

#### 4.5.14 Wildfire

##### 4.5.14.1 Description

A wildfire is an uncontrolled fire in a vegetated area. Wildfires are a natural part of the ecosystem. They have a purpose in nature and following years of fire suppression, many areas have built up fuels that can lead to larger, more intense fires. In Treasure County, timber, shrubs, grasses, and rangeland make up the primary fuel sources. These fuels burn rapidly and readily when cured. These types of fires have the potential to destroy structures and natural resources while producing heavy amounts of smoke, particularly when spread by strong winds.

Any flame source can trigger a wildfire, but they are most often triggered by lightning. Once ignited, ambient conditions dictate whether the fire will spread or not. Moist, cool, and calm conditions or a lack of fuels will suppress the fire, whereas, dry, warm, and windy conditions and dry fuels will contribute to fire spread. The terrain, accessibility, and capabilities of the fire agencies are also factors in the fire's growth potential. Problems with wildfire occur when combined with the human environment. People and structures near wildfires can be threatened unless adequately protected through evacuation, mitigation, or suppression.

Wildfire occurrence is weather dependent and highly variable from year to year. Fire season generally runs from March through November but wildfires can occur at any time of year. The light, flashy fuels and timber present in the region are capable of sustaining large, fast moving wildfires. The annual fire season determined by the US Bureau of Land Management is April 15 to October 15. (US Bureau of Land Management, 2004)

##### 4.5.14.1.1 *Vegetative Fuels and Landscape*

Fire is a normal part of the ecosystem. Prior to suppression activities, wildfires would burn through vegetation, reducing the fuels available and returning nutrients to the soil. Dead trees, seedlings, and diseased trees would all typically burn, cleaning up the understory, giving larger trees room to grow, and reducing the spread of disease and insects. These periodic wildfires would reduce the build-up of hazardous fuels.

Since fire suppression activities became common practice about 100 years ago, the natural cycle of frequent, low-intensity, surface fires was disrupted, and fuels, particularly in forested areas, have built up to hazardous levels. Those same habitats that would experience low-intensity fires now experience stand-replacing, high intensity fires.

Other changes may also occur with the change in fire frequency. Different plant species may begin to change the make-up of the landscape without a regular fire

regime. For example, ponderosa pine trees may encroach on grasslands without regular fires. Some species even rely on fire for seed dispersion. Fire suppression has created a more hazardous environment where fuels build up, leading to more intense and larger fires.

Treasure County has a variety of fuel types and topography. Generally, the area north of the Yellowstone River consists of rolling prairie grazing land



**Figure 4.5.14.1.1A** A mix of fuels and terrain in Treasure County.

with pine tree topped ridges. The most common fuels are native grasses, sagebrush, juniper, and yucca with ponderosa pines along the ridges. Along the Yellowstone River is irrigated farmland with hay, corn, sugar beets, and grain crops and hardwood trees stands along the river bottoms. The area south of the Yellowstone River has rough topography with sharp ridges and deep coulees. The area is fairly continuous ponderosa pine forest intermingled with meadows and cropland benches. (Treasure County, 2005)

The native tree and shrub species in Treasure County include American elm, green ash, box elder, alder, cottonwood, willow, buffaloberry, chokecherry, wild plum, ponderosa pine, limber pine, and juniper. Willow and cottonwood species are also native to the riparian areas. Treasure County has the only two known occurrences of birchleaf mountain-mahogany (*Cercocarpus montanus* var. *glaber*) in the state. (Treasure County, 2003)

Map 4.5.14.5C shows the potential natural vegetation groups in Treasure County. Potential natural vegetation is the "climax" vegetation that will occupy a site without disturbance or climate change and is an expression of environmental factors such as topography, soils, and climate across an area. (Rocky Mountain Research Station, 1999) Of course, human activities, such as fire suppression, timber harvesting, livestock grazing, and the introduction of exotic plant, insect, and disease species, have altered the natural environment. Map 4.5.14.5D shows the existing land cover from 2000 in Treasure County.

Different habitats have different natural frequencies and intensities of fire. Table 4.5.14.1.1B shows the various categories for fire regimes. Fire frequency is the average number of years between fires. Severity is the effect of fire on the dominant overstory vegetation. (US Forest Service, 2002)

**Table 4.5.14.1.1B Historical Natural Fire Regimes**

Code	Description
I	0-35 year frequency, low severity (most commonly associated with surface fires) to mixed severity (in which less than 75% of the dominant overstory vegetation is replaced)
II	0-35 year frequency, stand-replacement severity (greater than 75% of the dominant overstory vegetation is replaced)
III	35-200+ year frequency, mixed severity
IV	35-200+ year frequency, stand-replacement severity
V	200+ year frequency, stand-replacement severity

Source: Interagency Fuels Committee, 2005.

Map 4.5.14.5E shows the historical natural fire regimes (reference fire regimes) for Treasure County. When compared with the Potential Natural Vegetation Groups, the ponderosa pine habitats naturally experience fires of low to mixed severity every 0-35 years, the shrub habitats should experience stand replacement fires every 35-200 years, the grasslands usually have a stand replacement fire every 0-35 years, and the areas along the Yellowstone River now devoted to agriculture would experience low to mixed severity fires every 35-200 years. With fire suppression and land cover modifications, the fire regime has changed throughout the region.

Changes to the ecosystem can have profound effects on the intensity and severity of wildland fires. To qualify the changes, fire ecologists use the term, fire regime condition class. Fire regime condition classes measure the degree of departure from "natural" conditions. Table 4.5.14.1.1C shows the classes and definitions accepted by many agencies.



**Table 4.5.14.1.1C Fire Regime Condition Class**

Condition Class	Description
I	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.
II	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.
III	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

Source: US Forest Service, 2002.

Map 4.5.14.5F shows the percent departure from the normal fire regime and Map 4.5.14.5G shows the fire regime condition classes for Treasure County in 2006. The areas with the greatest departures are the areas converted to agriculture along the Yellowstone River, much of northern Treasure County, parts of southern Treasure County along Sarpy Creek, and a wide area surrounding Tullock Creek and the Bighorn River. Surprisingly, much of the timber area in southern Treasure County shows very little departure from normal, however, regular fires in this habitat are expected.

