 | 4.5% |
| Pine Haven | 490 | 493 | 492 | 492 | 499 | 519 | 529 | 522 | 6.5% |
| Sundance | 1,182 | 1,191 | 1,207 | 1,212 | 1,234 | 1,265 | 1,278 | 1,265 | 7.0% |
| Unincorporated | 4,019 | 4,035 | 4,031 | 4,029 | 4,077 | 4,179 | 4,208 | 4,153 | 3.3% |

Source: American Factfinder, U.S. Census Bureau - www.census.gov

Select Census demographic and social characteristics for Crook County are shown in the table below. The county's average age is 44 years old (2 years above the State's average). The table also indicates some populations that may have special needs or prove vulnerable, such as the elderly or children under 5 years of age. About 9% of the total 65 years and below (i.e., workforce-aged adults) have a disability. The percentage of household renters in the county is 31.7%. Households contain an average of 2.28 persons. 4.2% of homes speak a language other than English.

**Table 3-3 Crook County Demographic Profile**

| | |
|---|---|
| Population | |
| Population estimate, 2017 | 7,410 |
| Population Growth, 1970-2016 (US average was 58.6%) | 64.8% |
| Age and Sex | |
| Median Age (US median age is 37.7) | 43.1 |
| Percent of population under 18 | 23.4% |
| Percent of population 18-34 | 18.4% |
| Percent of population 35-44 | 9.7% |
| Percent of population 45-64 | 30.5% |
| Percent of population 65 and over | 18.0% |
| Percent of population male | 52% |
| Percent of population female | 48% |
| Race and Hispanic Origin | |
| White alone | 99.0% |
| White alone, not Hispanic or Latino | 96.7% |
| Hispanic or Latino | 2.4% |
| Black or African American alone | 0.2% |
| American Indian alone | 0.1% |
| Asian alone | 0.1% |
| Native Hawaiian & Other Pacific Is. alone | 0.0% |
| Some other race alone | 0.2% |
| Two or more races | 0.5% |
| Education | |
| High school graduate or higher, age 25 years+ | 93.9% |
| Bachelor's degree or higher, age 25 years+ | 21.4% |
| Vulnerable Populations | |
| Percent of population under 5 years old | 6.7% |
| Percent of population 80 years and older | 1.4% |
| Percent of population that speak English "not well" | 0.0% |
| Percent of population with disabilities | 10.4% |
| Percent of population without health insurance | 11.2% |
| Percent of population in poverty | 6.1% |
| Percent of population in deep-poverty (<1/2 federal poverty level) | 4.2% |
| Percent of population over 65 and in poverty | 2.1% |

Source: U.S. Census Bureau www.census.gov/

*Hispanic or Latino is considered to be an ethnicity and not a race. People who identify themselves as Hispanic or Latino can belong to one or more races. Therefore, the total percentage can be greater than 100%.

# 4 Development Trends

From 2000-2016, a larger percentage of the population growth has been due to net migration trends, which accounts for 52.6% of the population change (increasing by 1,562 people during said time period). All jurisdictions in the county have positively grown since the 2010 census, which in turn has led to a slight growth in jobs and improvement in some industries and markets across the county (in terms of productivity, sales, etc.). As of the last census decade (2000-2010), Crook County has had the largest change in residential land area percentage of the entire Region 1, showing a growth of 143.5%. Personal income percent has grown over 200% since 1970, and the median value of owner-occupied housing units was $217,500 based on the 2012-2016 Census estimates.

### Table 4-1 Crook County Housing Characteristics

| | # Units | % of Units | US Average |
|---|---|---|---|
| Total Housing Units | 3,573 | ------ | 134,054,899 |
| Occupied | 2,976 | 83.3% | 87.8% |
| Rental Units | 21.1% | 21.1% | 36.4% |
| Mobile Homes | 23.3% | 23.3% | 5.7% |
| Vacant | 597 | 16.7% | 12.2% |
| For rent | 56 | 1.6% | 2.1% |
| Rented, not occupied | 0 | 0.0% | 0.5% |
| For sale only | 78 | 2.2% | 1.0% |
| Sold, not occupied | 6 | 0.2% | 0.5% |
| Seasonal, recreational, occasional use | 242 | 6.8% | 4.0% |
| For migrant workers | 0 | 0.0% | 0.0% |
| Other vacant | 215 | 6.0% | 4.1% |
| **Year Built** | | | |
| Built 2014 or later | 56 | 1.6% | 0.4% |
| Built 2010 to 2013 | 127 | 3.6% | 1.9% |
| Built 2000 to 2009 | 747 | 20.9% | 14.7% |
| Built 1990 to 1999 | 639 | 17.9% | 14.0% |
| Built 1980 to 1989 | 448 | 12.5% | 13.7% |
| Built 1970 to 1979 | 703 | 19.7% | 15.6% |
| Built 1940 to 1969 | 546 | 15.3% | 26.7% |
| **Median year structure built** | 1985 | ----- | 1977 |

Source: U.S. Department of Commerce; Census Bureau, American Community Survey

# 5 Economy

In 2016, Crook County had 4,552 total jobs, where 1,750 were non-services related, 763 were in government sectors, and an estimated 1,979 in service industries. In particular, farming, mining (including fossil fuels), and construction were popular, while retail trade and accommodation/food services also contributed largely to the local economies. The three industry sectors with the largest earnings in 2016 were reported to be government, construction, and manufacturing. Crook County's unemployment rate has fluctuated from a 3.7% in 2000, to 5.0% in 2010, to the current 3.5% as of 2017. The lowest monthly unemployment rate was found in August of 2015. A total of 1,916 proprietors (self-employed jobs) were reported in 2016, which is a growth of 541 jobs of this type since the year 2000. The table below summarizes the county's economic statistics based on the latest U.S. Census.

### Table 5-1 Crook County Basic Economic Profile

| Characteristic | Crook County |
|---|---|
| EMPLOYMENT | |
| Total Employment, 2016 | 4,552 |
| Unemployment Rate, as of 2017 (US ave: 4.4%) | 3.5% |
| Per capita income, 2016 (US ave: $50,280) | $41,498 |
| Average earning per job, 2016 (US ave: $59,598) | $38,438 |

| Characteristic | Crook County |
|---|---|
| Population % change, 1970-2016 (US ave: 58.6%) | 64.8% |
| Employment % change, 1970-2016 (US ave: 112.2%) | 118.4% |
| Personal Income % change, 1970-2016 (US ave: 201.1%) | 206.7% |
| Persons in poverty (US ave: 15.1%) | 6.1% |
| Families in poverty (US ave: 11.0%) | 5.2% |
| | |
| EMPLOYERS | |
| Total employer establishments, 2016 | 237 |
| Total annual payroll, 2016 | $70,676 |
| Paid employees | 1,503 |
| | |
| EMPLOYMENT BY SECTOR/INDUSTRY | |
| Total Private | 69.3% |
| Non-Services | 29.2% |
| Natural Resources and Mining | 12.8% |
| Ag., Forestry, Fishing, Hunting | 2.4% |
| Mining | 10.4% |
| Construction | 9.0% |
| Manufacturing (Incl. Forest Prod.) | 7.4% |
| Services | 40.1% |
| Trade, Transportation, Utilities | 18.5% |
| Information | na |
| Financial Activities | 2.7% |
| Professional and Business | 2.7% |
| Education and Health | 3.6% |
| Leisure and Hospitality | 11.1% |
| Other Services | na |
| Unclassified | 0.0% |
| Government | 30.7% |
| Federal Government | 3.9% |
| State Government | 3.0% |
| Local Government | 23.8% |
| Travel & Tourism % of private emp., 2016 (US ave: 15.8%) | 17.6% |
| | |
| HOUSEHOLD INCOME | |
| Total Households | 2,976 |
| Less than $10,000 | 5.6% |
| $10,000 to $14,999 | 2.8% |
| $15,000 to $24,999 | 5.7% |
| $25,000 to $34,999 | 8.9% |
| $35,000 to $49,999 | 16.5% |

| Characteristic | Crook County |
|---|---|
| $50,000 to $74,999 | 21.6% |
| $75,000 to $99,999 | 15.4% |
| $100,000 to $149,999 | 15.4% |
| $150,000 to $199,999 | 3.5% |
| $200,000 or more | 5.6% |
| Median household income (US ave: $55,322) | $60,307 |
| Median monthly mortgage cost (US ave: $1,491) | $1,355 |
| Median monthly rent (US ave: $949) | $736 |
| Mean Annual Household Earnings by Source, 2016 | |
| Labor earnings | 79.2% |
| Social Security | 32.6% |
| Retirement income | 18.0% |
| Supplemental Security Income | 2.2% |
| Cash public assistance income | 1.0% |
| Food Stamp/SNAP | 1.6% |

Source: U.S. Census Bureau www.census.gov/

Visitors traveling to and throughout Wyoming represent an important component of the state's, including Crook County's, economy. Travel originating in domestic and international markets generates valuable business sales, payroll, employment and tax receipts for the state as well as for local jurisdictions.

Crook County's land use plan from 1998 cited the following: "The people of Crook County historically, traditionally, and currently earn their livelihood from activities reliant upon the use of natural resources. The economy of the County has always been, and is today, dependent on activities critically and economically related to ranching and farming, logging, mining and other natural resource related activities. Segments of Crook County's economy are reliant upon the abundant natural resources occurring countywide. In addition, family and community traditions have developed around the economic and recreational use of the land." Crook County attracts many recreation and tourism enthusiasts, being home to natural resources such as the Keyhole Reservoir, Devils Tower, State Parks, and National Forests (e.g. Keyhole State Park, Black Hills National Forest), among others. Golfing, skiing, hunting, fishing, and other such activities also bring in visitors and contribute to the economy. Travel and tourism services provide an estimated 16.2% of the county's total private employment, only surpassed by mining services (which compose about 18.4% of the total private employment). Exploration and mining of Uranium continue in the area, after the resources' discovery in 1949. (Sources: U.S. Census Bureau, 2018 Economic Profile System report by Headwaters Economics, Crook County Jurisdictional Chamber of Commerce websites [e.g. Moorcroft], Crook County government website.)

# 6 Hazard Identification and Risk Assessment

## 6.1 Identified Hazards

The HMPC reviewed the hazards from the 2013 Crook County Hazard Mitigation Plan for inclusion in the 2018 Regional hazard mitigation plan. The hazards list was compared with the hazards list found in the State of Wyoming's Hazard Mitigation Plan, updated in 2016. Upon further review, the HMPC added high winds and downburst hazards to be more consistent with the State's plan and hazards in the Region. Furthermore, debris flow and rockfall hazards were considered as part of the Landslide section, to supplement said hazards as they are similar in nature and risk posed. The following table notes the summary of hazard significance for each jurisdiction in the County based on a combination of geographic extent, potential magnitude/severity, and frequency/probability of occurrence as defined below. Hazard significance is rated as High, Medium or Low.

**Table 6-1 Overall Hazard Significance Summary Table**

| Hazard | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| Dam Failure | M | M | L | L | L |
| Drought | H | H | H | H | H |
| Earthquake | L | L | L | L | L |
| Expansive Soil | L | L | L | L | L |
| Flood | M | H | M | L | H |
| Hail | M | M | M | M | M |
| Hazardous Materials | H | M | H | M | M |
| High Winds and Downbursts | M | M | M | M | M |
| Landslide/ Rockfall/ Debris Flow | L | M | L | L | M |
| Lightning | H | H | H | H | H |
| Mine and Land Subsidence | L | L | L | L | L |
| Severe Winter Weather | H | H | H | H | H |
| Tornado | M | H | H | H | M |
| Wildfire | H | H | H | H | H |

**Geographic Extent**
Negligible: Less than 10 percent of planning area or isolated single-point occurrences
Limited: 10 to 25 percent of the planning area or limited single-point occurrences
Significant: 25 to 75 percent of planning area or frequent single-point occurrences
Extensive: 75 to 100 percent of planning area or consistent single-point occurrences

**Potential Magnitude/Severity**
Negligible: Less than 10 percent of property is severely damaged, facilities and services are unavailable for less than 24 hours, injuries and illnesses are treatable with first aid or within the response capability of the jurisdiction.
Limited: 10 to 25 percent of property is severely damaged, facilities and services are unavailable between 1 and 7 days, injuries and illnesses require sophisticated medical support that does not strain the response capability of the jurisdiction, or results in very few permanent disabilities.
Critical: 25 to 50 percent of property is severely damaged, facilities and services are unavailable or severely hindered for 1 to 2 weeks, injuries and illnesses overwhelm medical support for a brief period of time, or result in many permanent disabilities and a few deaths.
Catastrophic: More than 50 percent of property is severely damaged, facilities and services are unavailable or hindered for more than 2 weeks, the medical response system is overwhelmed for an extended period of time or many deaths occur.

**Probability of Future Occurrences**
Unlikely: Less than 1 percent probability of occurrence in the next year, or has a recurrence interval of greater than every 100 years.
Occasional: Between a 1 and 10 percent probability of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Likely: Between 10 and 90 percent probability of occurrence in the next year, or has a recurrence interval of 1 to 10 years
Highly Likely: Between 90 and 100 percent probability of occurrence in the next year, or has a recurrence interval of less than 1 year.

**Overall Significance**
Low: Two or more of the criteria fall in the lower classifications or the event has a minimal impact on the planning area. This rating is also sometimes used for hazards with a minimal or unknown record of occurrences/impacts or for hazards with minimal mitigation potential.
Medium: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is also sometimes utilized for hazards with a high impact rating but an extremely low occurrence rating.
High: The criteria consistently fall along the high ranges of the classification and the event exerts significant and frequent impacts on the planning area. This rating is also sometimes utilized for hazards with a high psychological impact or for hazards that the jurisdiction identifies as particularly relevant.

### 6.1.1 Hazards Considered but Not Profiled

Though noted in other relevant plans such as the Wyoming State Multi-Hazard Mitigation Plan from 2016, this plan does not further evaluate the following hazards:

- Avalanche
- Space weather
- Volcanism
- Windblown deposits

It is important to be aware of the probability of these events and the associated impacts for Crook County. However, the hazard identification described in Chapter 4 of the Base Plan omits these hazards due to the limited relevance in the regional context of this plan, or the hazards being sufficiently addressed in other planning mechanisms. Some of the above listed hazards are acknowledged to some degree under other hazard profiles, such as windblown deposits carried by wind that could be associated with drought conditions.

## 6.2 Building Inventory and Assets

In addition to people, structures, critical facilities and infrastructure, other important assets exist in Crook County that are potentially exposed to hazards identified in this plan. Table 6-2 summarizes the property inventory for the county and jurisdictions, based on the improvement value and contents by parcel type and jurisdiction. This as an assessment of the overall property exposed within the county and by jurisdiction.

Assets inventoried to determine vulnerability include people, structures, critical facilities, and natural, historic, or cultural resources. For the regional planning process, locally available GIS databases were utilized. Parcel and assessor data were obtained through sources such as the Wyoming Property Tax Division's Assessor's Portal. This information provided the basis for building exposure and property types. The focus of the analysis was on "improved," or developed, parcels. These parcels were identified based on an improvement value greater than zero. Abstract Codes were used to identify occupancy type as shown in the following table, which includes summations of total improved value for the various property types and jurisdictions, and the population exposed in each.

## Table 6-2 Crook County Building Inventory and Value by Jurisdiction

| Jurisdiction | Property Type | Parcel Count | Improved Value | Est. Content Value | Total Exposure | Population |
|---|---|---|---|---|---|---|
| Hulett | Commercial | 29 | $7,088,393 | $7,088,393 | $14,176,786 | --- |
| | Duplex | 4 | $513,291 | $256,646 | $769,937 | 11 |
| | Industrial | 1 | $99,036 | $99,036 | $198,072 | --- |
| | Residential | 152 | $18,490,296 | $9,245,148 | $27,735,444 | 416 |
| | Total | 186 | $26,191,016 | $16,689,223 | $42,880,239 | 427 |
| Moorcroft | Commercial | 60 | $9,363,472 | $9,363,472 | $18,726,944 | --- |
| | Duplex | 3 | $357,179 | $178,590 | $535,769 | 8 |
| | Multiple Unit | 1 | $120,091 | $120,091 | $240,182 | --- |
| | Residential | 301 | $39,832,297 | $19,916,149 | $59,748,446 | 825 |
| | Total | 365 | $49,673,039 | $29,578,301 | $79,251,340 | 833 |
| Pine Haven | Commercial | 10 | $2,667,880 | $2,667,880 | $5,335,760 | --- |
| | Duplex | 2 | $318,153 | $159,077 | $477,230 | 5 |
| | Residential | 265 | $47,057,519 | $23,528,760 | $70,586,279 | 726 |
| | Total | 277 | $50,043,552 | $26,355,716 | $76,399,268 | 732 |
| Sundance | Agricultural | 8 | $270,795 | $270,795 | $541,590 | --- |
| | Commercial | 98 | $24,459,204 | $24,459,204 | $48,918,408 | --- |
| | Duplex | 5 | $732,928 | $366,464 | $1,099,392 | 14 |
| | Multiple Unit | 2 | $632,443 | $632,443 | $1,264,886 | --- |
| | Residential | 479 | $68,688,411 | $34,344,206 | $103,032,617 | 1,312 |
| | Total | 592 | $94,783,781 | $60,073,112 | $154,856,893 | 1,326 |
| Unincorporated | Agricultural | 1,237 | $102,148,611 | $102,148,611 | $204,297,222 | --- |
| | Commercial | 134 | $24,159,360 | $24,159,360 | $48,318,720 | --- |
| | Duplex | 1 | $92,722 | $46,361 | $139,083 | 3 |
| | Exempt | 7 | $761,913 | $761,913 | $1,523,826 | --- |
| | Industrial | 5 | $9,374,645 | $9,374,645 | $18,749,290 | --- |
| | Residential | 1,783 | $382,547,262 | $191,273,631 | $573,820,893 | 4,885 |
| | Total | 3,167 | $519,084,513 | $327,764,521 | $846,849,034 | $4,888 |
| | Grand Total | 4,587 | $739,775,901 | $460,460,872 | $1,200,236,773 | 8,206 |

Source: Wyoming Property Tax Division

Total building exposure within Crook County based on the analysis of improved parcels is over $1.2 billion, with over $739 million in improved value properties and over $460 million in estimated contents value. The unincorporated parts of the county have the greatest number of buildings, followed by Sundance and Moorcroft.

Based on these exposure estimates, there are 8,206 individuals exposed to the various hazards identified for Crook County. To calculate these population exposure summaries, a household average of 2.43 was used, based on the most current statistics from the U.S. Census. Note that this method over-estimates the Census-estimated population. There is also a seasonal influx of visitors during the summer months.

### 6.2.1 Critical Facilities, Infrastructure, and Other Important Community Assets

A critical facility (CF) may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. Essential facilities are those that, if damaged, would have devastating impacts on disaster response and/or recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are a third category of critical assets. Examples of each are provided below.

| Essential Facilities | High Potential Loss Facilities | Transportation and Lifelines |
|---|---|---|
| • Hospitals and other medical facilities<br>• Police stations<br>• Fire station<br>• Emergency Operations Centers | • Power plants<br>• Dams and levees<br>• Military installations<br>• Hazardous material sites<br>• Schools<br>• Shelters<br>• Day care centers<br>• Nursing homes<br>• Main government buildings | • Highways, bridges, tunnels<br>• Railroads and facilities<br>• Airports<br>• Water treatment facilities<br>• Natural gas and oil facilities and pipelines<br>• Communications facilities |

Table 6-3 summarizes critical facility counts in Crook County, followed by Table 6-4 which examines the distribution of critical facilities across each individual jurisdiction. Critical facilities were based on the Homeland Security Infrastructure Program (HSIP) Freedom GIS databases and supplemented with input by the HMPC.

**Table 6-3 Crook County Critical Facility Summary**

| Facility Type | Facility Count |
|---|---|
| Cellular Towers | 7 |
| Day Care Facilities | 5 |
| Electric Substations | 11 |
| EMS Stations | 5 |
| Fire Stations | 5 |

| Facility Type | Facility Count |
|---|---|
| FM Transmission Towers | 3 |
| Hospitals | 1 |
| Local Law Enforcement | 5 |
| Microwave Service Towers | 53 |
| Nursing Homes | 2 |
| Paging Transmission Towers | 3 |
| Private Schools | 1 |
| Public Schools | 7 |
| TV Analog Station Transmitters | 1 |
| Total | 109 |

Source: HSIP Freedom and HMPC

## Table 6-4 Crook County Critical Facilities by Jurisdiction

| Jurisdiction | CF Type | Count |
|---|---|---|
| Hulett | Day Care Facilities | 1 |
| | EMS Stations | 1 |
| | Fire Stations | 1 |
| | Local Law Enforcement | 1 |
| | Public Schools | 2 |
| | Total | 6 |
| Moorcroft | Day Care Facilities | 1 |
| | EMS Stations | 2 |
| | Fire Stations | 1 |
| | Local Law Enforcement | 1 |
| | Private Schools | 1 |
| | Public Schools | 2 |
| | Total | 8 |
| Pine Haven | EMS Stations | 1 |
| | Fire Stations | 1 |
| | Microwave Service Towers | 2 |
| | Total | 4 |
| Sundance | Day Care Facilities | 3 |
| | EMS Stations | 1 |
| | Fire Stations | 2 |
| | Hospitals | 1 |
| | Local Law Enforcement | 3 |
| | Microwave Service Towers | 5 |
| | Nursing Homes | 2 |
| | Public Schools | 3 |
| | Total | 20 |
| Unincorporated | Cellular Towers | 7 |
| | Electric Substations | 11 |

| Jurisdiction | CF Type | Count |
|---|---|---|
| | FM Transmission Towers | 3 |
| | Microwave Service Towers | 46 |
| | Paging Transmission Towers | 3 |
| | TV Analog Station Transmitters | 1 |
| | Total | 71 |
| | Grand Total | 109 |

Source: HSIP Freedom and HMPC

## 6.2.2 Natural, Historic, and Cultural Assets

Assessing the vulnerability of Crook County to disasters also involves inventorying the natural, historical, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant more protection due to their unique and irreplaceable nature as well as contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

### *Historic and Cultural Resources*

By definition, a historic property not only includes buildings of other types of structures, such as bridges and dams, but also includes prehistoric of Native American sites, roads, byways, historic landscapes, and many other features. Given the history of the County, these types of historic properties exist in the planning area.

Table 6-5 lists the properties and districts in Crook County that are on the National Register of Historic Places, which is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

## Table 6-5 Crook County Historic Properties

| City | Historic Name |
|---|---|
| Aladdin | Wyoming Mercantile |
| Beulah | Ranch A |
| Devils Tower | Old Headquarters Area Historic District |
| | Entrance Station--Devils Tower National Monument |
| | Entrance Road--Devils Tower National Monument |
| | Tower Ladder--Devils Tower National Monument |
| Hulett | DXN Bridge over Missouri River |
| Moorcroft | Arch Creek Petroglyphs (48CK41) |
| | McKean Archeological Site (48CK7) |
| Sundance | Inyan Kara Mountain |
| | Vore Buffalo Jump |
| | Sundance State Bank |
| | Sundance School |

Sources: National Register of Historic Place Program, https://www.nps.gov/Nr/research/

### *Natural Resources*

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as attenuates and stores floodwaters.

### *Wetlands*

Wetlands are a valuable natural resource for communities, due to their benefits to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water. They also provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital.

### *Endangered Species*

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely

to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

There are four federally-recognized endangered, threatened, or candidate species present in Crook County according to the U.S. Fish and Wildlife Service. These species are listed in Table 6-6.

**Table 6-6 Endangered and Threatened Species in Crook County**

| Common Name | Scientific Name | Type of Species | Status |
|---|---|---|---|
| Ute ladies'-tresses | Spiranthes diluvialis | Flowering Plants | Threatened |
| Gray wolf | Canis lupus | Mammals | Recovery |
| Northern Long-Eared Bat | Myotis septentrionalis | Mammals | Threatened |
| Bald eagle | Haliaeetus leucocephalus | Birds | Recovery |

Source: http://www.fws.gov/endangered/

# 6.3 Vulnerability to Specific Hazards

This section provides vulnerability to specific hazards, where quantifiable, to summarize the information of the Region and/or provide more detail at the county and jurisdictional level. The results of detailed GIS analyses used to estimate potential for future losses are presented here, in addition to maps of hazard areas and details by jurisdiction and building type in Crook County. For a discussion of the methodology used to develop the loss estimates refer to Chapter 4 of the Base Plan. In many cases, Chapter 4 contains information that differentiates the risk by county thus the information is not duplicated here. For most of the weather-related hazards the risk does not vary significantly enough from the rest of the Region and thus the reader should refer to Chapter 4.

## 6.3.1 Dam Failure

There have not been any recent dam failure events in the county. There are two high hazard dams and five significant hazard dams located within close proximity to population centers in Crook County. Table 6-7 below identifies the dams and the affected communities; they are also shown in Figure 6-1.

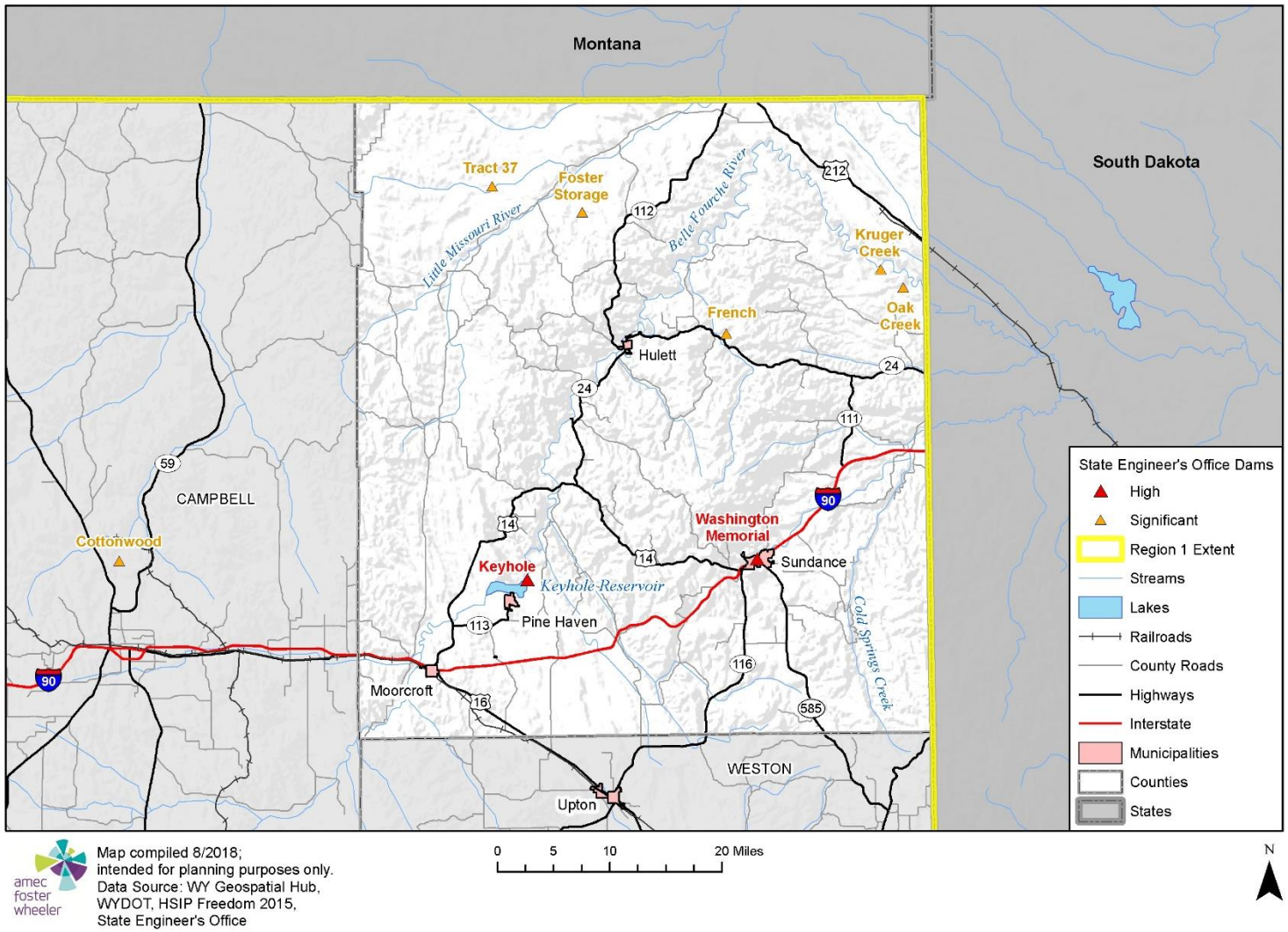
## Table 6-7 High and Significant Level Dams in Crook County

| Hazard Level | Dam Name | Normal Capacity (AF) | Nearby Jurisdiction/Populated Area |
|---|---|---|---|
| High | Keyhole | 191,500 | Hulett |
| High | Washington Memorial | 31 | Sundance |
| Significant | Foster Storage | 103 | Camp Creek, Sd |
| Significant | French | 37 | Alva |
| Significant | Kruger Creek | 674 | Belle Fourche Sd |
| Significant | Oak Creek | 915 | Belle Fourche, Sd |
| Significant | Tract 37 | 2,454 | Alzada, Mt |

Source: Wyoming State Engineer 2018

There are also several other dams rated as low hazard. There is a possibility of structure failure-based flooding in the future, though it is not likely. The overall risk of dam failure across Crook County and its jurisdictions is **medium**, however, mainly because the Keyhole Dam has a very large storage capacity (629,025 acre-feet) and, were it to fail and flood nearby areas, Hulett and other unincorporated portions of the county could be highly affected.

## Figure 6-1 High and Significant Hazard Dams in Crook County



## 6.3.2 Drought

Drought is a high significance hazard across the county and region. Drought-related impacts to the local economy can be extensive, affecting the water supply and quality, plants and wildlife, relief response efforts, and even the tourism and recreation industries (e.g., due to increased wildfire danger, forest closures, and fire bans). One of the most affected sectors in Crook County, however, is agriculture, as crops and livestock cannot thrive during longer warmer seasons when there is a continued lack of precipitation, in turn causing farmers and growers to experience sales declines and increased management costs. The other highly affected sector impacts are to relief, response, and restrictions efforts, as the county and jurisdictional agencies see significantly increased management costs that prevent them from maintaining revenue flows. Since 1999, Crook County has received seventeen reports of countywide impacts to the various sectors due to drought. The overall significance of drought is again consistently high throughout the county and its jurisdictions.

The figure below summarizes the number and type of reports that have been made at the county level, from 1999 to the end of 2017. These reports were submitted to indicate negative effects to the economic sectors and local industries due to drought events. Refer to Chapter 4 in the Base Plan for additional discussion of drought risk related to the region and the county.

**Figure 6-2 County-Level Drought Reports in Crook County, 1999-2017**

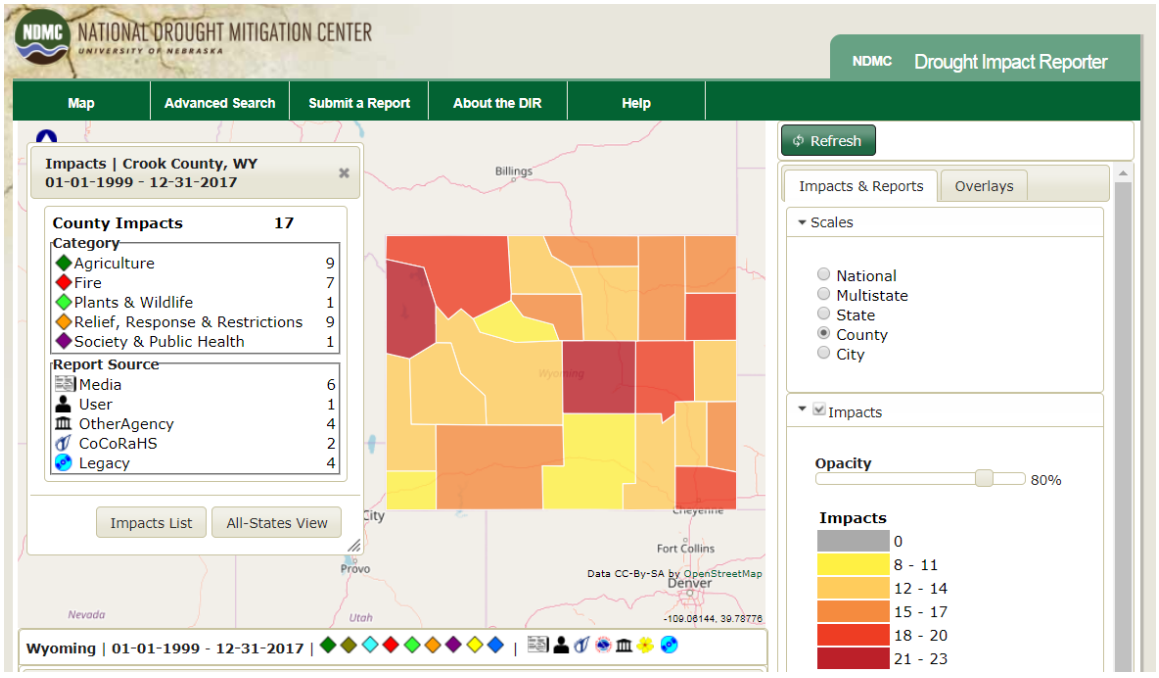



Table 6-8 takes the impacts of drought on crop production detailed in Table 4-17 of the base plan and breaks out the losses specific to Crook County.

**Table 6-8 Indemnities Paid for Commodities that Suffered from Drought in Crook County, 2008-2017**

| Commodity | Acres Damaged | Indemnity Amount |
|---|---|---|
| Barley | 159 | $ 7378 |
| Forage Production | 80,147 | $ 3,413,147 |
| Forage Seeding | 470 | $ 26,092 |
| Oats | 542 | $ 14,270 |
| Wheat | 4,671 | $ 289,224 |
| All Other Crops | 0 | 0 |
| **Total** | 85,989 | $ 3,750,111 |

Source: USDA – Risk Management Agency

## 6.3.3 Earthquake

Crook County has experienced two seismic events since 1897. The earthquakes occurring in the county are not usually felt by anyone due to the weakness of the events, and both which took place also failed to cause any reportable damages or injure populations. Below are the occurrence summaries:

- One of the first recorded earthquakes in northeastern Wyoming occurred near Sundance on February 3, 1897. The intensity IV-V earthquake severely shook the Shober School on Little Houston Creek southwest of Sundance. Many residents of Sundance reported hearing three loud reports resembling the explosion of a boiler or a great blast. (Sundance Gazette, February 5, 1897).
- On February 18, 1972, a magnitude 4.3 earthquake occurred approximately 18 miles east of Gillette near the Crook County-Campbell County border. No damage was reported.

Overall, earthquakes are a **low** significance hazard in the county.

## 6.3.4 Expansive Soils

State of Wyoming mapping data shows expansive soils area within Crook County, comprising more than 20% of the county's area; this is well above the regional average of 7.33%.

While the percentage of land area susceptible to expansive soils in Crook County is a little over 20%, there are no known historic or current issues of this hazard in the County. However, as shown in the figure above there are areas where expansive soils are present.

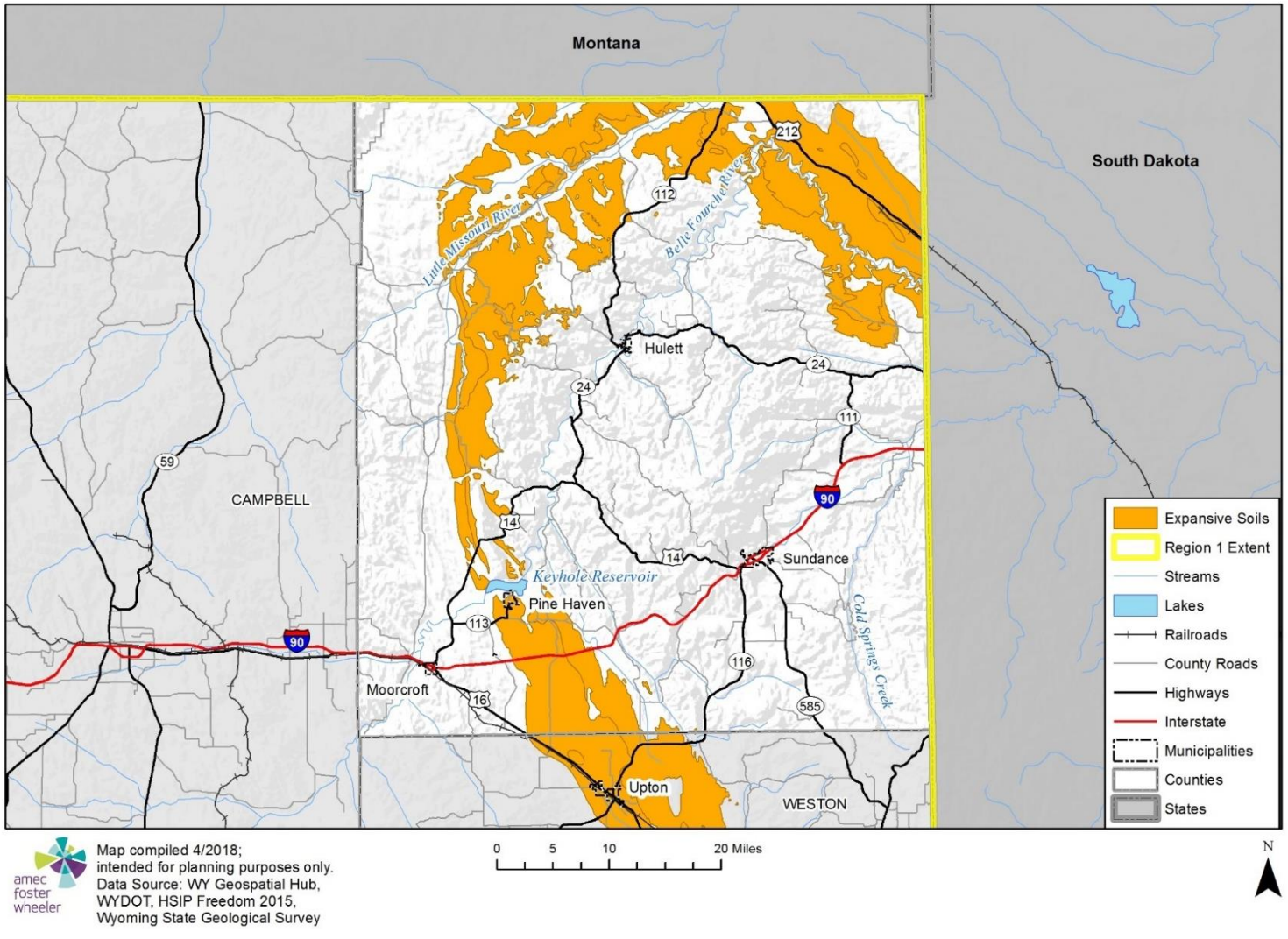
These areas are located along a northeast to central-west and south corridor in the county, crossing it completely (the flanks of the Black Hills). Potential for swelling is predominantly low for the County, and associated impacts negligible. A large portion of Pine Haven is slightly more vulnerable to this hazard, as shown in the map below. Chapter 4 of the Base Plan includes more information on the location of various soil types,

probability of expansion, and exposed building values for both Crook County and Region 1 overall.

Based on GIS analysis of parcels, buildings, building improved values, building contents, population, and critical facilities in Crook County it is estimated that there is some risk of exposure to expansive soils across unincorporated portions. The tables below summarize the findings of the analysis, including potential losses, population affected, and the type and number of parcels and facilities that could be affected by this hazard.

The maps below display the areas known to be susceptible to expansive soils in Crook County.