#### 4.5.14.1.2 Land Management Practices

Treasure County covers approximately 628,427 acres with most of the land privately-owned and used for agricultural. Several very large ranches make up much of the county, particularly in northern Treasure County. In 2002, the county had 115 farms covering approximately 606,846 acres. (US Department of Agriculture, 2002) Much of that acreage, about 574,000 acres, is devoted to cattle grazing. About 33,000 acres are used for crop production, primarily in the irrigated areas near the Yellowstone River. (US Department of Agriculture, 2006a)

Cattle grazing and crop production generally reduce the wildfire hazard. Tillage on the crop lands and grazing in the pastures typically reduces the fuels available for



wildfires. Some of the larger ranches, however, can have significant access problems if a fire ignites in a remote area, particularly during strong wind events. In the interface between tree covered areas and the grasslands, grazing can limit the fire regime by reducing the number of young trees that survive and begin to encroach on the grassland areas.

Some of the privately-owned, undeveloped lands within Treasure County are part of the Conservation Reserve Program (CRP). The US Department of Agriculture (USDA) Farm Service Agency's Conservation Reserve Program (CRP) is a voluntary program available to agricultural producers to safeguard environmentally sensitive lands. Producers enrolled in CRP establish long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, the Farm Service Agency provides participants with rental payments and cost-share assistance. (Farm Service Agency, 2004) Although the CRP benefits the environment in many respects, CRP lands may increase the fuels available and therefore the wildfire risk in those areas. As of October 31, 2006, Treasure County had 2,345 acres participating in the CRP. (Farm Service Agency, 2006)

The remaining 22,000 acres in Treasure County not devoted to farming or ranching have residential land use, are water bodies, or are managed by government entities. Treasure County has relatively few government owned lands. Most of the larger tracts scattered throughout the county are owned by the State of Montana and managed by the Department of Natural Resources and Conservation. Many scattered parcels, primarily in the forested areas south of the Yellowstone River, are also owned by the Crow Nation. The Bureau of Land Management manages Howrey Island. The Isaac Homestead Wildlife Management Area is managed by Montana Fish, Wildlife & Parks. This scattering of government and private ownership can present unique firefighting challenges and opportunities.

#### 4.5.14.1.3 *Wildland Urban Interface*

Wildfires become problematic when combined with the human environment. Fire can threaten lives, structures, livestock, equipment, fences, feed supplies, and other resources. Essentially, all areas of Treasure County are at some risk for wildfire. Those areas with high fuel loads, rough terrain, or limited access are at an elevated risk. The wildland urban interface for Treasure County can be defined as the areas where structures or other human development lie within close proximity



**Figure 4.5.14.1.3A** Fuels and terrain along Interstate 94.



to hazardous vegetative fuels. Since native grasses and non-irrigated croplands can be considered hazardous vegetative fuels, the entire county is within the wildland urban interface by this definition.

Generally, the hazard areas in Treasure County are prioritized as follows:

High Hazard Areas: *Southern Treasure County, including Sarpy Creek and Tullock Creek.*

Southern Treasure has rugged, timber covered terrain. The land use consists primarily of large ranches. Many ranch buildings lie on or near steep terrain and flammable evergreen trees. Sarpy Creek Road is a decent, paved highway. Tullock Creek Road is minimally paved from Interstate 94 to Burnt Creek Road. Other roads in the southern part of the county are dirt and gravel. Depending on the conditions, some roads and driveways may be impassable and buffered by hazardous fuels. Slash piles also exist in some of the remote areas. A subdivision may be possible between Reservation, Bear, and Sarpy Creeks based on a forthcoming land sale. Some properties in southern Treasure County may be designated "highest hazard" based on their proximity to continuous evergreen fuels.



**Figure 4.5.14.1.3B** A typical ranch in southern Treasure County along Bear Creek Road.



**Figure 4.5.14.1.3C** Slash piles along Burnt Creek Road in southern Treasure County.



Moderate Hazard Areas:  
*Along the Yellowstone River  
in the river bottoms  
including Howrey Island,  
Isaac Homestead, and  
Manuel Lisa Fishing Access.*

Howrey Island, managed by the US Bureau of Land Management has one access road and experiences high use. Weeds, deadfall, and cottonwoods make up the primary fuels. Isaac Homestead can be accessed off of Webb Road and contains a build-up of weeds and deadfall from the riparian cottonwood forest. Both Howrey Island and Isaac Homestead are managed with the goal, "To provide an interspersions of habitat types that enhances wildlife abundance,

particularly white-tailed deer and ring-necked pheasants, and to provide recreational opportunities." (Montana Fish, Wildlife & Parks, 2007) Manuel Lisa Fishing Access, although in Yellowstone County, has impacts in Treasure County through its high use and launching point for people fishing and rafting. Those entering the river at Manual Lisa then drift into Treasure County. Homes and ranches near these areas and along the river are at enhanced risk from the riparian cottonwood fuels and recreational uses.



**Figure 4.5.14.1.3D** Riparian fuels on Howrey Island.



**Figure 4.5.14.1.3E** Riparian fuels in Isaac Homestead.



Low Hazard Areas: Northern  
Treasure County.

Northern Treasure County is very sparsely populated and generally consists of smoother terrain. A few pockets of steep terrain and timber fuels exist in northern Treasure County and are a higher hazard than the general area may indicate. Although northern Treasure County is considered a low wildfire hazard area, this part of the county can present significant firefighting challenges due to its remoteness and lack of access roads. Roads, where they do exist, are dirt or gravel and can become impassible during wet weather.



**Figure 4.5.14.1.3F** Cabin in northern Treasure County off of Sumatra Road on Cat Coulee Lane.

*4.5.14.1.4 Fire Protection Organizations and Capabilities*

Fire protection and associated activities in Treasure County are provided by a number of agencies. Treasure County is responsible for fighting wildland fires on state and private lands. The US Bureau of Land Management (BLM) is responsible for wildfires on BLM lands and will assist, if requested, on other non-BLM fires. Montana Department of Natural Resources and Conservation (DNRC) will provide assistance when the fire is beyond the county's capability to control. (Treasure County, 2005)

Hysham Fire Department

As a rural, sparsely populated county with a small tax base, Treasure County has limited fire protection capabilities. The Town of Hysham Fire Department provides fire services to the entire county through an inter-local agreement with Treasure County. The Hysham Fire Department, also known as the Treasure County Fire Department, is composed entirely of volunteers. As of 2006, the department has about 22 rostered volunteers, however, in an actual call-up, about 2 or 3 volunteers may show



**Figure 4.5.14.1.4A** Fire Station in Hysham

up on a weekday and 5 to 6 may show up on a weekend. The volunteer firefighters get paid \$7 per wildland fire, and unfortunately, that is not enough to entice most people to leave work. The town's fire budget is about \$4,000 and the county's is about \$9,000 per year. State equipment is used when available. Fundraisers and funds generated by providing equipment to out of district fires supplement the small budget.