## Figure 6-3 Expansive Soils in Crook




**County**

## Figure 6-4 Expansive Soils in Pine Haven

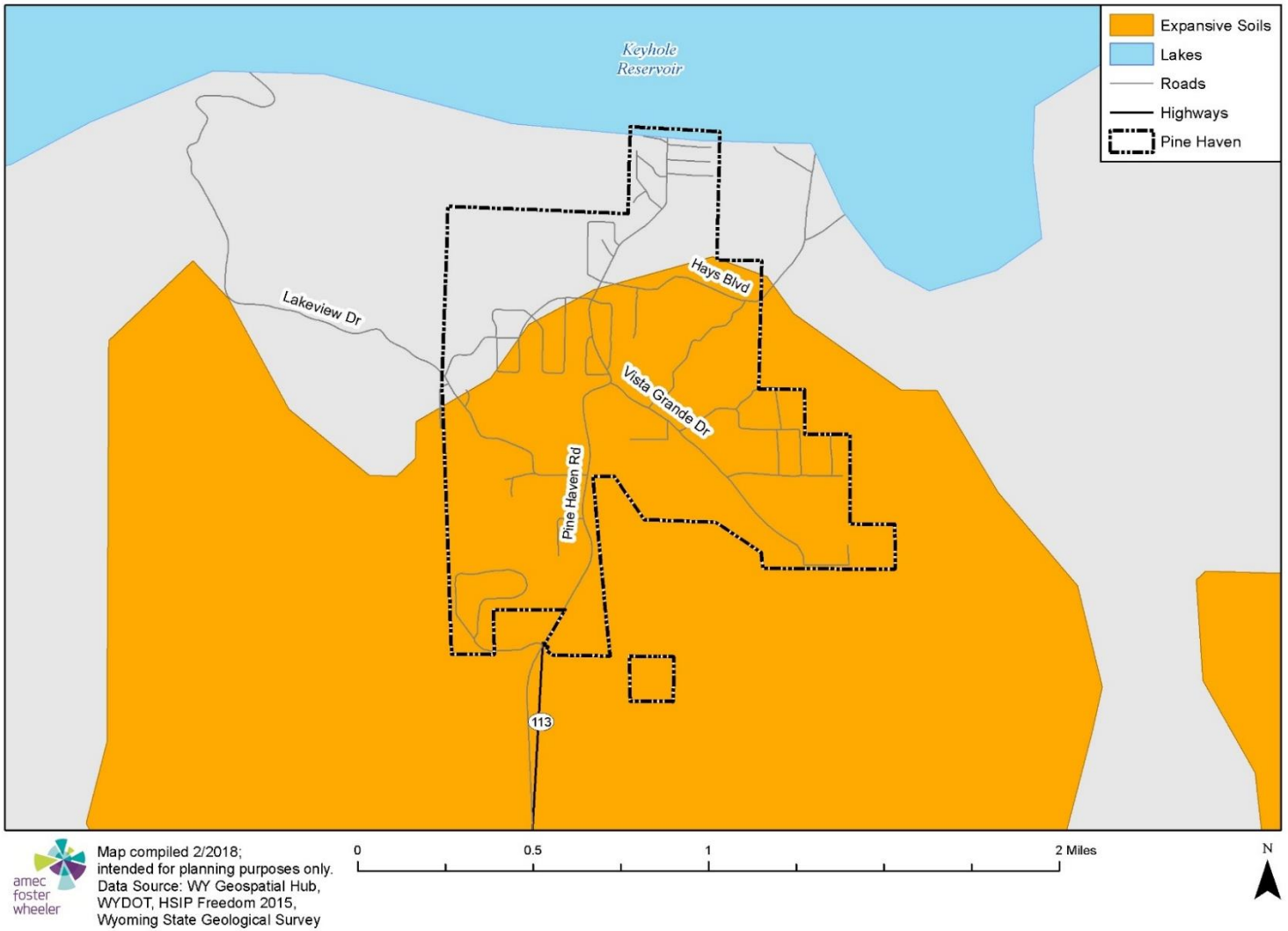


**Table 6-9 Building/Structure and Population Exposure to Expansive Soils in Crook County**

| Jurisdiction | Property Type | Parcel Count | Improved Value | Est. Content Value | Total Exposure | Population |
|---|---|---|---|---|---|---|
| Pine Haven | Commercial | 8 | $1,996,798 | $1,996,798 | $3,993,596 | |
| | Residential | 187 | $33,606,701 | $16,803,351 | $50,410,052 | 454 |
| | Total | 195 | $35,603,499 | $18,800,149 | $54,403,648 | 454 |
| Unincorporated | Agricultural | 237 | $16,874,594 | $16,874,594 | $33,749,188 | |
| | Commercial | 17 | $3,433,880 | $3,433,880 | $6,867,760 | |
| | Exempt | 1 | $44,801 | $44,801 | $89,602 | |
| | Industrial | 1 | $6,390,323 | $6,390,323 | $12,780,646 | |
| | Residential | 304 | $60,839,644 | $30,419,822 | $91,259,466 | 739 |
| | Total | 560 | $87,583,242 | $57,163,420 | $144,746,662 | 739 |
| Grand Total | | 755 | $123,186,741 | $75,963,569 | $199,150,310 | 1,193 |

**Table 6-10 Exposure of Critical Facilities to Expansive Soils in Crook County**

| Jurisdiction | Facility Type | Facility Count |
|---|---|---|
| Pine Haven | EMS Stations | 1 |
| Pine Haven | Fire Stations | 1 |
| Pine Haven | Microwave Service Towers | 2 |
| Unincorporated | Electric Substations | 1 |
| Total | | 5 |

## 6.3.5 Flood

Crook County has a history of flooding that has resulted in financial losses and property destruction. Sources of flooding in the county include the Little Missouri River, Belle Fourche River, Sundance Creek, and potentially the Keyhole Reservoir (potentially applicable under a dam failure situation, and hence more thoroughly covered in Section 4.2.2 Dam Failure of Chapter 4). Most reported flooding has taken place near Moorcroft and Sundance as well as surrounding unincorporated areas including Aladdin, Colony, Lightning Flat, Oshoto, and New Haven. A total of $266,000 has been lost in property damages since 2001 within New Haven and Colony. The sources of the flooding were all heavy rains.

Table 6-11 summarizes significant flood events that occurred between 2001 and 2017 in Crook County, as reported to the NOAA National Centers for Environmental Information (NCEI) system.

## Table 6-11 Flood Events in Crook County, 2001-2017

| Type | Location | Date | Property Damage | Crop Damage |
|---|---|---|---|---|
| Flood | Aladdin | 6/4/2001 | $0 | $0 |
| Flash Flood | Sundance | 6/30/2001 | $0 | $0 |
| Flood | Moorcroft | 5/5/2007 | $0 | $0 |
| Flood | Moorcroft | 5/23/2008 | $0 | $0 |
| Flood | Colony | 6/5/2008 | $100,000 | $0 |
| Flash Flood | Colony | 5/18/2010 | $0 | $0 |
| Flood | Lightning Flat | 5/21/2011 | $0 | $0 |
| Flash Flood | Oshoto | 7/2/2011 | $0 | $0 |
| Flood | Colony | 3/11/2012 | $0 | $0 |
| Flood | New Haven | 5/31/2013 | $60,000 | $0 |
| Flood | New Haven | 6/1/2013 | $100,000 | $0 |
| Flash Flood | Sundance | 7/22/2014 | $0 | $0 |
| Flash Flood | Moorcroft | 6/17/2015 | $5,000 | $0 |
| Flood | Moorcroft | 7/27/2017 | $1,000 | $0 |
| **TOTAL** | | | **$266,000** | **$0** |

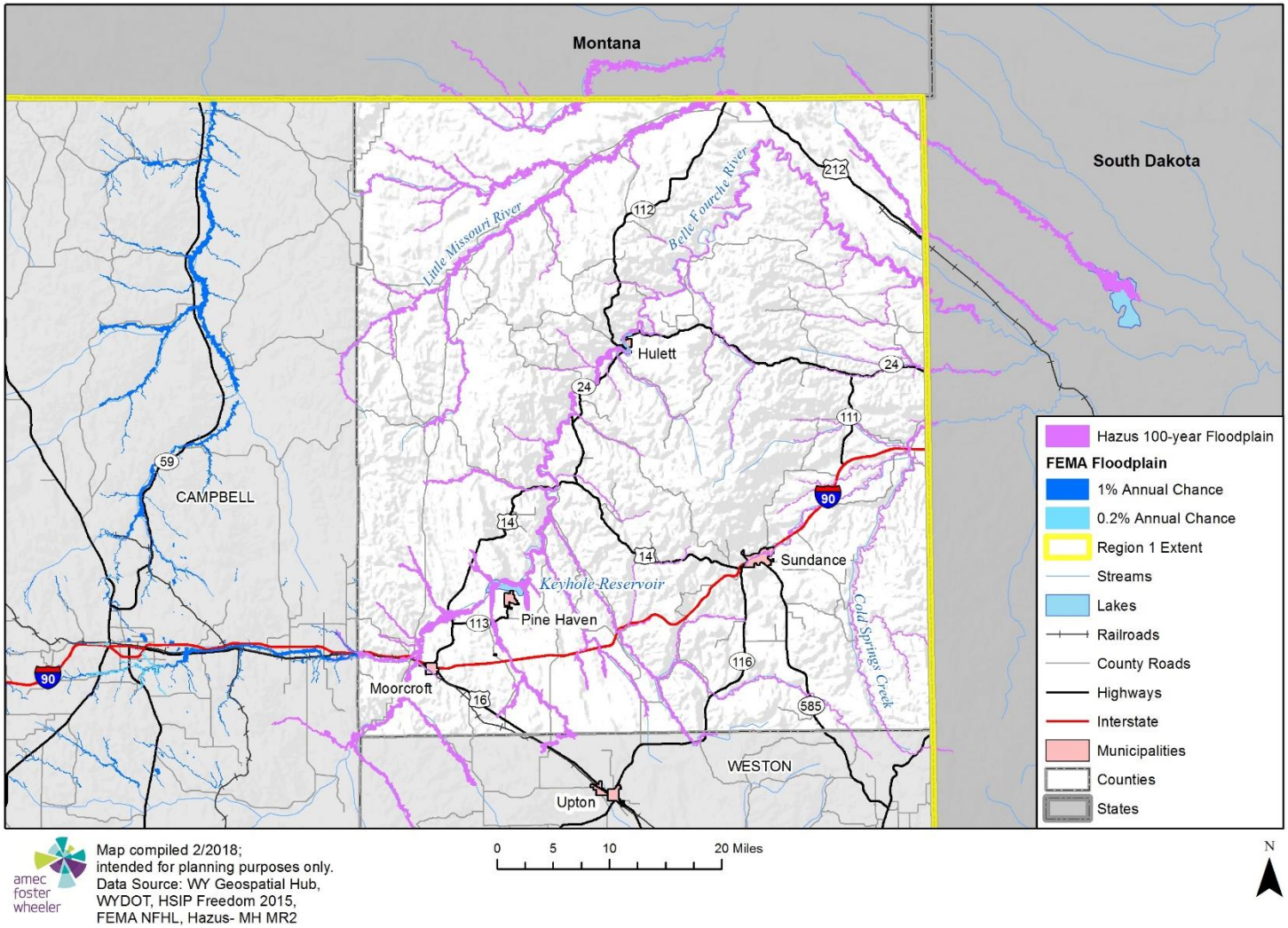
Source: NOAA NCEI

Based on GIS analysis, in the event of a 100-year flood (1% annual chance), the most impacted buildings would be in the unincorporated areas (76.1% of all the impacted buildings in the county), followed by the City of Sundance (20.5%), Hulett (2.7%), and Moorcroft (0.5%). This ratio changes when taking into consideration the improved value, content value, and total exposure of the properties at risk, as the unincorporated areas represent 79.9% of potential loss in the entire county (given higher value properties, more contents at risk, or other such factors). The total exposure value in Crook County is equal to $48 million, with $12 million of potential loss during a 100-year flood event. An estimated 284 people would be at risk of displacement during these floods.

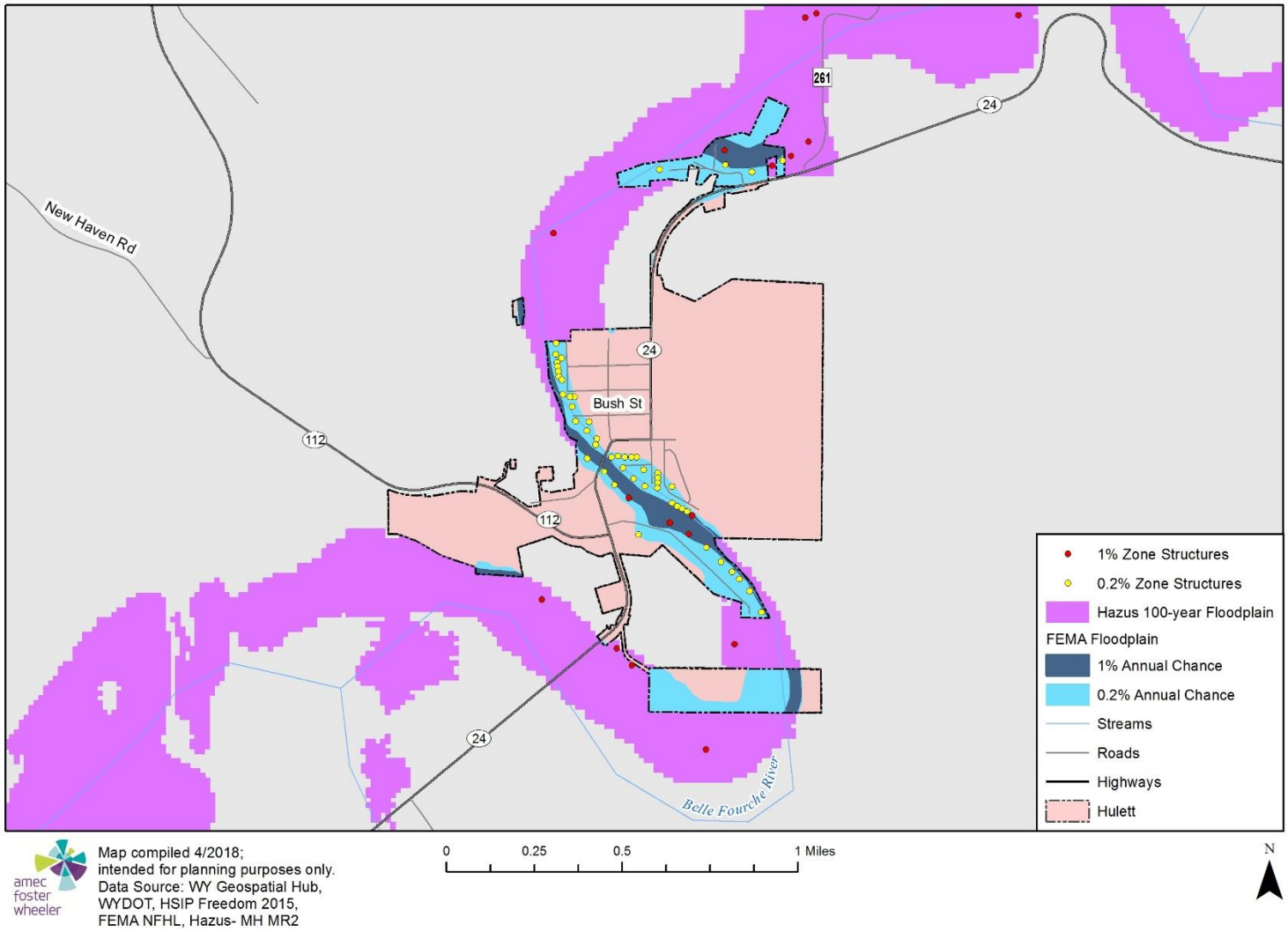
For a 500-year flood event (0.2% annual chance flood), the estimated content value of properties at risk amounts to over $3.1 million, with $9.3 million of total exposure, and $2.3 million in overall potential losses. Approximately 117 people would be at risk of displacement during these floods. These losses and displacement estimates would be added on top of those calculated for the 100-year flood event, given the 500-year flood event takes place outside (i.e., supplements) the 100-year floodplain.

Below are maps of flood prone areas in Crook County and its jurisdictions, based on both FEMA's NFHL layers, which include the 1% (i.e. 100-year) and 0.2% (i.e. 500-year) annual chance flooding, and Hazus-derived floodplains calculated for a 1% annual chance flood event. Tables highlighting general properties at risk, vulnerable critical facilities, exposure values, potential losses, and overall population vulnerable to flooding are included under the Base Plan. Crook County does not have any NFIP Repetitive Loss Facilities.

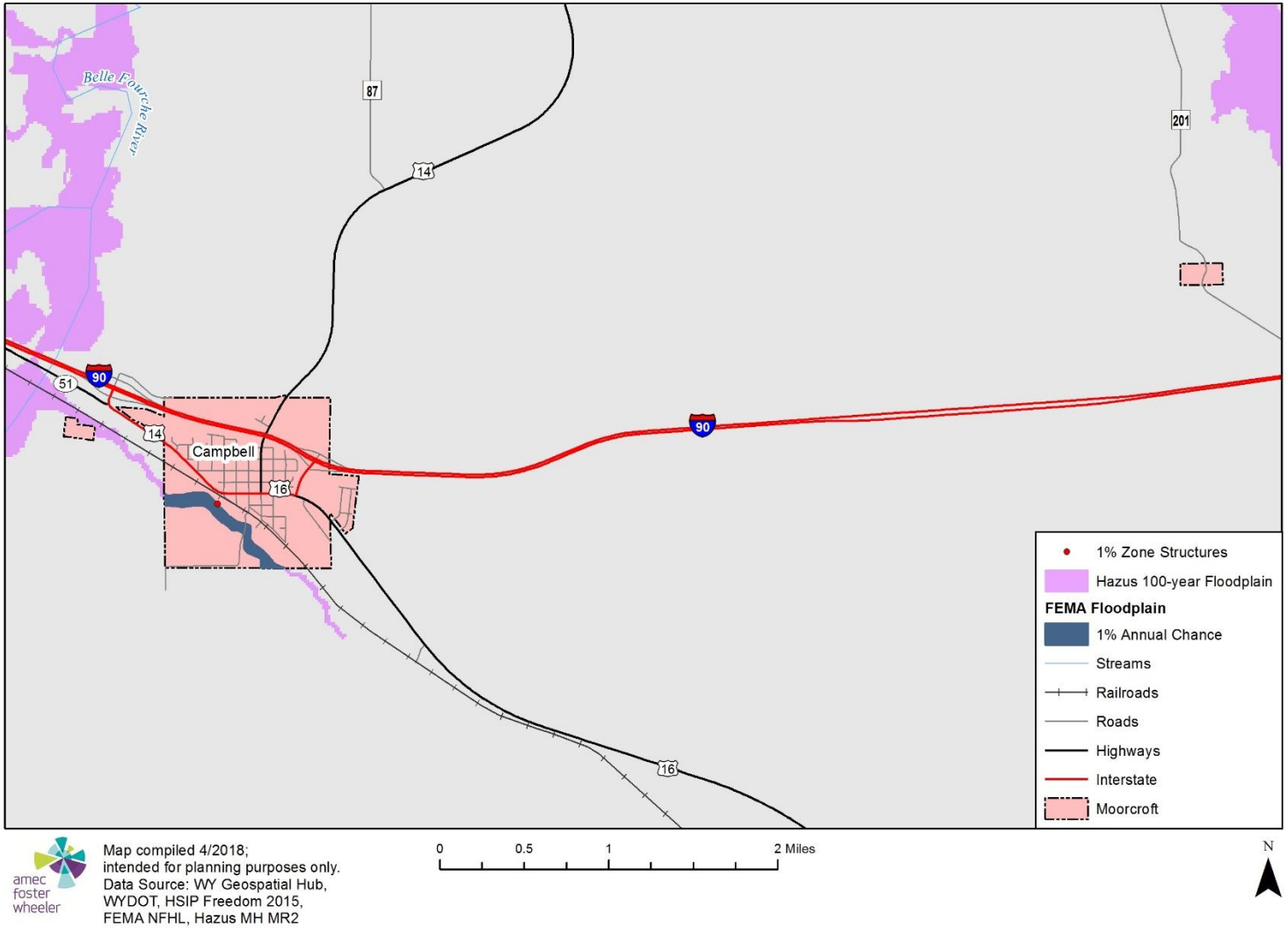
## Figure 6-5 Crook County 100-year and 500-year Flood Hazards



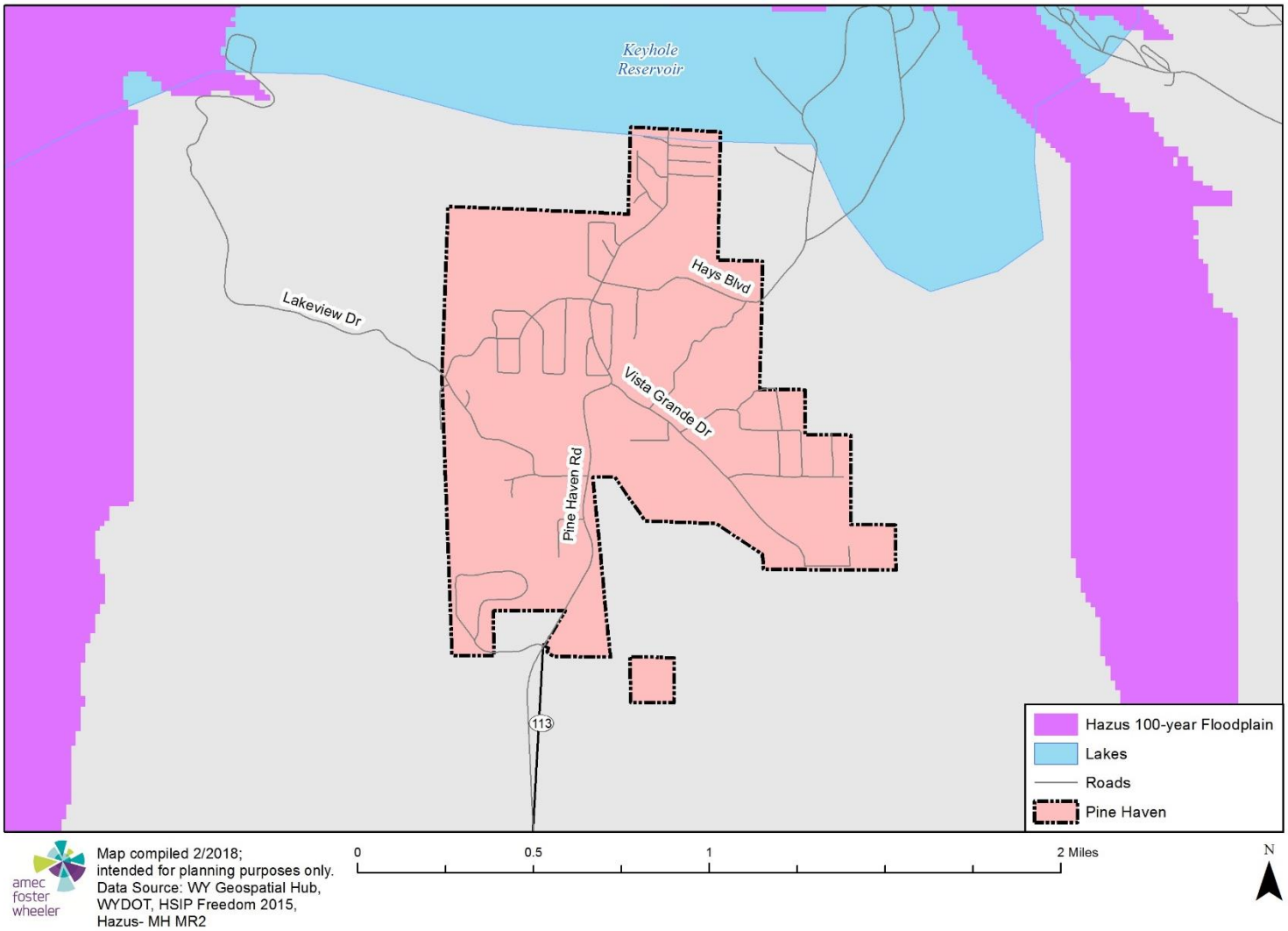
## Figure 6-6 Town of Hulett 100-year and 500-year Flood Hazards