Training and equipment within the fire department is minimal. The department can only provide very basic structural fire protection. Refilling of water tanks is done at the fire station in Hysham. During periods of drought, a pump can be set up to take water from the Yellowstone River or portable water reservoirs that can be filled by helicopter may be deployed. The fire department also responds to automobile accidents and hazardous materials releases on Interstate 94. (Treasure County, 2003) Table 4.5.14.1.4B shows the vehicle resources of the Hysham Fire Department and Tables 4.5.14.1.4C through 4.5.14.1.4E show the inventory in fiscal year 2005.

**Table 4.5.14.1.4B Hysham Fire Department Vehicles**

Vehicle	Designation	Type
1995 L9000 Ford – White	TC-1	Tender
1975 F250 Ford – Green with equipment	TC-2	6
1999 F550 Ford – Red with equipment	TC-3	6
1952 GMC 6x6 with 700 gallon water tank – Rust	TC-12	Tender
1993 Ford – White Tanker		
1965 Ford 1 ½ Ton Water Truck		

**Table 4.5.14.1.4C Hysham Fire Department Communications Equipment – Fiscal Year 2005**

Number	Equipment	Year Purchased
8	14-channel Alphanumeric Radios	2002
2	Kenwood Portable Radios TK270G in trucks	2001
10	Chest pack with radio cases in trucks	1999
4	Portable Radios, Model 5150	1990
4	Motorola Hand Pagers/Radio, VHF two frequency	1997
2	Motorola low band radios w/antenna	1984
10	Used Syntor Radios (REX-4160 PL Proms) in trucks	
1	Motorola HT 600 Radio in trucks	

**Table 4.5.14.1.4D Hysham Fire Department Personal Protection Equipment – Fiscal Year 2005**

Number	Equipment	Year Purchased
20	Fire shelters with cases	2002
10	Wildfire Yellow Helmet Caps	2001
15	Nomex Ear, Neck, and Face Protectors	2001
15	Flame Resistant Shirts GSA Size XXL	1997
1	Air pack	1992
3	Life-Saver oxygen units (units, cylinders, elder valve with trigger, headgear)	1985
20	Striketeam XTO Goggles	

**Table 4.5.14.1.4E Hysham Fire Department Other Equipment – Fiscal Year 2005**

Number	Equipment	Year Purchased
1	Heiman 1500 Frameless Portable Tank	2001
6	McLeod Tools	2001
1	1,000 gallon galvanized low profile tank	1984
1	Smith & Wesson Light Bar & Mount	1979
1	HP pump	
1	Gorman-Rupp pump, 2" Briggs gas engine, self-priming centrifugal	
	Equipment in old 1973 Chevy ambulance	
1	Booster Hose Reel	
2	Sure-Seal Drip Torches	
3	Truck Mounting Brackets	
5	Fire Weather Instrument Kits	

#### Private Firefighting

With very large ranches covering much of the county, individual ranches may have their own firefighting equipment. For example, the PV Ranch in northern Treasure County owns four firefighting vehicles and a motor grader. The four firefighting vehicles are located, one each, at Ridge Camp, Butte Camp, Horse Camp, and at the ranch.

#### Montana Department of Natural Resources and Conservation

The state firefighting agency, Montana Department of Natural Resources and Conservation (DNRC) provides resources to communities when wildfires exceed the community's capabilities. In support of these efforts, DNRC keeps about 3-4 vehicles



within the county that the Hysham Fire Department is authorized to use. Table 4.5.14.1.4F shows the DNRC vehicle resources in Treasure County.

**Table 4.5.14.1.4F DNRC Vehicles in Treasure County**

Vehicle	Designation	Type
1976 Dodge W200 – White	TC-5/DNR1054	6
1983 F350 Ford – White	TC-6/DNR1124	6
	TC-7/DNR	
1977 Dodge W200 – White	TC-8/DNR1110	6

#### US Bureau of Land Management (BLM)

Federal agencies manage fires on federal lands. Treasure County has few federal tracts of land, however, the US Bureau of Land Management, part of the US Department of Interior, does have a few tracts, including Howrey Island. Treasure County is part of the Miles City Field Office, however, initial fire attack comes from the Billings Field Office. Under the Miles City Field Office Fire Management Plan, Treasure County is within the “Mixed-Grasses Prairie-Sagebrush” Fire Management Unit. Part of the BLM’s fire management objective for this unit is to “suppress all fires using the appropriate management response with the intent of minimizing loss of natural resources and improvements, protecting cultural and historic resources, preventing fire spread onto private property, and minimizing the suppression costs.” Howrey Island is designated an “area of critical environmental concern”, and fire management activities do not allow the use of earth moving equipment, blading of roads, increasing road areas, or unnecessary tree cutting or burning to protect wildlife, recreational, and scenic values. (US Bureau of Land Management, 2004)

#### Treasure County Sheriff’s Department

The Treasure County Sheriff’s Department has responsibility for law enforcement throughout the county, including the Town of Hysham through an inter-local agreement. When an emergency proclamation or disaster declaration establishes a mandatory evacuation, the sheriff’s department has the authority and responsibility to implement and enforce the evacuation. Otherwise, an evacuation advisory may be issued, and the sheriff’s department is responsible for notifying the public. Generally, door-to-door notifications are used, or if time is limited, mobile public address systems in the sheriff’s vehicles may be used. (Treasure County, 2005) The Sheriff’s Department has a Sheriff, an Undersheriff, and six reserve officers. Table 4.5.14.1.4G shows the Sheriff’s Department vehicles.

**Table 4.5.14.1.4G Treasure County Sheriff’s Department Vehicles**

Vehicle	Designation
1997 Ford Crown Victoria – Silver	33-1
2000 Ford Crown Victoria – White	33-2
2001 Chevy Pickup – White	33-4

#### Treasure County Disaster and Emergency Services

Emergency management within Treasure County is provided by a part-time (10 hours per week) position. Local emergency management is supported by state emergency management with a full-time district representative located in Billings.

#### Treasure County Extension Office

The County Extension Agent coordinates animal evacuations. The primary plan is for large and small animals to be evacuated to the county fairgrounds.

#### Public Works/Road Department

One Town of Hysham employee and two Treasure County employees can operate heavy equipment during a wildfire to assist with containment efforts. The county owns two road graders. Table 4.5.14.1.4H shows the Road Department vehicles in Treasure County.

**Table 4.5.14.1.4H Treasure County Road Department Vehicles**

Vehicle	Designation
1985 Chevy 3/4T Pickup	33-60
1983 International F1954 Dump Truck	33-51
1984 WEPR 16 foot Trailer	33-57
1995 Chevy Pickup 4x4	33-47
1970 Mill Trailer	33-40
10-yard Tandem with Dump Body and Hoist	

#### Mutual Aid

Mutual aid is used to call up additional resources from other jurisdictions. Montana law allows for fire departments to request mutual aid from other local departments, even if a mutual aid agreement is not in place. (MCA 10-3-209) Additionally, Treasure County has specific mutual aid agreements with Yellowstone, Big Horn, Musselshell, and Rosebud Counties, Montana DNRC, and the US Bureau of Land Management. (Treasure County, 2005) Similarly, law enforcement can request assistance from neighboring jurisdictions and Montana Highway Patrol.

#### *4.5.14.1.5 Community Preparedness*

Most people in Treasure County are good at taking care of themselves and neighbors. With wildfires throughout the region almost annually, most are aware of the potential for wildfires locally. Therefore, the wildfire awareness in the community is good. Some of the larger ranches have taken action and have their own basic firefighting equipment to protect their property. Most of the equipment and communications systems are primitive and can be unreliable. Problems do exist with getting residents to comply with fire restrictions. Enforcement and communication of restrictions can be challenging.

Treasure County does have an Emergency Operations Plan, dated 2005, that generally outlines the roles, responsibilities, and system for disaster response and specifically addresses the wildfire hazard. Public information is at the discretion of the Incident Commander and the governing bodies. The recommendation to evacuate is made by the Incident Commander and carried out by the Sheriff. Animal evacuations are coordinated with the County Extension Agent's office and the fairgrounds. Planning to the level of pre-identifying staging areas, water supplies, and evacuation routes has not been formally done.

The National Weather Service issues several products to alert for significant wildfire potential or hazards. These include:

- Fire Weather Watch: A fire weather watch is issued when Red Flag conditions (see below) are expected in the next 24 to 72 hours.
- Red Flag Warning: A red flag warning is issued when Red Flag criteria are expected within the next 12 to 24 hours. A Red Flag event is defined as weather conditions that could sustain extensive wildfire activity and meet one or more of the following criteria in conjunction with "Very High" or "Extreme" fire danger:
  - Sustained surface winds, or frequent gusts, of 25 mph or higher
  - Unusually hot, dry conditions (relative humidities less than 20%)
  - Dry thunderstorm activity forecast during an extremely dry period
  - Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger. For example, very strong winds associated with a cold front even though the fire danger is below the "Very High" threshold.
- Fire Warning: A fire warning may be issued by local officials when a spreading wildfire or structure fire threatens a populated area. Information in the warning may include a call to evacuate areas in the fire's path as recommended by officials according to state law or local ordinance.
- Dense Smoke Advisory: Dense smoke advisories are issued when the widespread visibilities are expected at a ¼ mile or less for a few hours or more due to smoke.

(National Weather Service, 2005d)

#### **4.5.14.2 History**

Treasure County has a long history of wildfires ranging from small to large. Some have caused damages and others have not. The extent of damages often depends on the fire spread rate and the effectiveness of suppression and mitigation measures. The history of wildfires can be difficult to compile because of the various firefighting entities involved and a variety of recordkeeping measures over the years. Data from Treasure County 911 Dispatch on the number of fire incidents since 1996 is shown in Table 4.5.14.2A and Figure 4.5.14.2B.

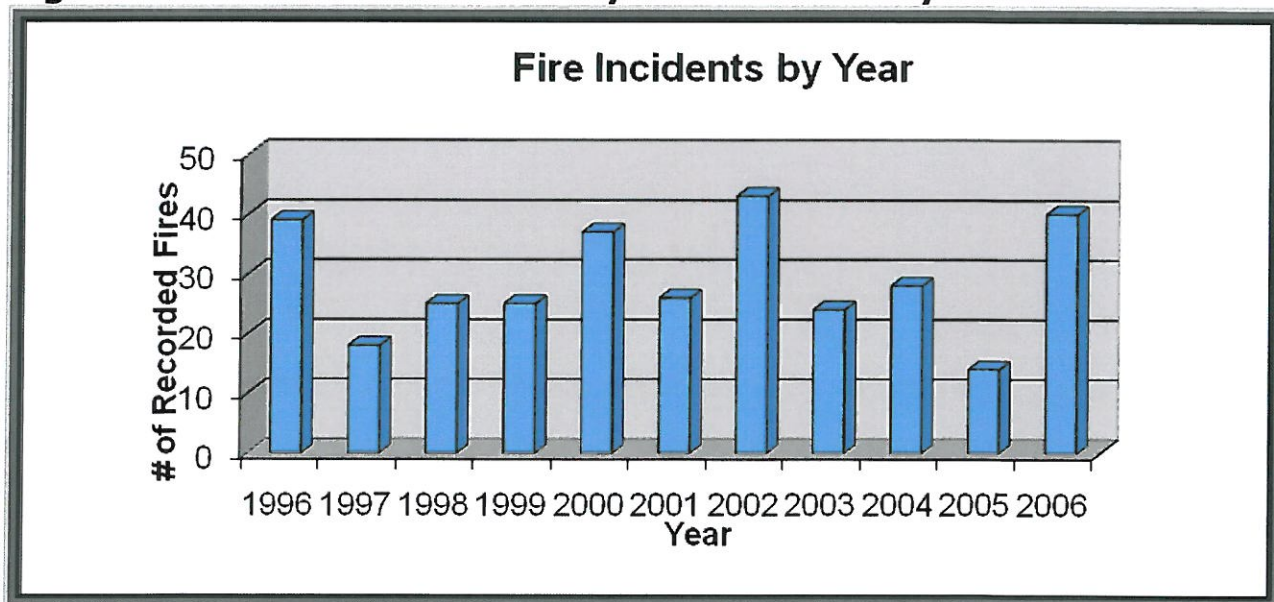


**Table 4.5.14.2A Fire Incidents in Treasure County from 1996-2006**

Year	Number of Fire Incidents
1996	39 incidents
1997	18 incidents
1998	25 incidents
1999	25 incidents
2000	37 incidents
2001	26 incidents
2002	43 incidents
2003	24 incidents
2004	28 incidents
2005	14 incidents
2006	40 incidents

Source: Treasure County, 2007.