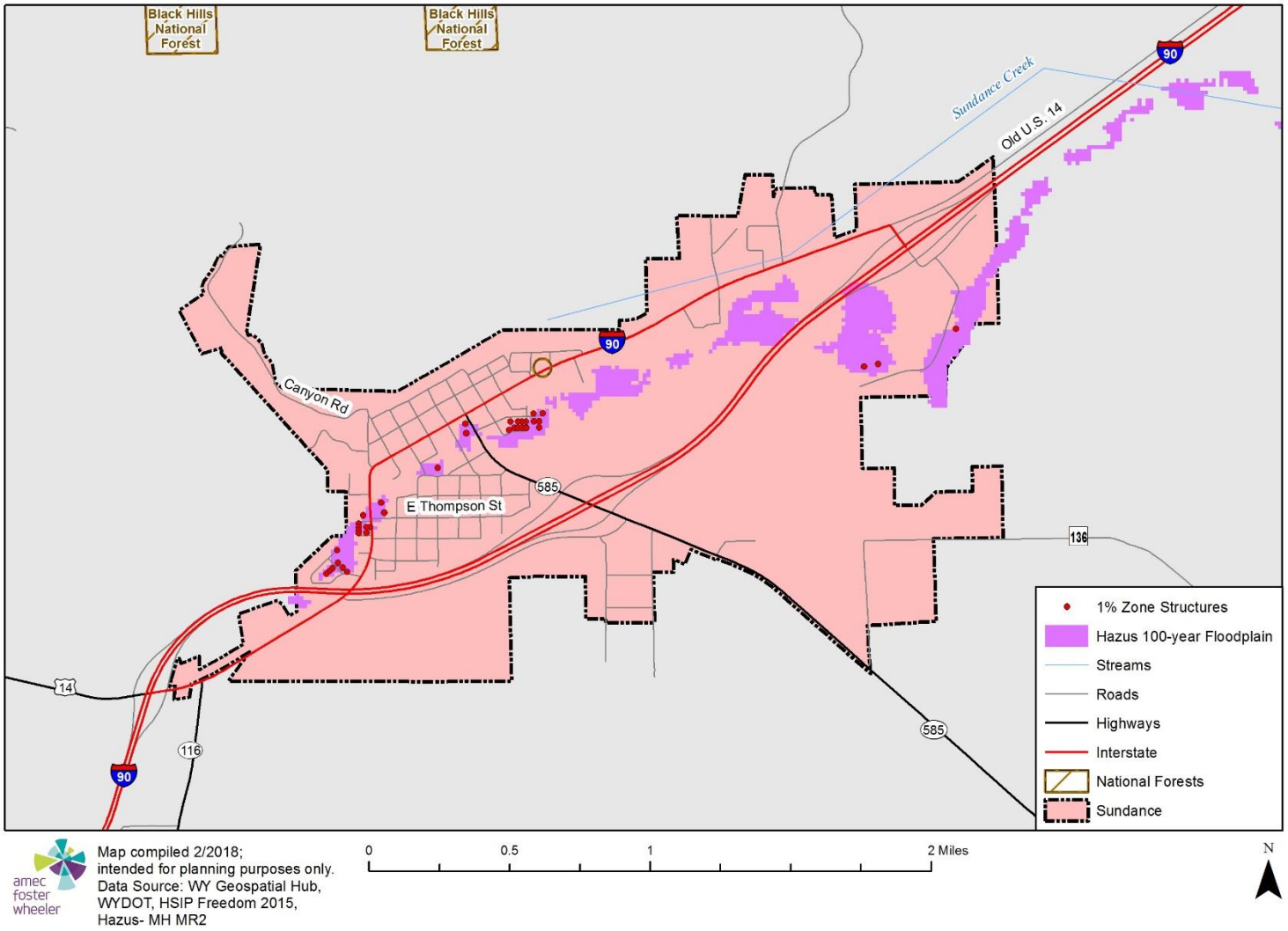
## Figure 6-7 City of Moorcroft 100-year and 500-year Flood Hazards



## Figure 6-8 Town of Pine Haven 100-year and 500-year Flood Hazards



## Figure 6-9 City of Sundance 100-year and 500-year Flood Hazards



## 6.3.6 Hail

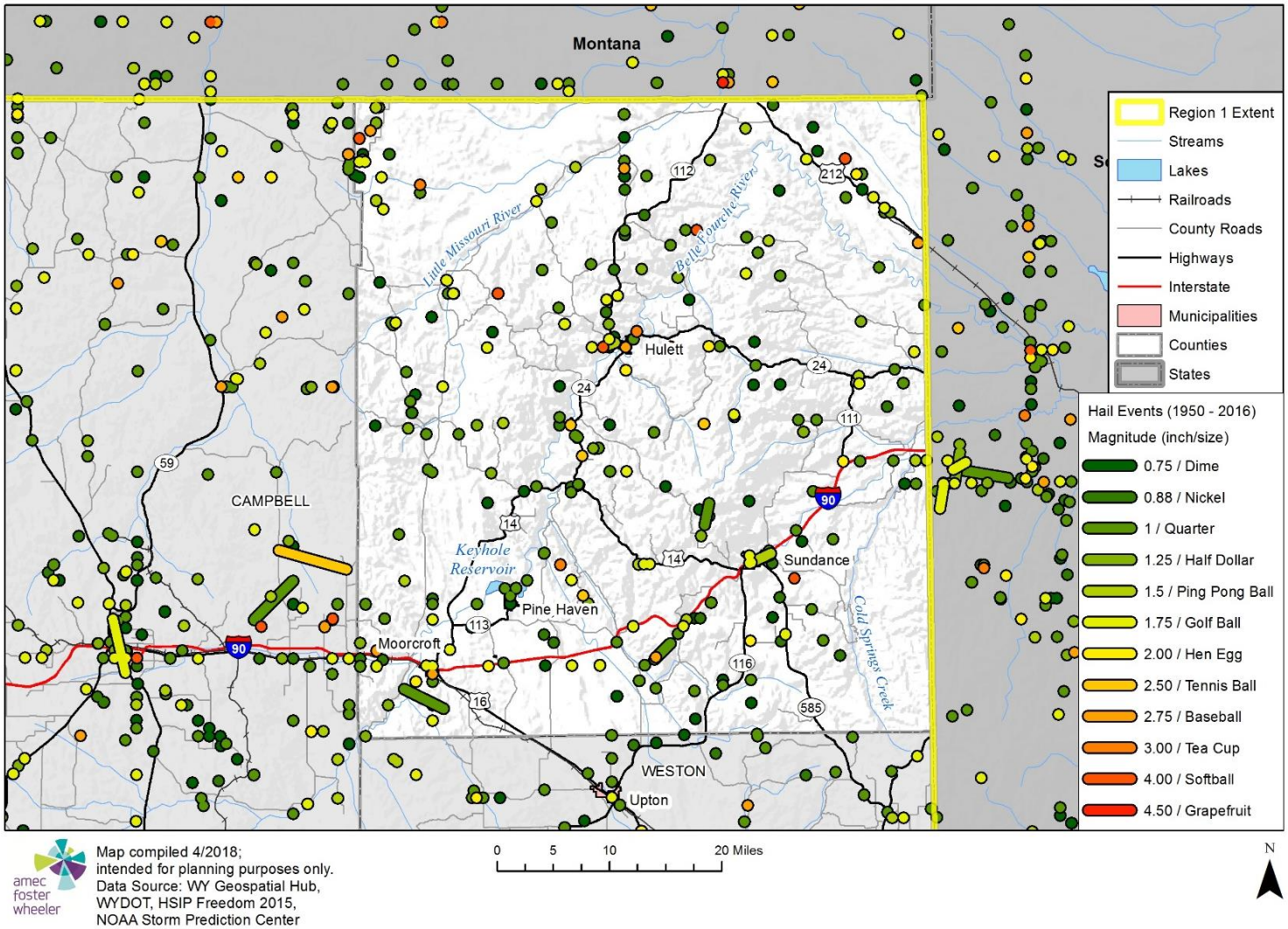
Hail storms occur sporadically throughout Region 1 and are often associated with severe summer storms; these events primarily impact buildings and agriculture. Most of the damages affect crops, though there is potential for significant structural destruction from particularly large hailstones. The probability of future occurrence for this event in Crook County is likely, but the magnitude of these events could vary from negligible to significant. Overall, hail poses a moderate threat across the County and that ranking does not vary between the jurisdictions. Though it should be noted that property damages will be higher in the municipalities (due to exposed infrastructure, cars, etc.), potential crop and livestock damages would be concentrated in the more rural and unincorporated areas. See Section 4.2.7 of the Base Plan for more information on the previously recorded hail events and associated damages, and to revisit the hail map found on Figure 4-37. The total property damage recorded for the County since 1950 due to this hazard is $203,570,000, with $20,000 crop damages on file. (Source: NOAA's NCEI database.) The 2013 Crook County HMP notes the two events as highly significant:

- On September 11 of 1980, golf ball-sized hail ranging from 2 to 5 inches deep devastated the Moorcroft area in about 20 minutes. Schools, dwellings, businesses and automobiles suffered great damages. Trees were stripped and gardens were destroyed. Damage was estimated at $2,750,000 in 1980 dollars and $7.7 million in 2012 dollars.
- A severe thunderstorm swept through north central Crook County on August 11, 1987. This storm produced heavy rain and hail from one-quarter of an inch to two inches in diameter near Hulett. Wyoming Highway 24 south of Hulett was closed for a short time due to one- to two-foot drifts of hail and minor flooding as more than two inches of rain fell in about 30 minutes. Ranchers south of Hulett reported numerous windows shattered and roof and siding damage due to hail. Ranchers north of Aladdin reported washed out fences and the loss of livestock. Grain crops were battered flat by the hailstorm from Alva to Aladdin. The hail one mile west of Alva drifted to a depth from 4 inches to over 12 inches. Damage was estimated at $27,500 in 1987 dollars and $55,997 in 2012 dollars.

The HMPC also noted that climbers have been hurt on Devil's Tower by hail, and antelope and livestock deaths have also occurred from large-sized hail. In the summer of 2016 there was a particularly bad storm event on the Belle Fourche, with hail the size of cantaloupe, which damaged areas in the Pine Bluffs.

The map below displays where NOAA-reported hail events took place in Crook County, from 1950-2016:

## Figure 6-10 NOAA Reported Hail Events in Crook County



## 6.3.7 Hazardous Materials

As further discussed at a regional level in the Base Plan, since 2007Crook County has been exposed to at least 8 hazardous materials incidents that were significant enough to be recorded in the U.S. Coast Guard's National Response Center (NRC) database and Risk Management Plans (RMP) network; more information can be obtained at http://www.rtk.net/#rmp. Crook County contains four RMP facilities: Donkey Creek BG Mix Tanks, Raudsep BG Mix Tank, Reynolds BF Mix Tank (all of which handle flammable materials), and the Madison Pump Station which handles and treats chlorine. In addition, crude oil has been noted as a hazardous chemical also handled in the county. The table below summarizes the number of hazardous materials events that have occurred from 2007-2016 in Crook County.

**Table 6-12 NRC-Reported Incidents in Crook County: 2007-2016**

| Year | Crook County |
|---|---|
| 2007 | 3 |
| 2008 | 1 |
| 2009 | 1 |
| 2010 | 1 |
| 2011 | 0 |
| 2012 | 0 |
| 2013 | 0 |
| 2014 | 1 |
| 2015 | 1 |
| 2016 | 0 |
| **Yearly Average** | 0.8 |
| **Total** | 8 |

Source: http://www.rtk.net/#rmp

The 2013 Crook County Plan notes that life safety is a concern related to transportation incidents that can occur on the state and interstate highways and Burlington Northern/Santa Fe Railroad corridors in the County. I-90, state highways, and the railroads all serve as major corridors for transporting hazardous materials. According to the Crook County HazMat Response Plan, Crook County has roughly 50 miles of railroad track. The Burlington Northern Santa Fe Railroad averages nearly150 trains per day traveling through Crook County. Approximately 20% of these trains carry some hazardous materials cargo.

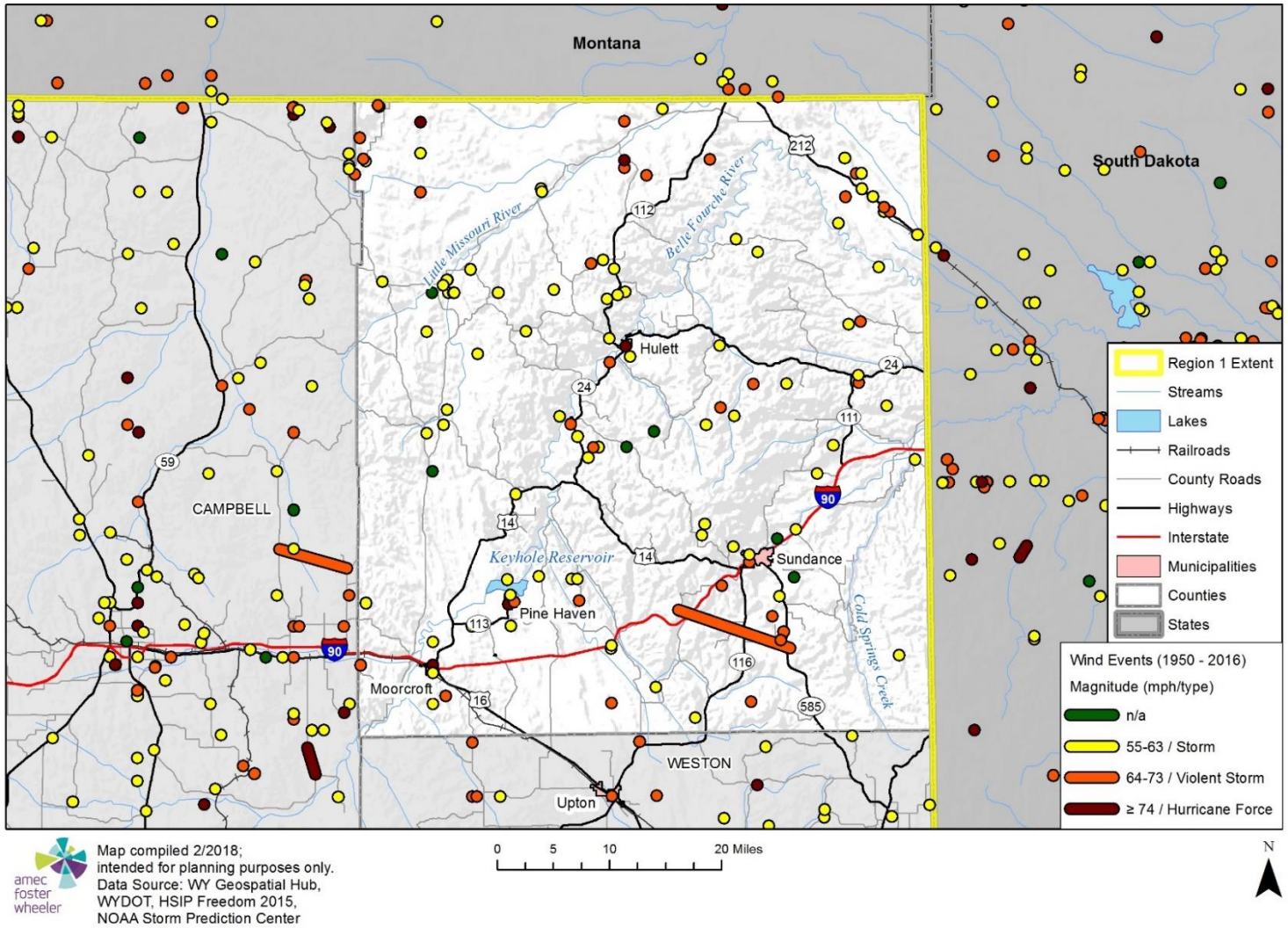
The most prevalent type of hazardous material transported appears to be combustible liquids. Commonly shipped hazardous materials include: gasoline and diesel fuel, paint related material, phosphoric acid, propane, and wet batteries, to name a few. Radiological materials are also transported on Crook County roads, but amounts are not known. Future uranium mining will greatly increase the amount of radiological material transported on

both County roads and the railroad. Overall, hazardous materials pose a high significance risk to Crook County.

### 6.3.8 High Winds and Downbursts

Wind is a constant presence in Wyoming but can be often overlooked. It is difficult to assess vulnerability as it relates to location because damaging winds have occurred everywhere in the County. The main risks associated with high wind events are related to poorly constructed buildings, flying debris, car accidents, and damages to electrical/power infrastructure. High wind events are usually somewhat random and damages from high winds are often described in a regional context, though downbursts occur in smaller extents. From 1950-2016, a total of 162 wind weather events have caused $1,020,000 in property damages, with a maximum recorded wind speed of 70 mph (source: NOAA's NCEI). The map below displays the locations of the NOAA-reported wind events in Crook County and near its jurisdictions, from 1950-2016. Overall, high winds pose a moderate threat across the County which does not vary between the jurisdictions. See Section 4.2.9 of the Base Plan for more information on wind zones, events, and impacts.

## Figure 6-11 NOAA Wind Events in Crook County



## 6.3.9 Landslide/Debris Flow/Rockfall

The geologic history and unique conditions of Wyoming make landslides one of the most common hazards. In Crook County, landslide deposits are found primarily in the forms of slump and complex slope movements, concentrated in the central portions of the county. These landslide areas are rather sprinkled throughout, with very small parts to the east seeing some unstable rock, and a few minor areas to the southeast at risk of debris or earth flows.

While the overall hazard significance is low in the county, GIS analysis of properties reveals the following potential risk, only found across unincorporated areas. Note that, to calculate the population at risk of displacement due to a landslide event, an average household size of 2.43 was used based on the most current U.S. Census statistics. No critical facilities were found to be at risk of landslides, debris flows, or even rockfalls hazards.