**Figure 4.5.14.2B Treasure County Fire Incidents by Year**



Source: Treasure County, 2007.

Summaries of some of the larger wildfires in Treasure County since 2000 follow.

**2000 Wildfires** – The State of Montana suffered a severe wildfire season, and as a result, most of the state, including Treasure County, was declared a Presidential Disaster Area (#1340) for individual assistance. Treasure County did not have any families or businesses register for federal individual assistance following the 2000 wildfires. (Federal Emergency Management Agency, 2006b) A USDA declaration for agricultural production and physical losses, for wildfires from July 13, 2000 through September 25, 2000 was also issued. (US Department of Agriculture, 2005)

2003 Treasure County Complex – The Treasure County Complex was made up of the Johnny, Earl, and Stracks' fires eight miles south of Hysham. This fire burned in ponderosa pine, downed and dead fuels, sagebrush, and grass from August 2-6, 2003. Initially, structure protection was in place for 15 residences and 2 commercial properties. These fires burned approximately 9,998 acres at a cost of \$459,000.

2006 Wildfires – Treasure County signed a Cooperative Agreement for assistance on wildfires from July 1, 2006 through March 1, 2007 with the Department of Natural Resources and Conservation. A statewide emergency was declared because of wildfires by the governor on July 11, 2006 through Executive Order 34-06. Map 4.5.14.2C shows the large wildfires tracked by federal agencies in 2006.

2006 Sarpy Fire – The Sarpy Fire was managed as part of the larger Pine Ridge Complex in neighboring counties. The Sarpy Fire burned about 7,139 acres in mid July. The entire Pine Ridge complex burned over 121,000 acres and cost nearly \$2 million.

2006 Hutchinson Coulee Fire – The Hutchinson Coulee fire burned about 1,350 acres eight miles south of Hysham from July 27-29, 2006. The fire burned in ponderosa pine, aspen, and grass, threatening ranches, microwave towers, and commercial property.

2006 Mailbox Fire – The Mailbox fire burned about 2,100 acres fifteen miles north of Custer from August 10-12, 2006. The fire started on private land in grass and threatened ranch facilities, oil wells, and power lines. Four structures were lost.

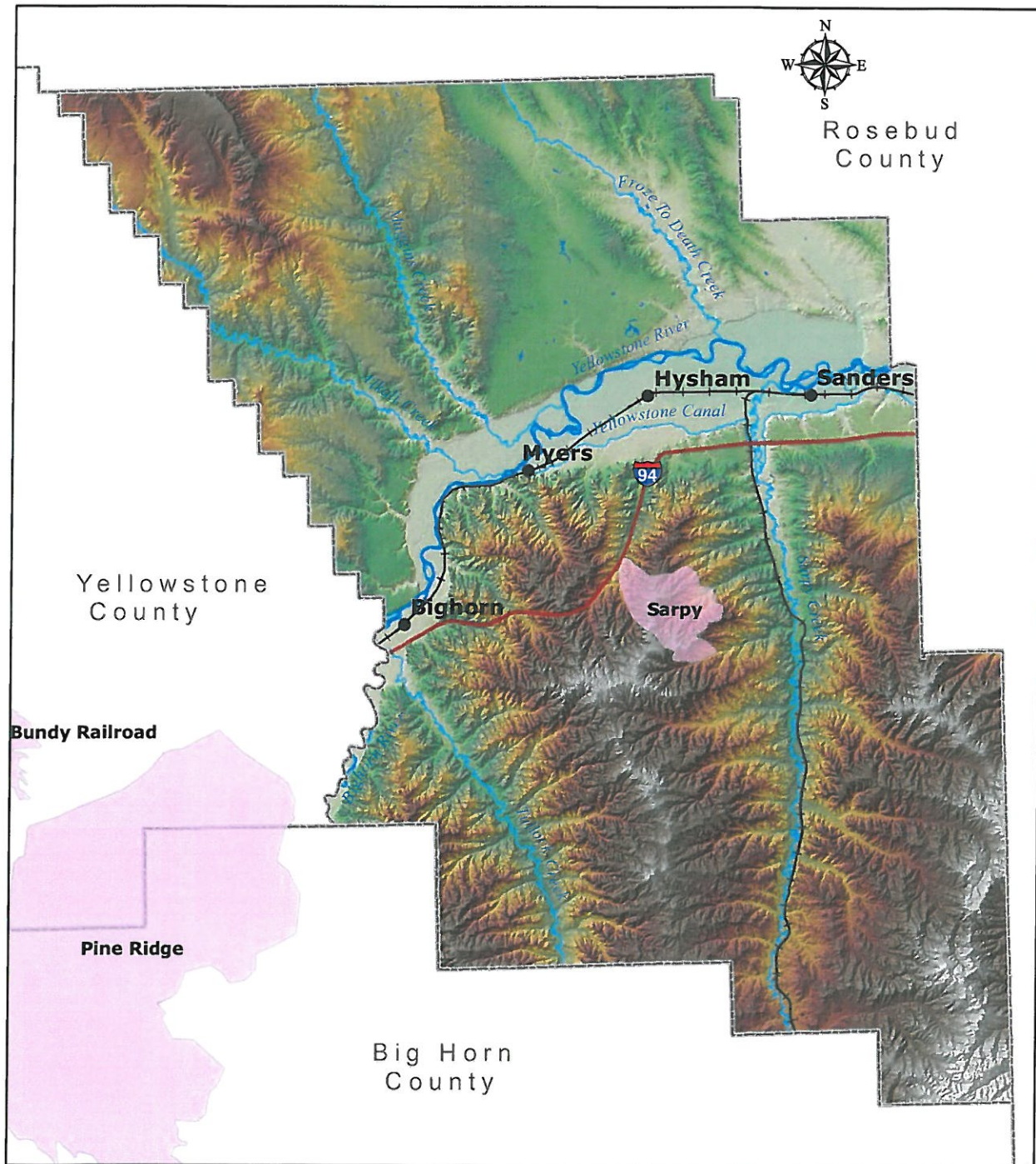
(Center for International Disaster Information, 2006)



STATE OF MONTANA DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF FIRE MANAGEMENT

Map 4.5.14.2C

## Large 2006 Wildfires Treasure County



Data Source: National Interagency Fire Center  
Data Date: 2006  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, January 2007





#### 4.5.14.3 Probability

Wildfires are an annual occurrence in Treasure County. The frequency and size of the wildfires depends on the ambient conditions and other factors. Based on local records from 1996-2006, an average of 29 fire incidents requiring local firefighting resources occur each year in Treasure County. The annual number of fire incidents has ranged from 14 to 43 since 1996. The largest wildfire in recent history was the 2003 Treasure County Complex that burned nearly 10,000 acres. Even larger wildfires are possible in Treasure County.

##### 4.5.14.3.1 Ignition Risks

One of the key factors in the probability of wildfires, besides weather and fuel conditions, is the likelihood of fire ignition. Most wildfires in Treasure County are initiated by lightning strikes. Lightning ground strikes, with or without rain, can easily produce enough heat to start a fire. Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause a separation of electrical charges. Positively charged ice particles rise to the top of the cloud and negatively charged ones fall to the middle and lower sections of the cloud. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye,



**Figure 4.5.14.3.1A** A mix of trees and grasses in Treasure County.

the negatively charged area of the cloud sends a charge called a stepped leader toward the ground.

Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder. (National Weather Service, 2006c) Positive lightning strikes originate from the top of the cloud and contain higher voltages based on the longer distance the charge must travel. Lightning strikes can occur anywhere in the county. These natural ignitions can only be observed and monitored. All areas of the county are at high risk for lightning ignitions.

Besides lightning strikes, other human-caused ignition risks exist. Common human-caused ignition risks include campfires, cigarettes, ranch equipment, controlled burns, railroads, fireworks, and arson. A burn permit system exists in Treasure County but is

often not enforced. The probability of ignitions from controlled burns anywhere in the county and along the railroad from railcars is moderate. Holidays such as the Fourth of July can increase the probability of an ignition from fireworks. Areas recognized for their potential ignition risks include recreation areas such as Amelia Island, Howrey Island, Isaac Homestead, Myers Bridge Fishing Access, and Manuel Lisa Fishing Access. These areas are at high risk of ignitions from campfires.

#### **4.5.14.4 Magnitude**

The magnitude of future wildfires depends on many factors such as climate, weather, fuel availability, and fire suppression capabilities. History has shown that fires up to and exceeding 10,000 acres are possible. Neighboring counties have also shown such magnitudes; even fires to 100,000 acres in size have occurred.

##### *4.5.14.4.1 Weather and Climate*

Weather and climate can influence the size and number of wildfires in any given season. Warm, dry conditions will increase the probability of significant wildfires whereas cool, wet conditions inhibit fire growth. The climate dictates the overall conditions leading up to a wildfire. Treasure County is generally known as having an arid climate with only about 10-15 inches of annual precipitation. The rainiest months are May and June. Snow that falls during the winter usually melts rather quickly as strong downslope winds from the west and southwest raise the temperature above freezing. Climate variability exists such that the county experiences some years with higher than normal precipitation such as 1993 when Hysham received nearly 22 inches and lower than normal precipitation such 1960 when Hysham received only 6.48 inches. Drought is common with impacts on agriculture and fuel moistures.

Seasonal changes often play a role in wildfire behavior. During the coldest months of December, January, and February, grasses are typically dead and could ignite, however, any fires during these months are generally low intensity fires due to the cold temperatures. March, April, and May are often "green-up" months where grasses regenerate and live fuel moisture increases. Prior to greening, however, low intensity fires can occur. During the transition into summer during June, temperatures rise, spring rains subside, and fuels begin to dry. The hot months of July and August typically have the most wildfires. The weather conditions during those months are often conducive to wildfire growth. The fall months of September, October, and November are generally cooler but can exhibit extreme wildfire behavior with strong wind events and dead, frost-killed light fuels.

Key to the growth of any given wildfire, regardless of season, is the weather (a shorter time scale than climate). Specifically, wind, temperature, and relative humidity are important factors in fire behavior. Treasure County often experiences strong, gusty winds. Winds greater than 15 mph can cause significant fire behavior in

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grass fires. Winds over 30 mph can result in extreme crown fires in forested areas. Generally, the wind direction will dictate the direction of fire spread, pushing the fire on to nearby fuels. Only under light wind conditions will fire be more influenced by topography and other factors. Temperatures over 80°F can also dry fuels and lead to quicker ignitions of fuels. Similarly, relative humidity, a measure of the amount of moisture in the air, can dictate the amount of fuel moisture; low relative humidities can lead to more extreme fire behavior. Generally, fire activity is greatest during the afternoon because of the high temperatures and lower relative humidities. Active fire behavior can occur at night due to strong winds, however.

Dry thunderstorms occur when dry air at the surface combined with atmospheric instability contributes to high-based clouds. The moisture associated with the cumulus clouds rarely hits the ground. This phenomenon is called virga, rain that evaporates before reaching the ground. In some of the stronger cells, gusty downdrafts can be produced and are often accompanied by dry lightning. Lightning, both in dry or wet thunderstorms, can serve as an ignition source, however, dry lightning typically has dry fuels to ignite and is not suppressed by ambient rainfall.

#### *4.5.14.4.2 Fire Behavior*

Fire behavior is primarily influenced by three factors: fuels, weather, and terrain. The interrelationships between these factors can be complex. Generally, however, drier fuels are more easily burned. Wildfires advance when heat from burning fuels is transferred to other fuels that then combust. Weather, primarily wind, temperature, and relative humidity, influences fire in the ways described in the previous subsection. Terrain can also play a role in fire behavior. The shape of landscape, exposure to sunlight, elevation, and natural or human-created barriers can all influence fire behavior. Generally, in the absence of wind, fire will burn upslope as flames ignite fuels higher up. Often, wildfires begin as ground fires that can then climb ladder fuels and become crown fires given the appropriate vegetation.

BehavePlus 3.0 is modeling software used to model fire behavior at the stand level for a single place and time. Outputs of the model include surface rate of spread, spotting distances, size of a point source fire, and probability of ignition from a firebrand. Inputs and results into the various models are shown in Tables 4.5.14.4.2A through 4.5.14.4.2D.