**Table 6-13 Landslide Hazards by Jurisdiction and Property Type in Crook County**

| Jurisdiction | Property Type | Parcel Count | Improved Value | Est. Content Value | Total Exposure | Population |
|---|---|---|---|---|---|---|
| Unincorporated | Agricultural | 23 | $1,139,329 | $1,139,329 | $2,278,658 | |
| | Commercial | 3 | $332,877 | $332,877 | $665,754 | |
| | Residential | 21 | $5,561,073 | $2,780,537 | $8,341,610 | 51 |
| | Total | 47 | $7,033,279 | $4,252,743 | $11,286,022 | 51 |

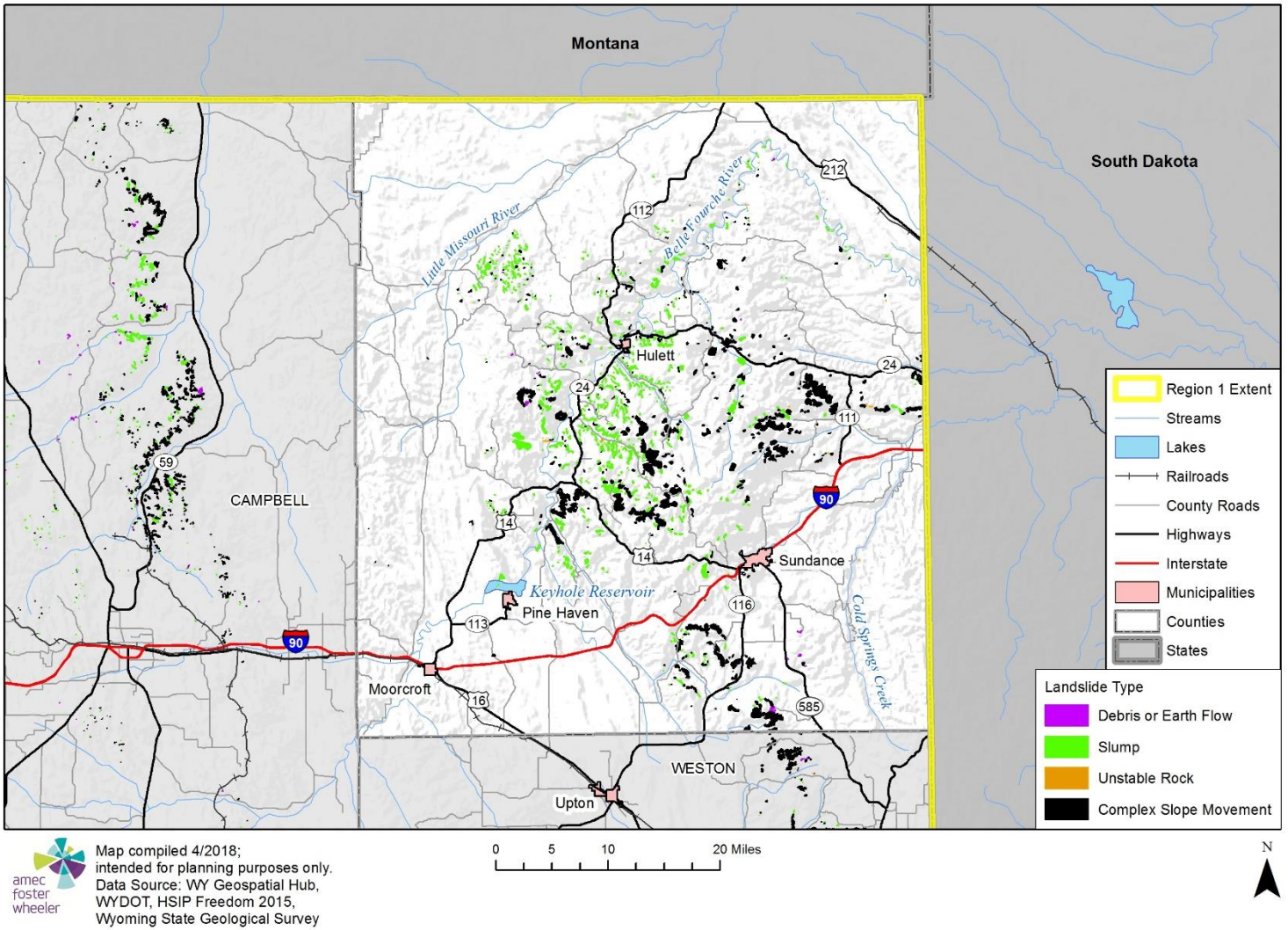
Source: Amec Foster Wheeler analysis of WGS and Wyoming Department of Revenue data

Landslides, debris flows, and rockfalls occur regularly in Wyoming and the Region, though limited information was available on previous occurrences that caused a particular high amount of damage or incurred some other cost or unique impact.

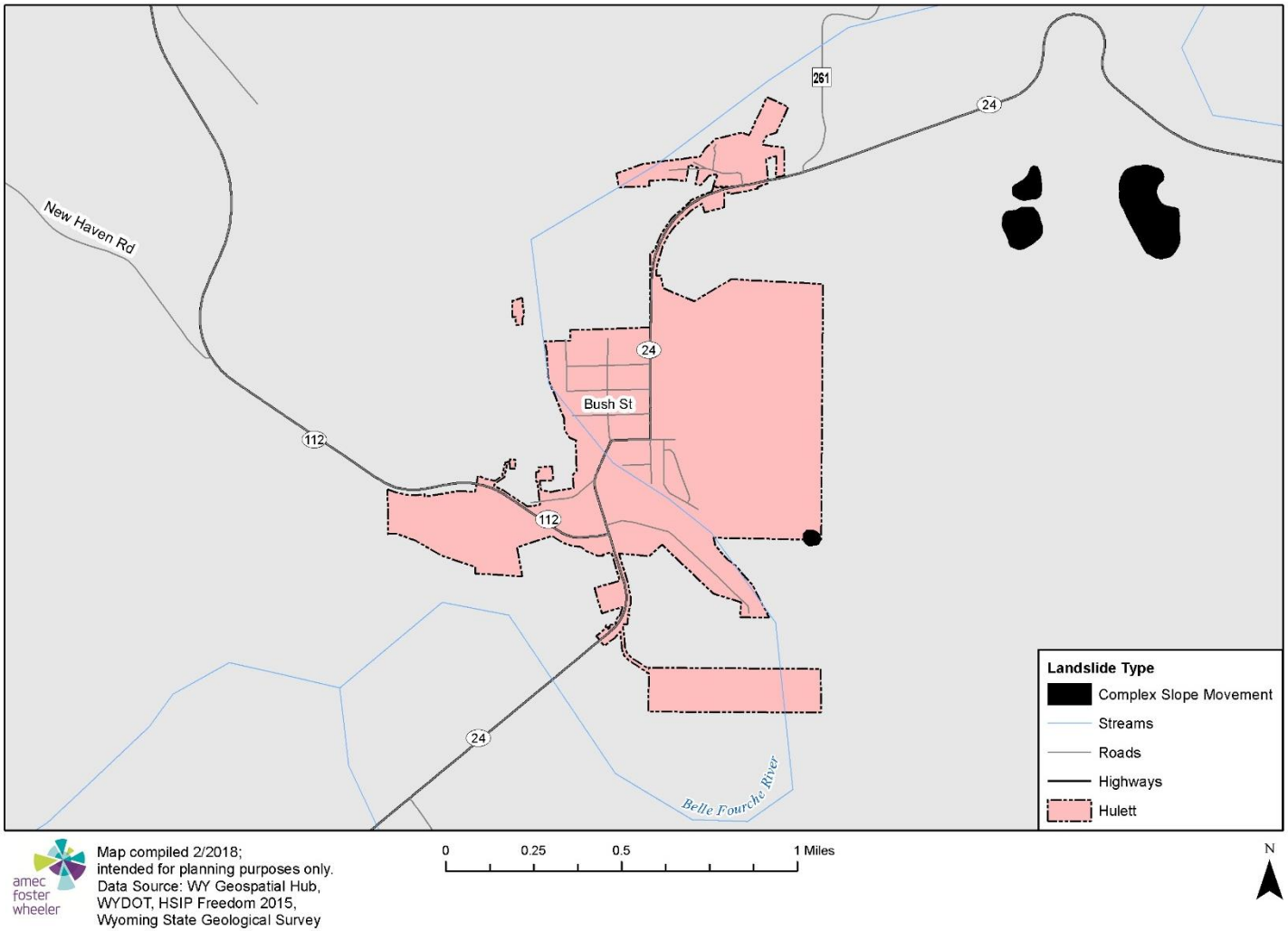
However, on July 22, 2011, President Obama declared a major disaster for the State of Wyoming for emergency work and the repair or replacement of facilities damaged by the severe storms, flooding, and landslides in Albany, Big Horn, Carbon, Crook, Fremont, Goshen, Johnson, Lincoln, Platte, Sheridan, Sublette, Teton, Uinta, Washakie, and Weston Counties. This declaration made Public Assistance funding available. In addition, WYDOT spent an estimated $7.8 million in between 2004 and 2012 in Crook County, to fix three slide areas that had damaged state highways. There is still ongoing work on a major slide near Devils Tower. Landslides can also damage utility lines and disrupt services around the county.

The geospatial distribution of landslide susceptibility can be seen in the figures below, with the Crook County map first followed by the jurisdictions of Hulett and Sundance.

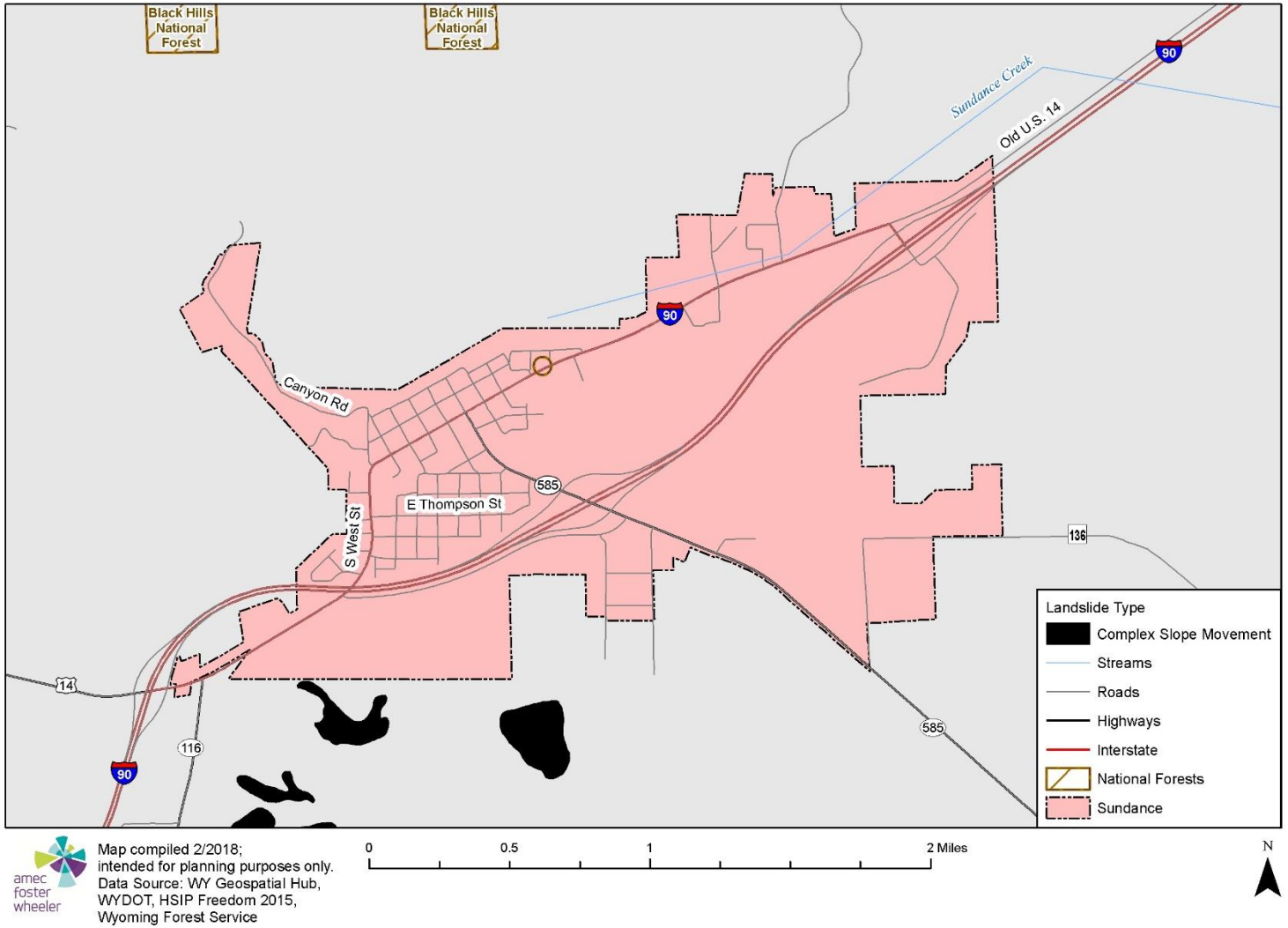
## Figure 6-12 Crook County Landslide Hazards



## Figure 6-13 Hulett Landslide Hazards



## Figure 6-14 Sundance Landslide Hazards



To summarize, landslides, debris flow, and rockfall hazard significance varies based on the magnitude and the location. There is also a possibility that creeks or rivers within the county could become dammed by landslide activity, resulting in a flash flood hazard downstream if the landslide dam fails or is overtopped, or flood nearby developed areas as pooling behind the landslide dam occurs. While some events are small and have limited impact on people and infrastructure, other occurrences can involve large sections of earth and may obstruct major roadways, power line corridors, or gas lines. Future impacts are likely to affect transportation corridors, rivers, lakes and reservoirs, transmission lines, campgrounds and the occasional structure or property in the county.

## 6.3.10 Lightning

All areas in western Wyoming are susceptible to lighting strikes. Impacts to persons and property are likely to remain isolated. Outdoor workers and outdoor enthusiasts and livestock will remain susceptible to lightning strikes. In Crook County, higher elevation/mountainous areas remain more susceptible. Ten lightning events have been recorded in Crook County from 1950-2015, with $293,882 in total damages accrued from the various events (in the form of property damages and crop losses). Lightning caused wildland fires may result in more extensive and compound/secondary damages as well. The table below summarizes the recorded events from this hazard.

**Table 6-14 Lightning Events in Crook County, 1950-2015**

| County | Number of Events | Injuries | Fatalities | Property Damage | Crop Damage | Total Damage |
|---|---|---|---|---|---|---|
| Crook | 10 | 2 | 0 | $ 293,382 | $ 500 | **$ 293,882** |

Source: 2016 Wyoming State Multi-Hazard Mitigation Plan

On July 9, 2001, a lightning strike ignited a sporting goods store in Moorcroft; most of the building was destroyed in the fire.

The HMPCs reported that lightning strikes are very common, and have led to losses of livestock, damage to houses, fences, and a hay stack fire that led to $6M in damages across Region 1. Lightning has at least twice struck communications towers, knocking out radio systems. Livestock strikes are more common than strikes to humans. Crook County's HMPC felt this hazard should be raised to high significance due to past damages and potential for wildfire ignitions.

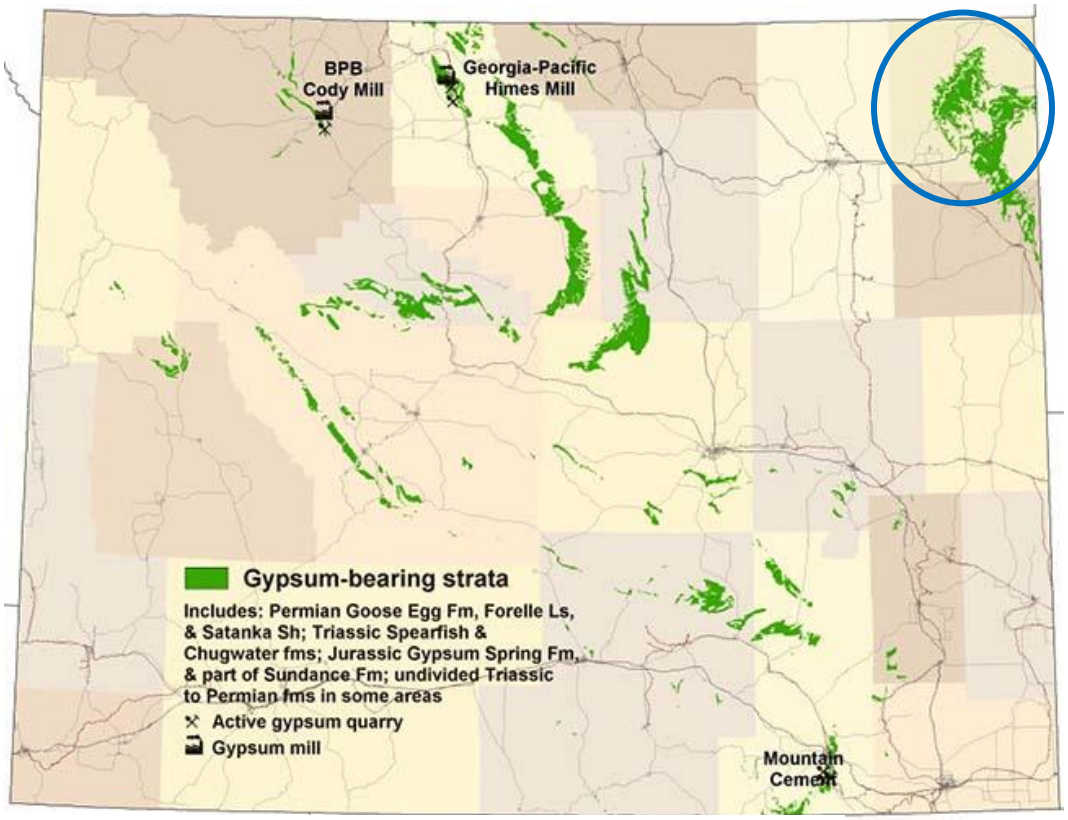
## 6.3.11 Mine and Land Subsidence

There are numerous abandoned mine sites with subsidence-prone underground workings in Crook County. Many mines across the county have been identified and there are mitigation projects designed to reduce the impacts from underground mining and subsidence, and to remove the threat they pose to the surrounding area. The unmitigated identified mines pose little to no threat to infrastructure in the surrounding area. Mine and

general land subsidence events occur occasionally, and the degree of risk and impact varies based on the characteristics of each area. Crook County should continue to make efforts to study geologic hazards as they relate to future industry and development to avoid future problems. A study was conducted to evaluate the presence of geologic hazards along the proposed Bakken Pipeline route in Crook and Weston counties. The report, published April 4, 2012, determined that the abundance of soluble gypsum beneath the proposed pipeline route could compromise the project. If the pipeline were damaged by a sinkhole, natural gas or liquid petroleum could seep out. Liquid petroleum leaking out of the pipeline could contaminate local ground water. Subsidence issues could seriously compromise the Bakken Pipeline project and other development initiatives that are undertaken without a thorough geologic hazard study.

A layer of prehistoric rock known as the Triassic Spearfish Formation traverses Crook County. The formation is abundant with gypsum, a soluble mineral that dissolves as water infiltrates the ground. As the gypsum dissolves, caves form underground; sinkholes appear on the ground surface when the roof of an underground cave collapses. This type of landscape is referred to as "karst," identified by the dissolution of layers of soluble minerals and bedrock. Karst landscapes may be marked by caves, sinkholes, cenotes, and other surface features. Figure 6-15 depicts known locations of gypsum-bearing strata in the State. Note the abundance of gypsum in Crook County (circled in blue).

**Figure 6-15 Gypsum-bearing strata in Wyoming**




Source: Wyoming State Geological Survey, "Gypsum," accessed December 13, 2012.

Refer to Section 4.2.12 from the Base Plan for a more detailed vulnerability assessment and maps with the location of abandoned mine sites, mine reclamation and abandonment programs, land subsidence information, and other details relevant to Crook County and Region 1.

## 6.3.12 Severe Winter Weather

Winter storms are a yearly feature of the Wyoming climate and may occur anywhere in the state. Blizzard conditions bring the triple threat of heavy snowfall, strong winds, and low temperatures. Poor visibility and huge snowdrifts are major hazards caused by blowing snow. These storms disrupt work, make travel difficult or impossible, isolate communities, kill livestock by the hundreds or thousands, and sometimes leave human fatalities in their wake. Higher elevation and mountainous areas tend to be more susceptible to severe winter weather events. In Crook County, there have been $2,190,000 worth of property damage from 1996 to 2017. In this time period, 126 winter storms were reported and one extreme cold event (Source: NOAA's NCEI database.)

The HMPCs reported that Interstate closures are common during winter storm events, which leads to the need to shelter stranded motorists, can create economic impacts, and can cause problems due to diverted semi-trucks on city and town streets. Access to rural homes can also become an issue, especially during prolonged storms; residents are encouraged to keep a 3-day supply of food, medication, and oxygen. Impacts on livestock and wildlife are also a major concern.

The overall significance of this hazard is high across the County but does not largely vary between the jurisdictions. Refer to Section 4.2.13 of the Base Plan for more details, since winter storms and related weather are easier to describe regionally than on a county by county basis.

## 6.3.13 Tornado

Many documented tornadoes occurring in the counties in Region 1 are given low ratings on the Fujita Scale (F0s and F1s) simply because these tornadoes are often formed over open land and result in little or no damage. Crook County has had 32 reported incidents of this kind from 1950-2016, according to the NOAA NCEI database. The table below summarizes the tornado events in this time period:

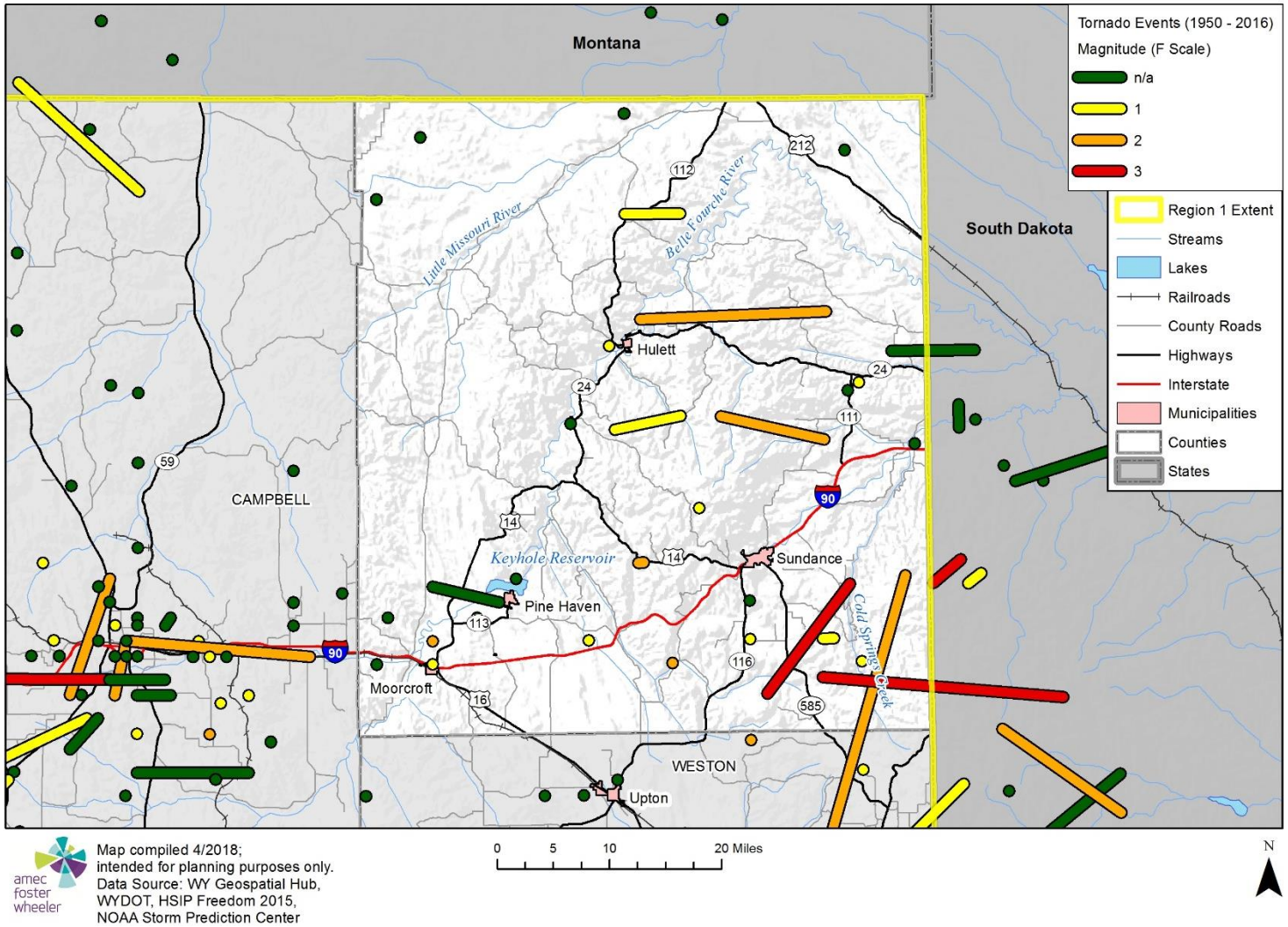
**Table 6-15 Tornado History in Crook County, 1950-2016**

| County | Total Incidents | Magnitude | Damage-Causing Incidents | Fatalities | Injuries | Property Damage |
|---|---|---|---|---|---|---|
| Crook | 32 | 0-3 | 19 | 0 | 3 | $ 1,241,200 |

Source: NOAA's NCEI, Crook County Multi-Hazard Mitigation Plan

Historical tornadoes in Crook County and Region 1 overall are most common during the months of May through August. Based on the historical data, it is estimated that one tornado will occur in Crook County about every 2.2 years on average. The overall significance is medium in the county.

## Figure 6-16 NOAA Tornado Events in Crook County from 1950-2016



## 6.3.14 Wildfire

Large wildland fires become increasingly damaging as the population expands into the more rural areas. The statewide Wildland Urban Interface (WUI) 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 common information and data. 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. These results provide vulnerability and potential risk assessment tools.

Another method of estimating potential future impacts from wildfires is to determine the value of structures that are located within Redzones, or wildland fire building exposure values. Wildland fire building exposure value is the value of buildings that can be potentially damaged by wildland fire in an area. Building exposure values are based on Census Block level data from the U.S. Census Bureau. The methodology utilized is like the one used to model flood exposure described in the flood chapter of the Base Plan. Based on GIS analysis performed, Crook County has over $326.4 million in total property exposure potentially at risk to wildland fires, and there are 2,357 people living in the Redzones (at risk of wildfires, displacement, etc.). Though it is not likely that the areas at risk will simultaneously face a completely destructive event, this figure provides the upper end of what could be affected. Future wildfires could face compound losses such as damaged crops and watersheds within the County, and the fires could contribute to soil erosion and deposition problems. The table below summarizes Crook County's risk to wildfires:

**Table 6-16 Wildfire Risk in Crook County based on Redzone Analysis**

| Jurisdiction | Property Type | Parcel Count | Improved Value | Est. Content Value | Total Exposure | Population |
|---|---|---|---|---|---|---|
| Moorcroft | Residential | 5 | $748,045 | $374,023 | $1,122,068 | 12 |
| | **Total** | **5** | **$748,045** | **$374,023** | **$1,122,068** | **12** |
| Pine Haven | Commercial | 8 | $1,996,798 | $1,996,798 | $3,993,596 | |
| | Duplex | 2 | $318,153 | $159,077 | $477,230 | 5 |
| | Residential | 230 | $40,238,920 | $20,119,460 | $60,358,380 | 559 |
| | **Total** | **240** | **$42,553,871** | **$22,275,335** | **$64,829,206** | **564** |
| Sundance | Commercial | 12 | $4,560,410 | $4,560,410 | $9,120,820 | |
| | Residential | 66 | $10,263,416 | $5,131,708 | $15,395,124 | 160 |
| | **Total** | **78** | **$14,823,826** | **$9,692,118** | **$24,515,944** | **160** |
| Unincorporated | Agricultural | 239 | $15,610,560 | $15,610,560 | $31,221,120 | |
| | Commercial | 29 | $7,030,543 | $7,030,543 | $14,061,086 | |
| | Duplex | 1 | $92,722 | $46,361 | $139,083 | 2 |
| | Exempt | 1 | $28,587 | $28,587 | $57,174 | |
| | Residential | 666 | $127,006,640 | $63,503,320 | $190,509,960 | 1,618 |
| | **Total** | **936** | **$149,769,052** | **$86,219,371** | **$235,988,423** | **1,621** |
| | **Grand Total** | **1,259** | **$207,894,794** | **$118,560,846** | **$326,455,640** | **2,357** |

Source: Wyoming Assessor's Office, Redzone data, U.S. Census

## Table 6-17 Crook County Critical Facility Exposure within the Redzone

| Jurisdiction | Facility Type | Facility Count |
|---|---|---|
| Pine Haven | EMS Stations | 1 |
| | Fire Stations | 1 |
| | Microwave Service Towers | 2 |
| Sundance | Hospitals | 1 |
| | Nursing Homes | 1 |
| Crook County (Unincorporated) | Cellular Towers | 3 |
| | Electric Substations | 1 |
| | Microwave Service Towers | 14 |
| | TV Analog Station Transmitters | 1 |
| **TOTAL** | | **25** |

Source: Homeland Infrastructure Foundation-Level Data (HIFLD)

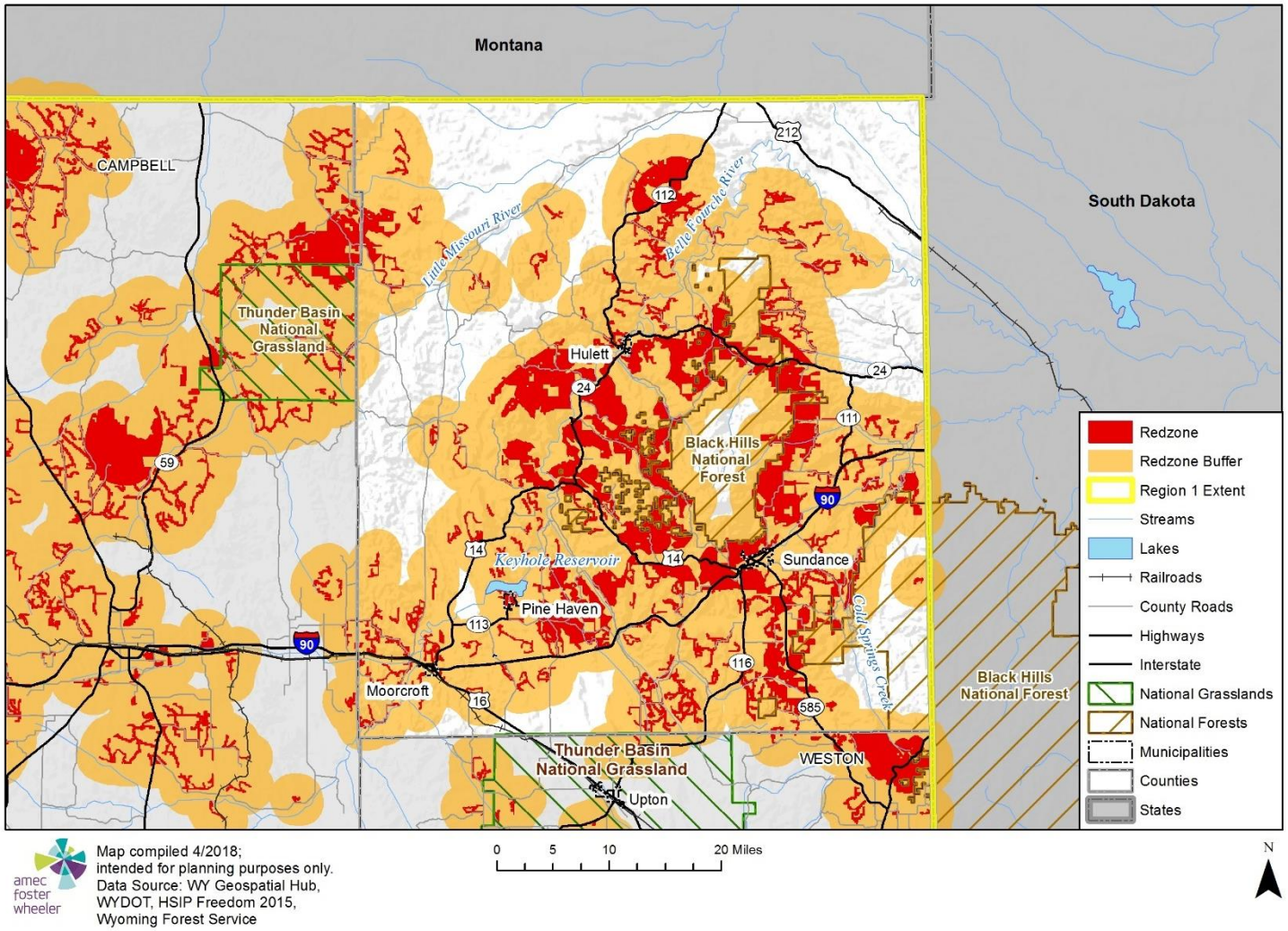
Potential resources for wildfire planning and management in Crook County include the following:

- The Crook County Community Wildfire Protection Plan (CWPP) – 2014
- Town of Moorcroft Emergency Operations Plan – 2017
- Wyoming Statewide Forest Resource Assessment – 2009
- Wyoming Fire Report – 2011
- Wyoming Wildland Urban Interface Hazard Assessment - 2002
- Front Range Redzone Project

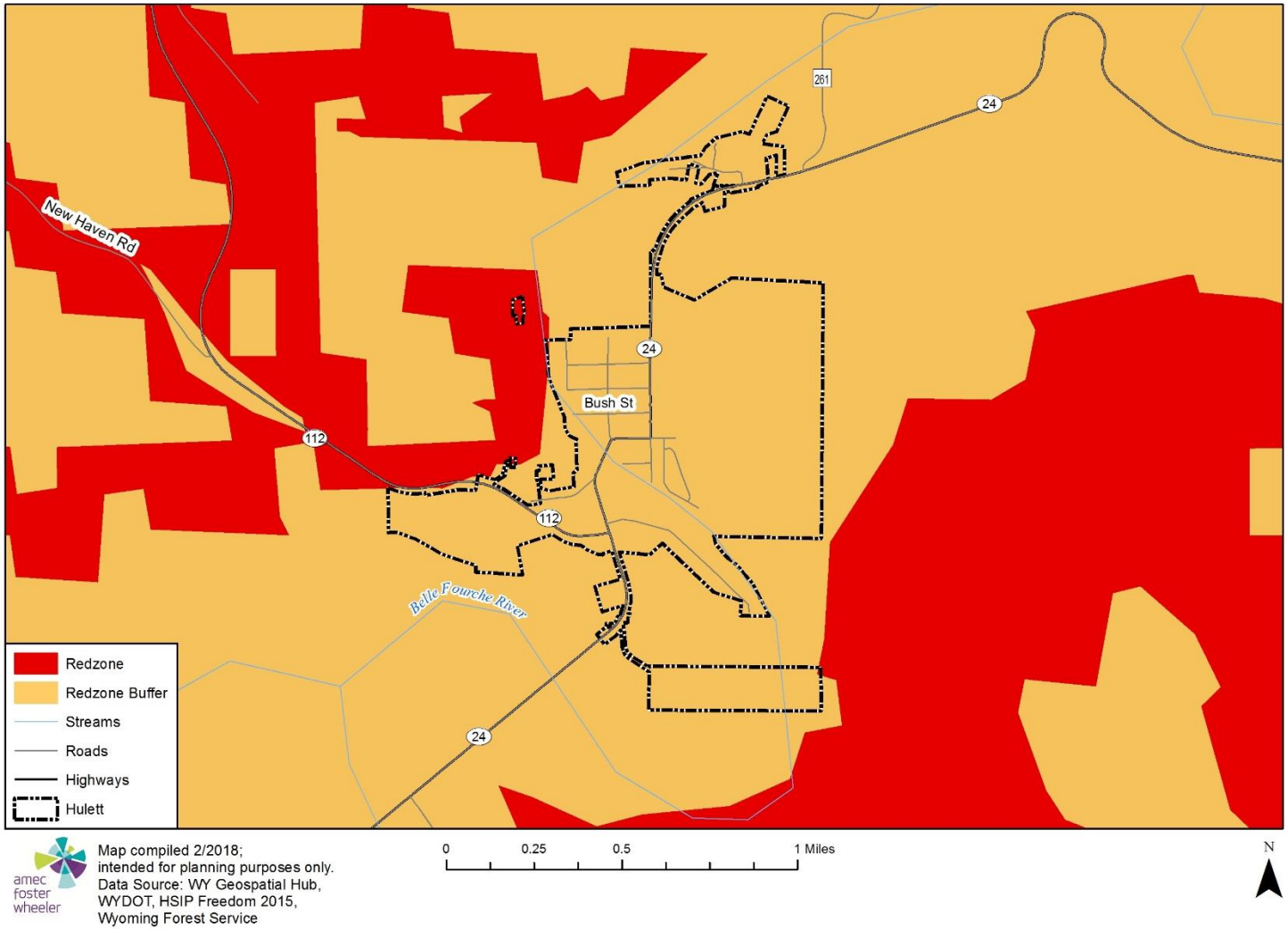
Below are the maps, first for Crook County and then for the affected jurisdictions, of Redzone vulnerability (where red colors mean high risk of fires, and the oranges are the areas immediately adjacent and hence slightly less vulnerable but still at risk). A fire history map of fire locations and their magnitudes is included last, for Crook County.

Overall, the significance of wildfires to the county is high, with around 43,094 acres burned just in the human- and natural-caused fires of over 1,000 acres in size that took place from 1980-2016. However, overall, there have been 159 fires reported. Refer to Section 4.2.15 of the Base Plan for additional analysis and information pertaining to Crook County and Region 1, including further statistics, summaries, and details.

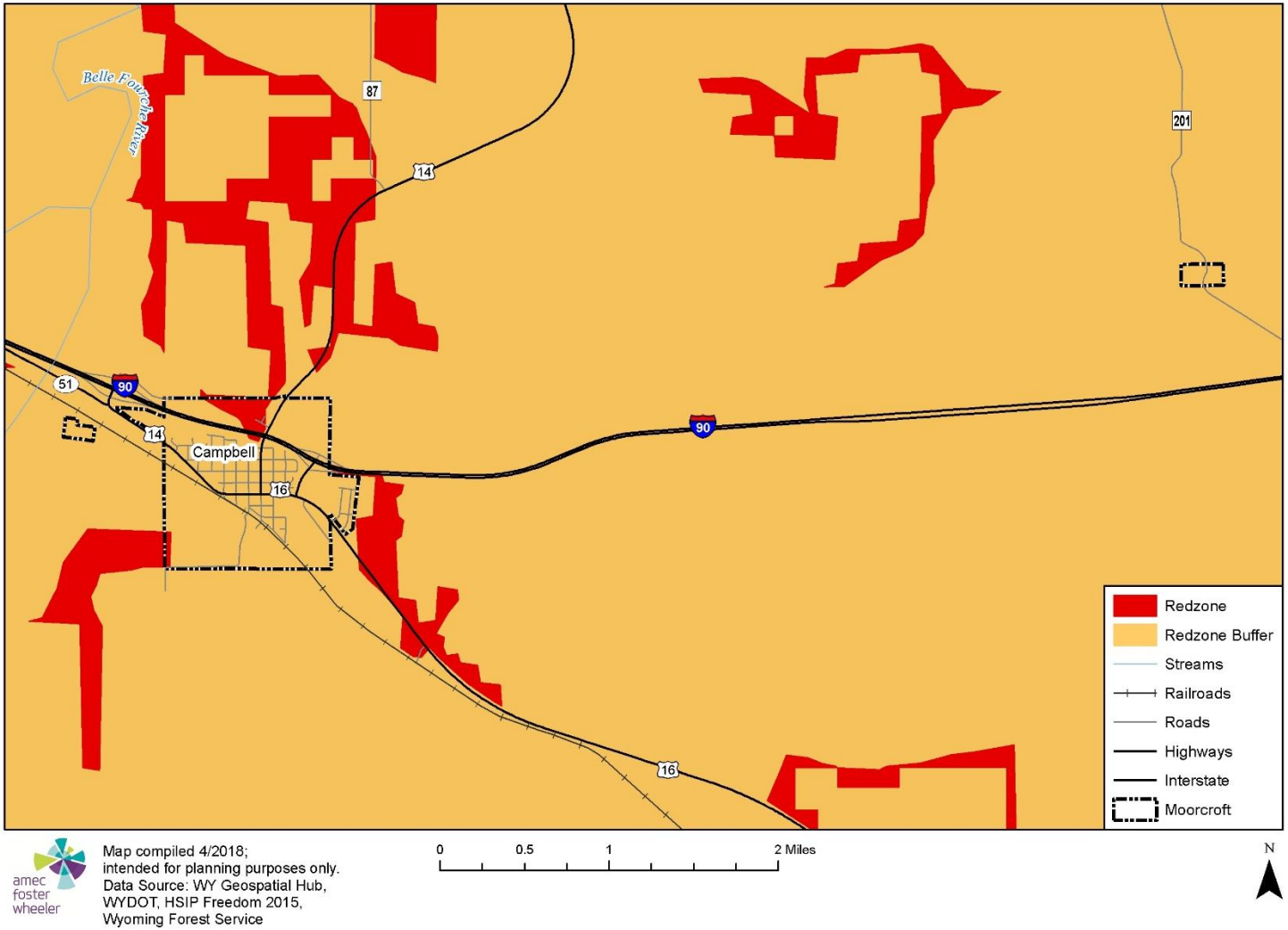
## Figure 6-17 Crook County Redzone Areas