**Table 4.5.14.4.2A BehavePlus Run – Timber Wildfire with Winds at 15 mph**

<b>Inputs</b>	
Fuel Model	Timber with Litter and Understory
1-Hour Fuel Moisture	3%
10-Hour Fuel Moisture	5%
100-Hour Fuel Moisture	8%
Live Woody Moisture	80%
Mid-flame Wind Speed (upslope)	15 mph
Slope Steepness	5%
<b>Results</b>	
Surface Rate of Spread	51.5 ch/h (0.64 mph)
Size at 2 hours, unsuppressed	179.3 acres
Fire Length at 2 hours, unsuppressed	104.2 ch (1.3 miles)
Maximum Fire Width at 2 hours, unsuppressed	21.9 ch (1,445 feet)
Size at 4 hours, unsuppressed	717.4 acres
Fire Length at 4 hours, unsuppressed	208.3 ch (2.6 miles)
Maximum Fire Width at 4 hours, unsuppressed	43.8 ch (2,891 feet)

**Table 4.5.14.4.2B BehavePlus Run – Timber Wildfire with Winds at 30 mph**

<b>Inputs</b>	
Fuel Model	Timber with Litter and Understory
1-Hour Fuel Moisture	3%
10-Hour Fuel Moisture	5%
100-Hour Fuel Moisture	8%
Live Woody Moisture	80%
Mid-flame Wind Speed (upslope)	30 mph
Slope Steepness	5%
<b>Results</b>	
Surface Rate of Spread	137.0 ch/h (1.71 mph)
Size at 2 hours, unsuppressed	697.9 acres
Fire Length at 2 hours, unsuppressed	274.9 ch (3.4 miles)
Maximum Fire Width at 2 hours, unsuppressed	32.3 ch (2,132 feet)
Size at 4 hours, unsuppressed	2,791.8 acres
Fire Length at 4 hours, unsuppressed	549.7 ch (6.9 miles)
Maximum Fire Width at 4 hours, unsuppressed	64.7 ch (4,270 feet)



**Table 4.5.14.4.2C BehavePlus Run – Tall Grass Fire with Winds at 5 mph**

<b>Inputs</b>	
Fuel Model	Tall Grass
1-Hour Fuel Moisture	3%
Mid-flame Wind Speed (upslope)	5 mph
Slope Steepness	0%
<b>Results</b>	
Surface Rate of Spread	159.7 ch/h (2.0 mph)
Size at 2 hours, unsuppressed	3,962.6 acres
Fire Length at 2 hours, unsuppressed	336.9 ch (4.2 miles)
Maximum Fire Width at 2 hours, unsuppressed	149.7 ch (1.9 miles)
Size at 4 hours, unsuppressed	15,850.2 acres
Fire Length at 4 hours, unsuppressed	673.9 ch (8.4 miles)
Maximum Fire Width at 4 hours, unsuppressed	299.5 ch (3.7 miles)

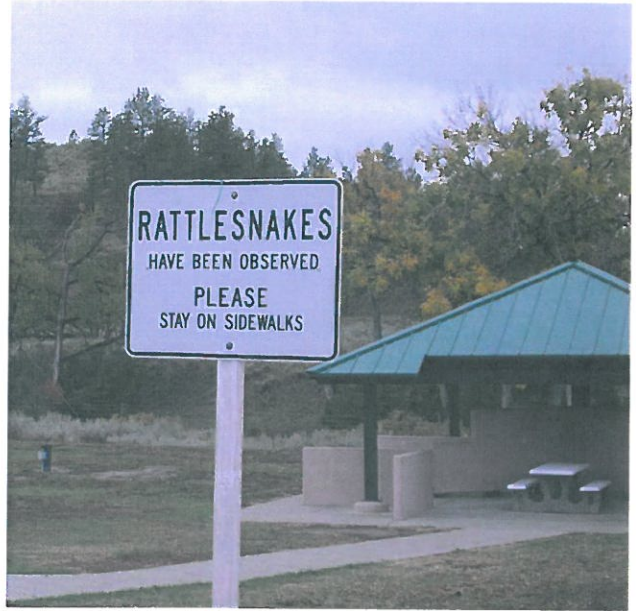
**Table 4.5.14.4.2D BehavePlus Run – Tall Grass Fire with Winds at 15 mph**

<b>Inputs</b>	
Fuel Model	Tall Grass
1-Hour Fuel Moisture	3%
Mid-flame Wind Speed (upslope)	15 mph
Slope Steepness	0%
<b>Results</b>	
Surface Rate of Spread	654.3 ch/h (8.2 mph)
Size at 2 hours, unsuppressed	28,961.7 acres
Fire Length at 2 hours, unsuppressed	1,323.5 ch (16.5 miles)
Maximum Fire Width at 2 hours, unsuppressed	278.6 ch (3.5 miles)
Size at 4 hours, unsuppressed	115,846.9 acres
Fire Length at 4 hours, unsuppressed	2,646.9 ch (33.1 miles)
Maximum Fire Width at 4 hours, unsuppressed	557.2 ch (7.0 miles)

#### 4.5.14.4.3 Severity Factors

Many factors exist that can increase the magnitude and severity of wildfires in Treasure County. Factors such as the fuel type available, accessibility, topography, water supplies, and weather conditions all become important for fire growth and suppression. These factors can make the difference between fire control and a large, raging wildfire. The most critical factors in Treasure County are the remoteness of many areas, the lack of water supplies, and a very limited number of firefighting volunteers.

The remoteness of much of Treasure County becomes an especially important factor when fighting wildfires. Northern Treasure County, in particular, has very few passable roads. This leaves many areas inaccessible or marginally accessible by fire crews. Often smoke columns can be seen, but observers, dispatchers, and firefighters cannot specifically pinpoint the fire's location. Even once located, the lack of roads can make getting to the fire difficult. The time spent locating and accessing the fire gives the fire more time to grow and become harder to manage. Adding to the difficulties of traveling on foot is the threat of rattlesnakes.



**Figure 4.5.14.4.3A** Sign at the westbound I-94 rest area.

The only designated fire suppression water supply is from the Town of Hysham's water system. Unless another readily available water supply is found, such as a ranch stock pond that the owner approves for use, water tenders and firefighting vehicles must travel back and forth to Hysham for water. For the more remote locations in the county, this can be very time and resource consuming. Often water supply is a limiting factor in wildfire suppression.