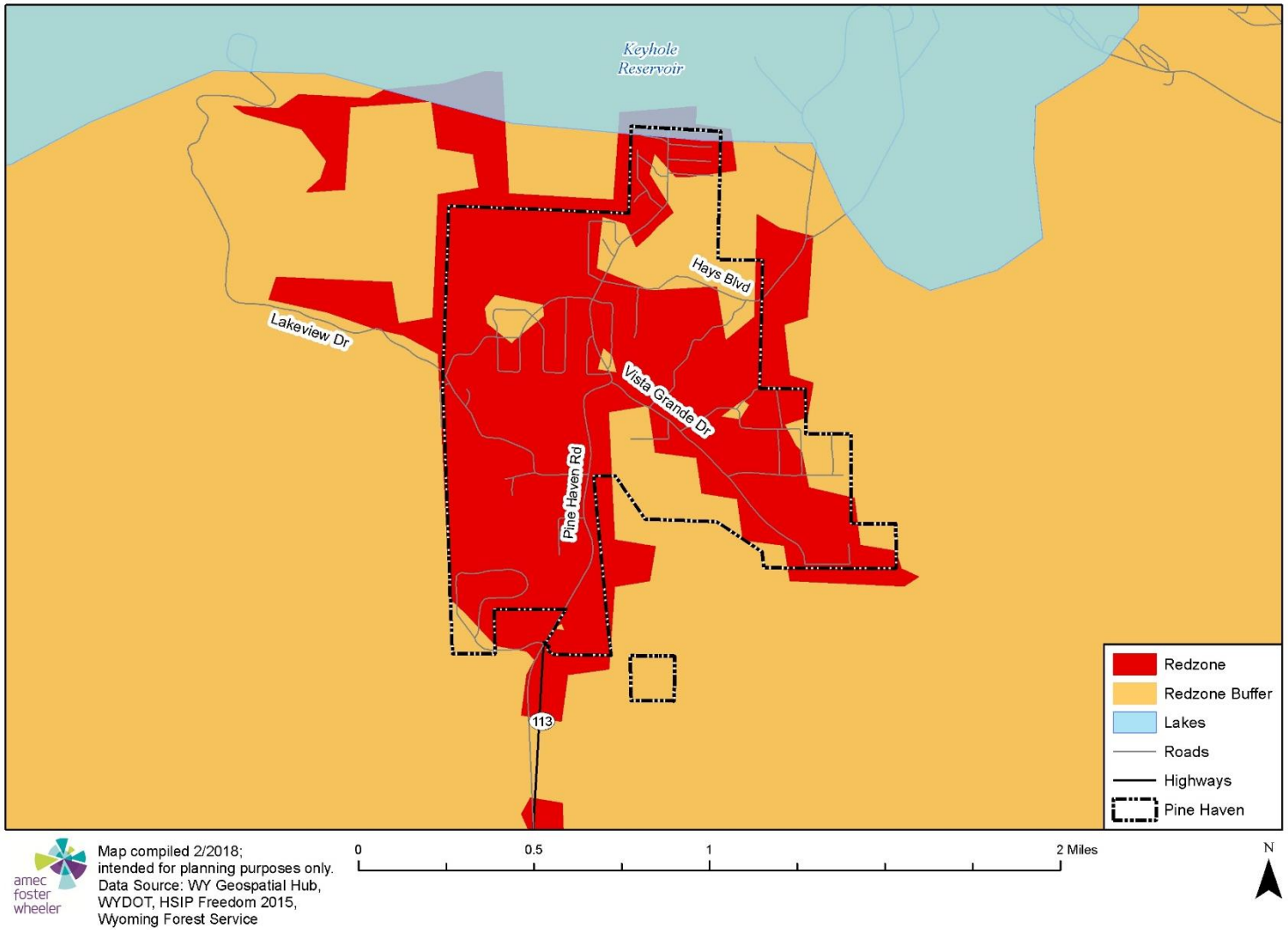
## Figure 6-18 Hulett Redzone Areas



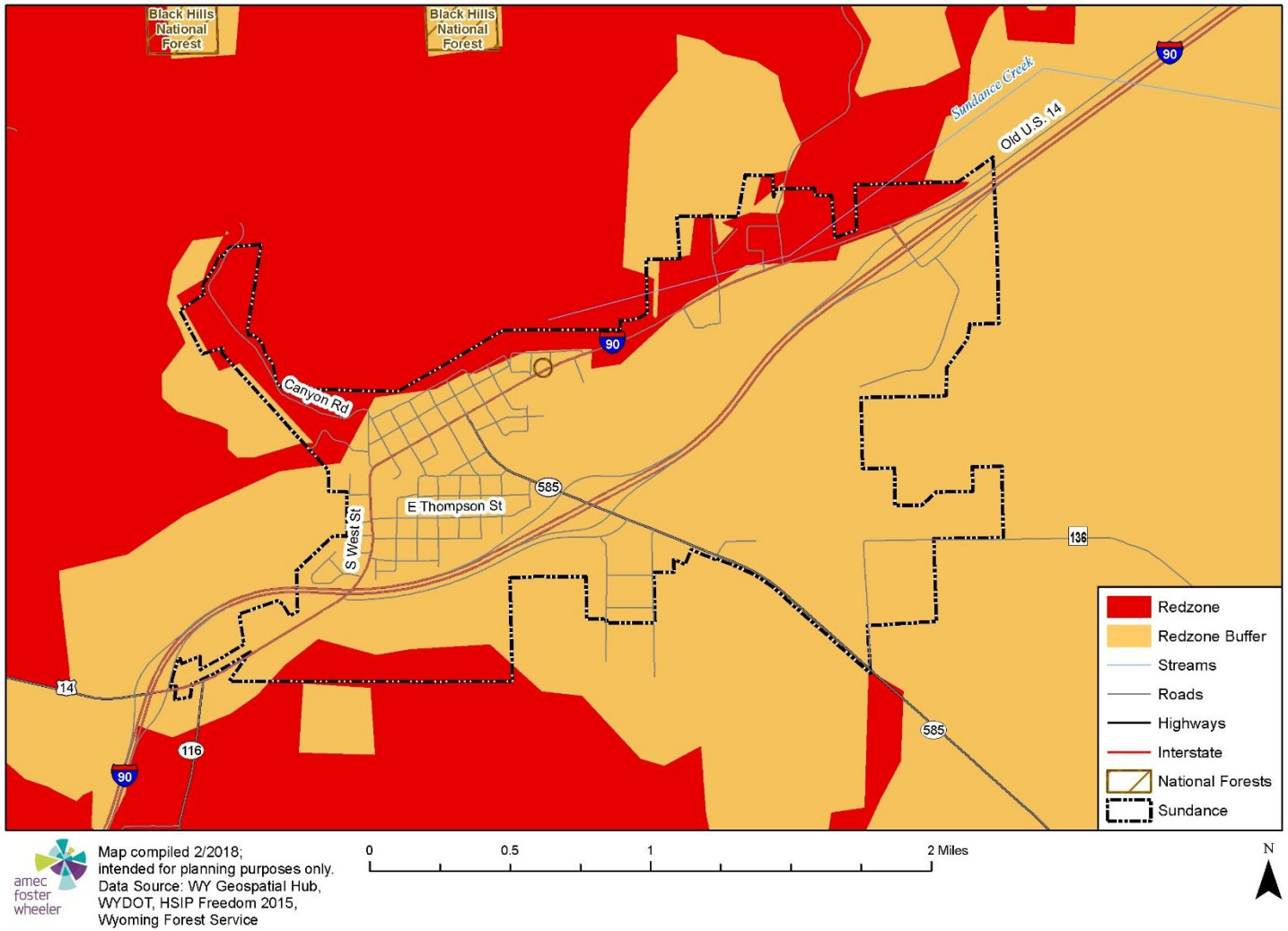
## Figure 6-19 Moorcroft Redzone Areas



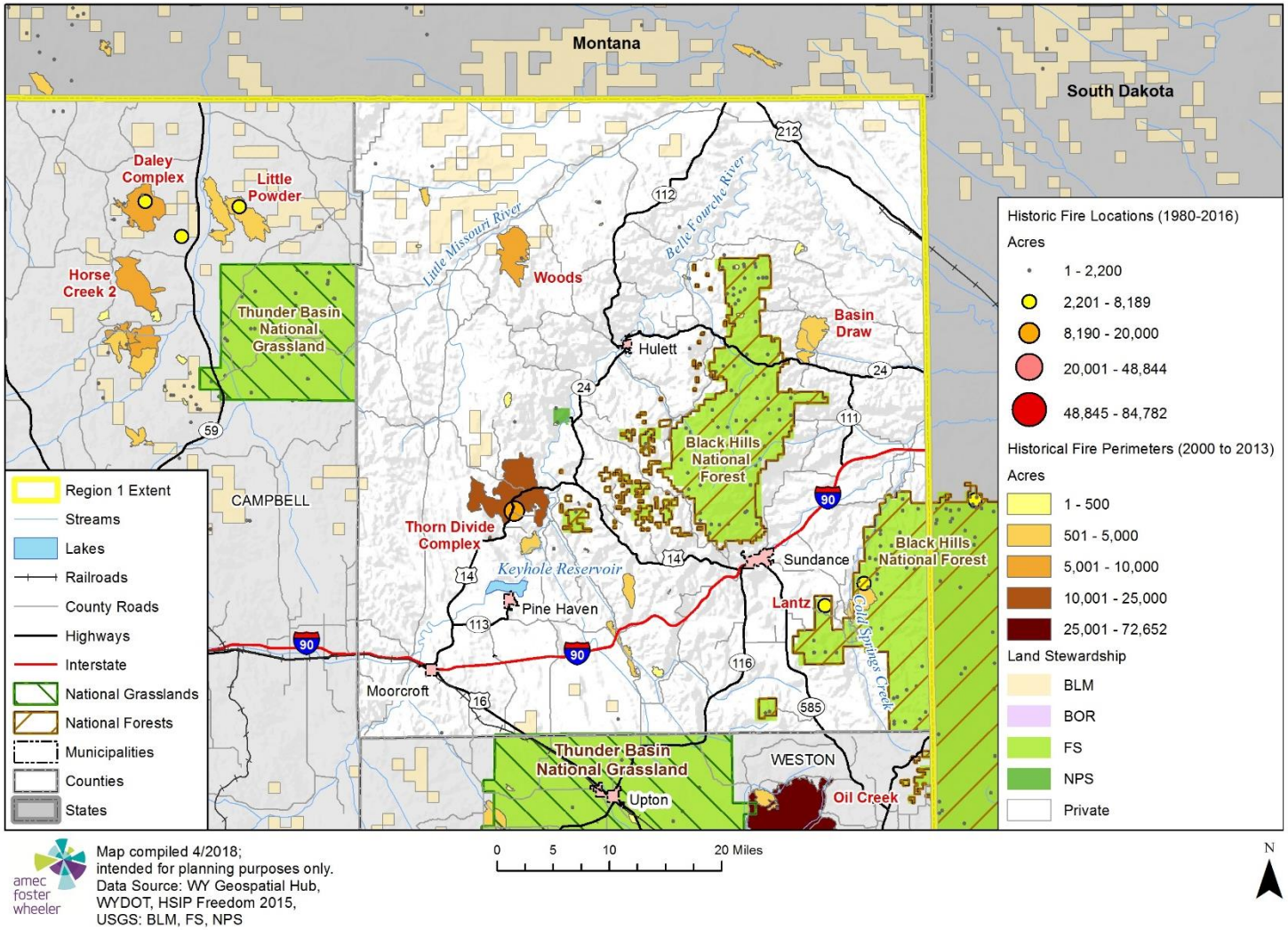
## Figure 6-20 Pine Haven Redzone Areas



## Figure 6-21 Sundance Redzone Areas



## Figure 6-22 Wildfire Occurrences in Crook County from 1980-2016



# 7 Mitigation Capabilities Assessment

As part of the regional plan development, Region 1 and participating jurisdictions developed a mitigation capability assessment. Capabilities are those plans, policies and procedures that are currently in place and contribute to reducing hazard losses. Capabilities also include staffing and financial considerations, including the ability to leverage funding for mitigation projects. Combining the risk assessment with the mitigation capability assessment results in "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan. The purpose of this effort was to identify policies and programs that were either in place or could be undertaken, if appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, projects, and programs to determine if they contribute to reducing hazard related losses.

## 7.1 Capability Summary

The 2016 Wyoming State Multi-Hazard Mitigation Plan summarizes existing mitigation capabilities of each county and some of their incorporated cities. The information was derived from county websites and through completed worksheets from the County Coordinators. Table 7-1 presents an overview of Crook County's mitigation capabilities as captured in the Wyoming State Mitigation Plan.

**Table 7-1 Crook County Mitigation Capabilities Overview**

| Building Codes | Comprehensive Planning | Floodplain Management | GIS & Planning | Land Use Regulations | Mitigation Plan | Additional Capabilities |
|---|---|---|---|---|---|---|
| No building codes in the county.<br><br>City of Sundance and Town of Moorcroft have building permit processes | 2014 Land Use Plan with limited restrictions | Town of Moorcroft and Sundance FIRM: 02/02/07<br><br>2006 Flood Damage Prevention Ordinance in City of Sundance | Growth and Development Office reviews subdivisions | No Zoning, but does have a Planning Commission<br><br>City of Sundance has an updated Zoning Ordinance<br><br>Town of Moorcroft adopted a Mobile Home Ordinance in 2013 to address rapid growth due to mineral industries | Approved; Expires 12/21/18 | City of Sundance has a Land Use Planning Commission<br><br>Town of Moorcroft is experiencing growth due to mineral industries |

Source: Wyoming Multi-Hazard Mitigation Plan 2016

Table 7-2 provides an assessment of Crook County's mitigation capabilities, based on input collected from the HMPC via data collection guides.

## Table 7-2 Crook County Capability Assessment

| Element | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| Planning Capabilities | | | | | |
| Comprehensive Plan | Yes | Yes (Town of Hulett Emergency Mgmt. Update) – 2012. Events in 2009/10/11 | Yes – May 2017 | No | No |
| Capital Improvement Plan | Yes | No | Yes | No | Yes |
| Emergency Operations Plan | Yes | Yes – Call down list. Flood response at the county level – March 24, 2011 | Yes – May 2017 | Yes – 03/01/18 | No |
| Recovery Plan | No | Yes - 2012 | Yes – May 2017 | Yes - at the county level, but no local one | Yes |
| Mitigation Plan | Yes, 12/23/13 | Yes | Yes | Yes | Yes |
| Debris Management Plan | No | No | Yes | No | No |
| Economic Development Plan | No | No | Yes | No | Yes |
| Transportation Plan | No | Yes – 2004. Keyhole dam emergency evacuation | Yes | N/A | No |
| Land-use Plan | Stated in 1977 but revoked in 1998; addresses only public lands. County has rural addressing. | No | N/A | No | Yes |
| Flood Mitigation Assistance (FMA) Plan | No | No | N/A | No | No |
| Watershed Plan | No | No | N/A | Yes | No |
| Community Wildfire Protection Plan or other fire mitigation plan | Yes – 2005 | No | Yes – ongoing | No | No |
| Critical Facilities Plan (Mitigation/Response/ Recovery) | No | No | May 2017 | No | No |
| Policies/Ordinance | | | | | |
| Zoning Ordinance | N/A | Yes – March 2010 | No | Yes | Zoning codes written in 1994 |
| Building Code | N/A | Original | Yes - IBC | 2012 – IBC | Building codes written in 1994 |

| Element | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| Floodplain Ordinance | No | No ordinance, but have flood zone maps | N/A | No | Yes |
| Subdivision Ordinance | Yes | Zoning | Yes | Yes | Subdivision regulation written in 1994 |
| Tree Trimming Ordinance | No | Zoning | No | No | No |
| Nuisance Ordinance | No | Yes | Yes | Yes | Yes |
| Storm Water Ordinance | No | Sewers zoning – 51.40 | No | No | Yes |
| Drainage Ordinance | No | Zoning | No | Yes | Yes |
| Site Plan Review Requirements | No | Zoning – approved by Board | Yes | Yes | Yes |
| Historic Preservation Ordinance | No | No | No | No | No |
| Landscape Ordinance | No | Zoning | No | No | Yes |
| Programs | | | | | |
| Zoning/Land-use Restrictions | No | Yes – Zoning | No | Yes | Yes |
| Codes Building Site/Design | No | Zoning | Yes | Yes | Yes |
| Hazard Awareness Program | No | EM | Yes | No | No |
| National Flood Insurance Program | No | Access online – mapped for floodplain | No | No | Yes |
| Community Rating System (CRS) | No | Yes – Rated | N/A | No | No |
| National Weather Service (NWS) Storm Ready Certification | Yes | No | No | No | No |
| Firewise Community Certification | Yes | No | Crook County | Yes | No |
| Building Code Effectiveness Grading (BCEGs) | No | No | N/A | Yes | No |
| ISO Fire Rating | No | No | 4 | Classification – 07/7x | Yes |
| Economic Development Program | No | No | Yes | No | Yes |
| Land-use Program | No | Zoning | No | No | No |
| Public Education/Awareness | No | No | Some | No | No |
| Property Acquisition | No | Council | Yes | No | No |
| Planning/Zoning Boards | Yes | Via Council | Yes | Yes | Yes |
| Stream Maintenance Program | No | Keyhole Watershed District – Corp of Engineers | N/A | No | Yes |
| Tree Trimming Program | No | Public Works – PreCorp WYDOT - Private | No | No | Yes |
| Engineering Studies for Streams (Local) | No | Municipal, as needed | Yes | Yes | Yes |
| Mutual Aid Agreements | Yes | County Fire – CC Sheriff – Red Cross | Yes | Yes | Yes |
| Studies/Reports/Maps | | | | | |
| Flood Insurance Rate Maps (FIRM) | No | Yes – 09/28/07 | Yes - 02/02/07 | N/A | 02/02/07 |

| Element | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| Hazard Analysis/Risk Assessment | Yes | EM Updater | Yes | Yes | Yes |
| Evacuation Route Map | No | School | Yes | No | Yes |
| Critical Facilities Inventory | No | Yes | Yes | Yes | Yes |
| Vulnerable Population Inventory | Being developed | Being developed | Yes | No | No |
| Land-use Map | No | Yes - Zoning | Yes | Yes | Yes |
| Staff/Department | | | | | |
| Building Code Official | No | Council | Yes | Yes | No |
| Building Inspector | No | Council | Yes | Yes | No |
| Mapping Specialist (GIS) | Yes | Yes | No | Yes | Yes |
| Engineer | Contract | As needed – Bearlodge Archived Project | Yes | Yes | Yes |
| Development Planner | Yes | None – Council | No | No – Planning & Zoning Commission | Yes |
| Public Works Official | No | Yes | Yes | Yes | Yes |
| Emergency Management Coordinator | Yes | Yes | Yes | Yes | Yes |
| NFIP Floodplain Administrator | No | Yes | Yes | No | Yes |
| Bomb and/or Arson Squad | No | Campbell County | No | No | No |
| Emergency Response Team | No | HVFD – County – EMS | Yes | Fire Dept. Ambulance | Yes |
| Hazardous Materials Expert | No | Campbell County | Yes | No | No |
| Local Emergency Planning Committee | Yes | Council | No | No | No |
| Emergency Management Commission | No | No | Yes | Yes | No |
| Sanitation Department | No | Hulett Municipal | Yes | No | Yes |
| Transportation Department | Yes | Hulett Public Works | No | No | No |
| Economic Development Department | No | Council via WBC | No | Yes | Yes |
| Housing Department | No | No | No | No | Yes |
| Historic Preservation | No | No | No | No | No |
| Non-Governmental Organizations (NGOs) | | | | | |
| American Red Cross | Campbell County – MOU | Campbell County - MOU | No | No | No |
| Salvation Army | No | No | No | No | No |
| Veterans Groups | No | Yes – American Legion (auxiliary) | Yes | No | Yes |
| Local Environmental Organization | No | No | No | No | No |
| Homeowner Associations | Yes | Yes – 3 active. IV Rd./Birch/Golf Course | No | No | Yes |
| Neighborhood Associations | No | Yes | No | No | No |
| Chamber of Commerce | No | Yes | Yes | Yes | Yes |

| Element | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| Community Organizations (Lions, Kiwanis, etc.) | No | Lion – L3GON – Women's Club GHCC | Yes | No | No |
| Financial Resources | | | | | |
| Apply for Community Development Block Grants | Yes | Yes | Yes | Yes | Yes |
| Fund projects through Capital Improvements funding | Yes | Yes | Yes | Yes | Yes |
| Authority to levy taxes for specific purposes | Yes | Yes | Yes | Yes | Yes |
| Fees for water, sewer, gas, or electric services | No | Yes | Yes | Yes | Yes |
| Impact fees for new development | No | Building permit | Yes | Yes | Yes |
| Incur debt through general obligation bonds | No | Yes | No | No | No |
| Incur debt through special tax bonds | No | Yes | No | Yes | Yes |
| Incur debt through private activities | No | No | No | No | No |
| Withhold spending in hazard prone areas | No | No | No | No | No |
| Additional Information | | | | | |
| Public education/information programs | No | High School Hold Siren Magnet – School drills – evacuation program – at risk population plan – Red Cross | Water usage (summer), fire safety in schools, homes, businesses | No | No |
| Past or ongoing programs to reduce disaster losses | Yes | Emergency Power – Cheyenne High School – T.O.H Emergency Coordinator – Local Red Cross – MOU – Airport (Av. Gas, jet fuel, available bldg. for IC). Also report Road to Sewer Pond or Alturret | No | No | No |
| Projects or issues related to people with Access and Functional Needs | No | Working on with Public Health | Movement of elderly or disabled in event of serious hazard | Elderly on oxygen | No |
| Outdoor warning sirens | No | Yes, 2 of them. Activated via radio, manual, and call down list | Yes, 2 of them. Within police dept. They are radio or manually controlled | Yes, 3 of them. Activation to be determined | Senior Outreach |
| Other public warning systems | Code red, IPAWS County Sheriff | Town website/Facebook – IAR – Code Red | Code red, Town website | No. Crook County warning system connected to County records | Public Warning, Calls |

| Element | Crook County | Hulett | Moorcroft | Pine Haven | Sundance |
|---|---|---|---|---|---|
| | | | | with plow numbers | |
| Designated public tornado shelters/saferooms | Yes- Courthouse basement | Yes, but not standard. At GHCC – 401 Sager | Yes – but probably not constructed by FEMA standards. They are at 100 Blk S. Little Home Ave., Hoppers Bar at 110 S. Bighorn, and 100 Blk S. Belle Fourche Ave | No | Yes |
| General development trends in the last 5 years | County roads and bridge | Residential housing and business development. Rec Ground development & Security. Becoming full service airport (Av. Fuel) | Infrastructure improvements | Infrastructure improvements | Infrastructure improvements |
| Future development plans and expected growth, especially in the 100-year floodplain or known hazard areas | No | Entire Town of Hulett/Municipality is in the Keyhole Flood Hazard Area. At risk of catastrophic fast fire. Future development: Town perimeter, Red Devil, OTGC | N/A | No | No |
| New facilities or infrastructure planned in the next 5 years | Yes | Yes, Crook County medical services – feasibility study completed | N/A | No | No |

Source: Data provided by jurisdictions

## 7.1.1 NFIP Participation and Continued Compliance

The National Flood Insurance Program (NFIP) Community Status Book outlines participation and flood map status for counties and jurisdictions across the country. Crook County and the Town of Pine Haven are not mapped and are not required to participate in the NFIP but are exploring participation in the future.

### Table 7-3 NFIP Status in Crook County

| Jurisdiction | Effective Map Status | Date Joined | Comments |
|---|---|---|---|
| **Crook County** | Not mapped | | Participation optional due to no mapping |
| Town of Hulett | 09/28/07 | 04/01/99 | |
| Town of Moorcroft | 02/02/07 | 03/01/86 | |
| Town of Pine Haven | Not mapped | Not mapped | Not mapped |

| Jurisdiction | Effective Map Status | Date Joined | Comments |
|---|---|---|---|
| Town of Sundance | 02/02/07 | 08/19/86 | |

Source: NFIP Community Status Book

As participants since 1999 and 1986, the towns of Hulett, Moorcroft, and Sundance will continue to comply with the NFIP to reduce flood losses and increase flood resiliency. Continued compliance with the NFIP includes continuing to adopt floodplain maps when updated as well as implementing, maintaining and updating floodplain ordinances. Actions related to continued compliance are summarized below:

- Continued designation of a local floodplain manager whose responsibilities include reviewing floodplain development permits to ensure compliance with the local floodplain management ordinances and rules;
- Suggest changes to improve enforcement of and compliance with regulations and programs;
- Participate in Flood Insurance Rate Map updates by adopting new maps or amendments to maps;
- Utilize Digital Flood Insurance Rate maps in conjunction with GIS to improve floodplain management, such as improved risk assessment and tracking of floodplain permits;
- Promote and disperse information on the benefits of flood insurance.

Also to be considered are the flood mitigation actions contained in the base Regional Plan and this annex, to support the ongoing efforts by participating counties to minimize the risk and vulnerability of communities to flood hazards, and to enhance their overall floodplain management program/s.

# 8 Mitigation Strategy

This section describes the mitigation strategy and mitigation action plan for Crook County. See Chapter 5 of the Base Plan for more details on the process used to develop and update the mitigation strategy.

## 8.1 Mitigation Goals

As part of the 2018 planning process, Crook County reviewed and updated goals and objectives to guide the development of the Hazard Mitigation Strategy. The potential hazards, risks and vulnerabilities were also considered in the update of the goals. The goals in the Crook County Multi-Hazard Mitigation Plan completed in 2013 were structured to make the plan easier for the local jurisdictions to identify their projects, encourage ownership, and improve implementation. Each jurisdiction has one goal with projects under that goal addressing the hazards that to which that jurisdiction is vulnerable. During the 2018 plan update, a change to each goal was to remove the word ‘natural’ in front of

'hazards' since the plan includes hazardous materials mitigation as well. A sixth goal was added to emphasize the personal responsibility aspects of hazard mitigation. This goal was influenced by a similar goal in Campbell County, and was embraced by all the other counties in the Region during the 2018 update.

*NOTE TO HMPC: The following objectives duplicate the actions in section 8.2. Recommend deleting the objectives and just keep goals and refer to action tables.*

**Goal 1: Mitigate hazards to reduce the potential for property loss or damage, injury and loss of life in the Town of Hulett.**

- Objective 1.1: Obtain a generator for community building/shelter.
- Objective 1.2: Improve capabilities for all-hazard response through airport improvements.
- Objective 1.3: Construct an all-weather bridge to access the wastewater treatment plant. This objective relates to flood hazards.

**Goal 2: Mitigate hazards to reduce the potential for property loss or damage, injury and loss of life in the Town of Moorcroft.**

- Objective 2.1: Add siren coverage to include Texas Trails area of town.
- Objective 2.2: Establish an emergency shelter.
- Objective 2.3: Conduct a planning exercise for a RR hazmat incident in town.
- Objective 2.4: Prepare an evacuation plan for the town. This objective relates to HazMat hazards.
- Objective 2.5: Address stormwater system capacity issues. This objective relates to flood hazards.
- Objective 2.6: Re-purpose old school into a tornado and evacuation shelter. This objective relates to tornado and other hazards.

**Goal 3: Mitigate hazards to reduce the potential for property loss or damage, injury and loss of life in the Town of Pine Haven.**

- Objective 3.1: Work with the town to obtain easements for second ingress/egress route to the community. This objective relates to wildland fire, flood, and winter storm hazards.

**Goal 4: Mitigate hazards to reduce the potential for property loss or damage, injury and loss of life in the City of Sundance.**

- Objective 4.1: Design and build new dam on Sundance Pond/Reservoir. This objective relates to flood hazards.

**Goal 5: Mitigate hazards to reduce the potential for property loss or damage, injury and loss of life in Crook County.**

- Objective 5.1: Develop notification system for rural areas.
- Objective 5.2: Determine the number of people potentially needing shelter from an event. Obtain supplies.
- Objective 5.3: Identify and prepare one or more facilities to shelter pets.
- Objective 5.4: Educate citizens on preparing to put pets in shelter.
- Objective 5.5: Increase awareness of accessing information during a disaster through social media.
- Objective 5.6: Replace Arizona style creek crossing at Spring and Arch Creeks, and the Little Missouri River. This objective relates to flood hazards.
- Objective 5.7: Enroll the county in the National Flood Insurance Program (NFIP). This objective relates to flood hazards.
- Objective 5.8: Install a stream flow gauge on the Belle Fourche River above Hulett. This objective relates to flood hazards.
- Objective 5.9: Conduct annual table top exercise as per Hazard Materials Response Plan. This objective relates to Hazmat hazards.
- Objective 5.10: Construct fire station at Oshoto to specialize in hazardous material response. This objective relates to Hazmat hazards.
- Objective 5.11: Conduct a Hazardous Materials Commodity Flow Study for the county. This objective relates to Hazmat hazards.
- Objective 5.12: Work with public health to put on training session on radiological and bioterrorism response. This objective relates to Hazmat hazards.
- Objective 5.13: Educate first responders about air quality hazards from mine activities. This objective relates to Hazmat hazards.
- Objective 5.14: Retrofit Alladin community building as tornado shelter. This objective relates to tornado hazards.
- Objective 5.15: Continue cooperation with WYDF and FS to treat mountain pine beetle stands. This objective relates to wildland fire hazards.
- Objective 5.16: Offer workshops to rural landowners on protecting property from wildland fire. This objective relates to wildland fire hazards.

**Goal 6: Increase the resilience of citizens by embracing their personal responsibility to be prepared and involved through education and volunteering**

- Objective 6.1: Determine the need for volunteers and training.
- Objective 6.2: Provide training and public education opportunities.

## 8.2 Mitigation Actions

This section provides updates on the actions identified in the 2013 Crook County Multi-Hazard Mitigation Plan and new actions identified during the 2018 Regional Plan development.

## 8.2.1 Identification and Implementation of Mitigation Measures

Crook County has identified several potential hazard mitigation projects that would benefit the County and reduce potential risks and vulnerabilities. These projects were originally developed with input from the HMPC, LEPC, and from the past public meetings and a public survey. See also Chapter 5 in the Base Plan for additional information on the development and update of the mitigation strategy. The action plans were shared amongst the regional plan participants to stimulate ideas amongst the respective planning committees in each county. Table 8-1 lists the actions ongoing from the 2013 planning effort to address and mitigate hazards, including information related projects, priorities, responsible agency(ies), the goal/s the project supports, and possible funding sources. Table 8-2 lists new mitigation actions identified in the 2018 planning process.

The County and its communities are making progress toward meeting the Plan's goals through implementation of individual mitigation actions or projects. Table 8-3 summarizes the completed mitigation actions. Five projects have been completed in the 2013-2017 timeframe. Over time other completed actions will be added to this table to document progress towards mitigation implementation.

Finally, Table 8-4 contains the deleted mitigation actions. These were actions identified in the 2013 plan that were deemed no longer needed or feasible due to various reasons noted in the table.

## Table 8-1 Ongoing Mitigation Actions

| Project ID | Project Description | Priority | Project Cost | Lead | Comments |
|---|---|---|---|---|---|
| 1.1 | Obtain generator for community building/shelter | High | Low | Hulett, CCEM | Deferred but still needed |
| 1.2 | Improve capability for all-hazard response through airport improvements | Medium | Medium | Hulett, CCEM | Containment for fuel spills has been implemented |
| 1.3 | Construct an all-weather bridge to access the wastewater treatment plant | Low | Medium | Hulett | Continue – Deferred but still needed. Floods have gone over bridge before |
| 2.1 | Conduct a county-wide hazmat incident awareness training | High | Low | CCEM, LEPC | Continue - Revised to training instead of exercise |
| 2.2 | Prepare an evacuation plan for the town | Medium | Medium | Moorcroft, CCEM, Pine Haven | Continuing. EOP done for Moorcroft. Continuing for Pine Haven. Working on for Hulett (school only) |
| 2.5 | Address stormwater system capacity issues | Medium | High | Moorcroft | Deferred but continuing |
| 2.6 | Re-purpose old school into a tornado and evacuation shelter | Medium | Medium | Moorcroft | Continuing |
| 3.1 | Work with town to obtain easements for second ingress/egress route to the community | High | Medium | Pine Haven, CCEM | Continuing. Discussions in the past. 8 months. |
| 4.1 | Design and build new dam on Sundance Pond/Reservoir | High | High | Sundance, CCEM | Reservoir has been dredged. |
| 5.2 | Determine the number of people potentially needing shelter from an event. Obtain supplies. | Medium | Low | CCEM, LEPC | Continuing – still need to get shelters supplies |
| 5.3 | Educate citizens on preparing to put pets in shelter. | Low | Low | CCEM, LEPC | Continuing. Training in Gillette and Sheridan |
| 5.5 | Increase awareness of accessing information during a disaster through social media | Medium | Low | CCEM, LEPC | Continuing effort Public Health has a Facebook page. |
| 5.6 | Replace Arizona style creek crossings at Spring Creek and the Little Missouri River. | Medium | High | CC Road and Bridge | Deferred – Continuing. Arch Creek no longer considered |
| 5.7 | Enroll the county in the National Flood Insurance Program (NFIP) | High | Low | CCEM, County Commissioners | Continuing |
| 5.9 | Conduct table top exercise as per Hazard Materials Response Plan | Medium | Low | CCEM, LEPC | Continuing (every 3 years) |
| 5.11 | Conduct a Hazardous Materials Commodity Flow Study for the County | Medium | Medium | CCEM | Deferred but continue |

| Project ID | Project Description | Priority | Project Cost | Lead | Comments |
|---|---|---|---|---|---|
| 5.12 | Work with public health to put on training session on radiological and bioterrorism response | Low | Low | CCEN, CC Public Health | Continue bioterrorism and POD Training, on an annual basis |
| 5.14 | Retrofit Alladin community building as tornado shelter | Medium | Low | CCEM | Defer |
| 5.16 | Offer workshops to rural landowners on protecting property from wildland fire | High | Medium | CC Fire | Continue |

## Table 8-2 New Mitigation Actions Identified in 2018

| ID | Hazard(s) | Related Goal(s) | Action Title | Description/ Background/ Benefits | Jurisdictions Involved | Lead Agency and/or Jurisdictions Involved | Cost Estimate and Potential Funding | Relative priority | Timeline, Status, Implementation Notes |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Flood, Dam Failure | Goals 1-5 | Flood hazard risk identification and notification and evacuation planning | Identify all at risk flood plains and notify residences of possible hazards involved in the flood plain. ID escape routes in the event of a flood. Determine notification methods. | County<br>Hulett<br>Pine Haven<br>Sundance<br>Moorcroft | CCEM | Low | Medium | 2018-2020<br>Build off information in Plan's HIRA |
| 2 | HAZMAT | Goals 1-5 | Hazardous Materials Preparedness | Hazmat training, PPE acquisition and training - certify firefighters to be responders | County<br>Hulett<br>Pine Haven<br>Sundance<br>Moorcroft | CCEM, LEPC | Low | Medium | 2018-2020 |

| ID | Hazard(s) | Related Goal(s) | Action Title | Description/ Background/ Benefits | Jurisdictions Involved | Lead Agency and/or Jurisdictions Involved | Cost Estimate and Potential Funding | Relative priority | Timeline, Status, Implementation Notes |
|---|---|---|---|---|---|---|---|---|---|
| 3 | Wildfire; drought | Goal 1 | Rural water supply enhancement for Hulett | An enhancement to the Horsehead station water supply is needed for wildfire and drought mitigation:<br>*filling area for local and county firetrucks is needed to effectively mitigate wildfire starts and protect structures<br>*protect critical facilities and assets, and enhances rural water supply<br>*urgent water fill for fire trucks<br>*Source for rural residents and tourism for water fill station | Hulett | Town of Hulett, CCEM | $100k | Medium | 2018-2022 |
| 4 | Wildfire | Goals 1-6 | Update the Community Wildfire Protection Plan | An updated wildfire protection plan/mitigation plan for county is needed. Previous plan developed in 2005. Get federal, state, local and landowners involved to getting rid of the fuels to help protect their property and not endanger their neighbors | County<br>Hulett<br>Pine Haven<br>Sundance<br>Moorcroft | CC Fire, CCEM, Natural Resource Protection district | $75k | Medium | 2018-2022 |

| ID | Hazard(s) | Related Goal(s) | Action Title | Description/ Background/ Benefits | Jurisdictions Involved | Lead Agency and/or Jurisdictions Involved | Cost Estimate and Potential Funding | Relative priority | Timeline, Status, Implementation Notes |
|---|---|---|---|---|---|---|---|---|---|
| 5 | Wildfire | Goal 5 | Post wildfire watershed protection, mitigation and restoration | Look into public funding for wildfire aftermath for cleanup, rural & town | County Hulett | County | $250k Investigate potential to use HMGP-Post Fire mitigation funding associated with Fire Management Assistance declarations | Low | 2018-2022 |
| 6 | Multi-Hazard: dam failure, lightning, hail, wind, tornado, severe winter weather, wildfire, haz mat | Goals 1-6 | Indoor/ Outdoor warning system upgrades | Upgrades to existing systems so there isn't any relying on people to manually setting the system. Add additional towers within the county in rural areas. | Pine Haven | CCEM, Pine Haven - 1 | $150k | High | Pine Haven needs EAS upgrade. |

## Table 8-3 Completed Mitigation Actions

| Project Description | Priority | Project Cost | Lead | Comments |
|---|---|---|---|---|
| Add siren coverage to include Texas Trails area of town | High | Low | Moorcroft, CCEM | A new siren has been installed – Confirmation pending when wired |
| Establish an emergency shelter | Medium | Medium | CCEM, Red Cross | Vineyard Church in Pine Haven; completed in December of 2017 |
| Develop notification system for rural areas. | High | High | CCEM | Completed – Code Red and IPAWS; Amish Community have 3 phones |
| Identify and prepare one or more facilities to shelter pets. | Medium | Medium | CCEM, LEPC | Completed fairgrounds; Sheridan has mobile corral that can be obtained if needed |
| Construct fire station at Oshoto | Medium | High | CC Fire | Fire station completed |

## Table 8-4 Deleted Mitigation Actions

| Project Description | Priority | Project Cost | Lead | Comments |
|---|---|---|---|---|
| Install a stream flow gauge on the Belle Fouche River above Hulett | Medium | Low | CCEM, NRCS | Deleted due to cost and not enough awareness – one on bridge installed at Devils Tower |
| Educate first responders about air quality hazards from mine activities. | Low | Low | LEPC, Mines | Deleted – Not applicable. Road and Bridge gets dust training |
| Continue cooperation with WYDF and FS to treat mountain pine beetle stands | High | Medium | | Deleted – logging going on and wood being sold. Pine Haven got a grant to clean up debris and baseball field. |

# 9 Implementation

Moving forward, the Crook County HMPC and LEPC will use the mitigation action tables in the previous section to track progress on implementation of each project. Implementation of the plan overall is discussed in more detail under Chapter 6 of the Regional (Base) Plan.

## 9.1 Incorporation into Existing Planning Mechanisms

To determine if this plan is consistent with goals identified in other community plans, the members of the Crook County Emergency Management Agency, along with the Hazard Mitigation Planning Team and LEPC, will meet with other agencies who have plans that address such issues as economic development, subdivision resolutions/ordinances, capital improvement, building permits, growth management, sustainability, environmental preservation, historic preservation, redevelopment, health and/or safety, recreation, or transportation. The process will provide an opportunity to integrate and/or correlate plans for the purpose of:

- Determining if the mitigation plan is compatible with goals stated in other plans.
- Identifying mitigation initiatives or proposed projects which serve multiple objectives for the communities and could be included in multiple plans.
- Identifying needs for revision or updating to the mitigation plan, or other plans, to provide a more comprehensive approach to hazard mitigation (including addition of new mitigation measures).

During the 2018 planning process, the HMPC discussed the importance of coordinating the mitigation plan with other planning processes, and vice versa. To date the plan has not been integrated with other planning efforts. The group discussed opportunities to cross reference the hazard mitigation plan in other upcoming planning efforts. As described in the capability assessment, the County and municipalities already implement policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. Where applicable, these existing mechanisms could include:

- County or community comprehensive or land use plans
- County or community development codes
- County or community Emergency Operations Plans
- Threat and Hazard Identification and Risk Assessments (THIRA)
- Community Wildfire Protection Plan (CWPP)
- Capital improvement plans and budgets including County Road/Bridge projects
- Recovery planning efforts
- Watershed planning efforts

- Wildfire planning efforts on adjacent public lands
- Firewise planning
- Master planning efforts
- WYDOT rockfall and landslide mitigation efforts
- Other plans, regulations, and practices with a mitigation aspect

## 9.2 Funding Sources

Funding for mitigation projects may come from a variety of sources. Below is a partial list of possible sources of funding that could help fund the actions identified in Section 8.

Local Government

- General revenues in the form of matches.
- One Percent Sales Tax
- County and Municipal Utility Authorities

State of Wyoming

- Community Development Block Grant Program
- Federal Mineral Royalty Capital Construction Account
- Wyoming Water Development Program
- State and Community Highway Safety, Department of Transportation
- State Lands and Investments Board (SLIB) Grants and Loans
- Transportation Enhancement Activities Local (TEAL)
- Wildfire Mitigation Grant (State Forestry Division)

Federal Government Programs

- Federal Emergency Management Agency Hazard Mitigation Assistance Grants including:
  - Pre-Disaster Mitigation (PDM)
  - Flood Mitigation Assistance Program (FMA)
  - Hazard Mitigation Grant Program (HMGP)
  - Notice of funding availability typically released in June with applications due in October/November of each year.
  - HMPG is dependent on federally declared disasters within the state and funding amount is based on a percentage of disaster relief costs.
  - FEMA Fire Management Assistance Grants - As of June 8, 2018 FEMA is making HMPG funds available for states, territories, and federally-recognized tribes that have a Fire Management Assistance Grant (FMAG) declaration between October 1, 2016 and September 30, 2018. The HMGP post-fire amount available for eligible applicants with standard state or tribal hazard mitigation plans is $425,008 per declaration
- USDA Environmental Quality Incentive Program

- USDA Conservation Reserve and Conservation Reserve Enhancement Program
- USDA Small Watersheds (NRCS)

There are many more potential funding opportunities available to the municipalities and county. Table 96 of the 2016 Wyoming State Mitigation Plan lists several other sources of federal funding.

Funding research will be done during the scoping process for each project to determine what funding mechanisms are available and appropriate for that project. Funding cycles will be monitored to ensure there is adequate time to prepare grant applications.

## 9.3 Monitoring, Evaluating and Updating the Plan

Crook County will follow the procedures to review and update this plan in accordance with Region 1 as outlined in Chapter 6 of the Base Plan. Crook County realizes it is important to review and update this plan regularly. This is especially important as the County receives additional information, which might change the risk analysis and resulting mitigation projects list.