Another limiting factor is the availability of firefighters. Wildfires can take many hours or even days to contain and mop up. Most of the volunteer firefighters in the county have full-time jobs and cannot afford to miss work to fight fires. As of 2006, the department has about 22 rostered volunteers, however, in an actual call-up, about 2 or 3 volunteers may show up on a weekday and 5 to 6 may show up on a weekend. The volunteer firefighters get paid \$7 per wildland fire, and unfortunately, that is not enough to entice most people to leave work. As a result, the initial attack on wildfires must be done with minimal resources until mutual aid or state resources can supplement.

#### **4.5.14.5 Mapping**

Wildfire potential is mapped in a variety of ways. Since many factors play into wildfire risk, components are often mapped individually. Slope, aspect, fuel density, fuel type, fuel moisture, and weather are all important factors in determining how a fire will behave. Slope is a measure of the steepness of the topography. The steeper the slope, the easier it is for fire to travel because of preheated fuels uphill and the ability for the flame to ignite new fuels above it. Map 4.5.14.5A shows the slope in Treasure County. Aspect is the direction in which the slope faces. Southern exposures tend to have drier fuels and hotter temperatures than northern exposures because of the

increased sun radiation. Western exposures tend to stay hotter later into the day than eastern exposures because of the afternoon sun radiation. Map 4.5.14.5B shows the aspect in Treasure County.

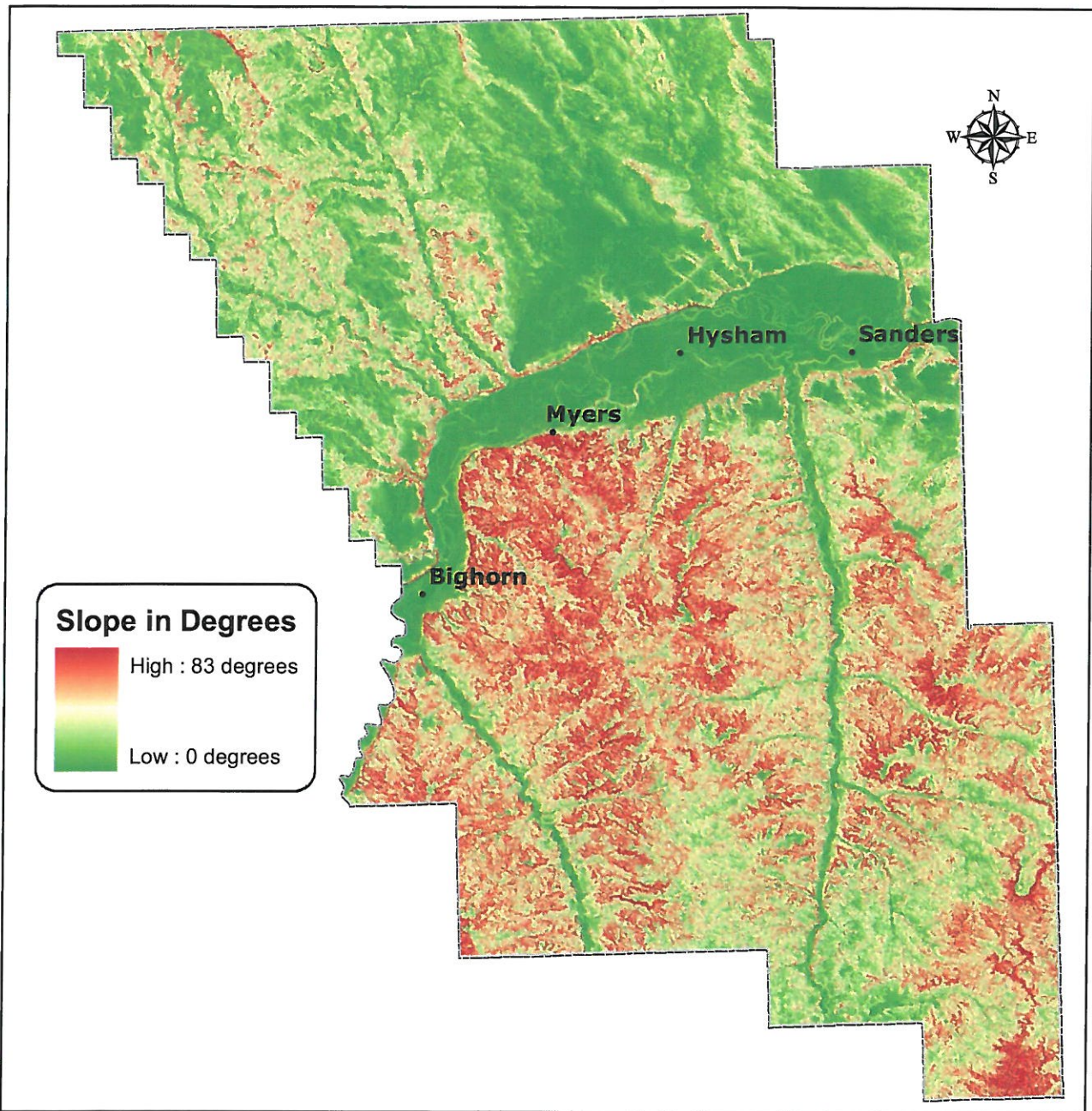
Map 4.5.14.5C shows the general land cover. Land cover demonstrates the type of fuels available for wildfires. In the case of agriculture, the flammability depends on the crop and its condition at that point in the growing season. Grasslands and shrublands are not usually managed significantly and may contain a build-up of flashy fuels year round.

Map 4.5.14.5D shows the potential natural vegetation groups. Potential natural vegetation is the "climax" vegetation that will occupy a site without disturbance or climatic change and is an expression of environmental factors such as topography, soils, and climate across an area. (Rocky Mountain Research Station, 1999) Given this, Map 4.5.14.5E shows the historical natural fire regimes (reference fire regimes) for Treasure County. This map depicts the normal natural cycles of wildfire without suppression. Under existing conditions, Map 4.5.14.5F shows the percent departure from the normal fire regime and Map 4.5.14.5G shows the fire regime condition classes for Treasure County in 2006. Fire regime condition classes measure the degree of departure from "natural" conditions. Table 4.5.14.5H shows the classes and definitions of fire regime conditions accepted by many agencies.



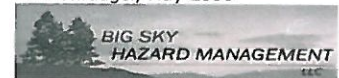
Map 4.5.14.5A

# Slope Treasure County



Data Source: Montana Natural Resource Information System  
Data Date: 2000  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, May 2006

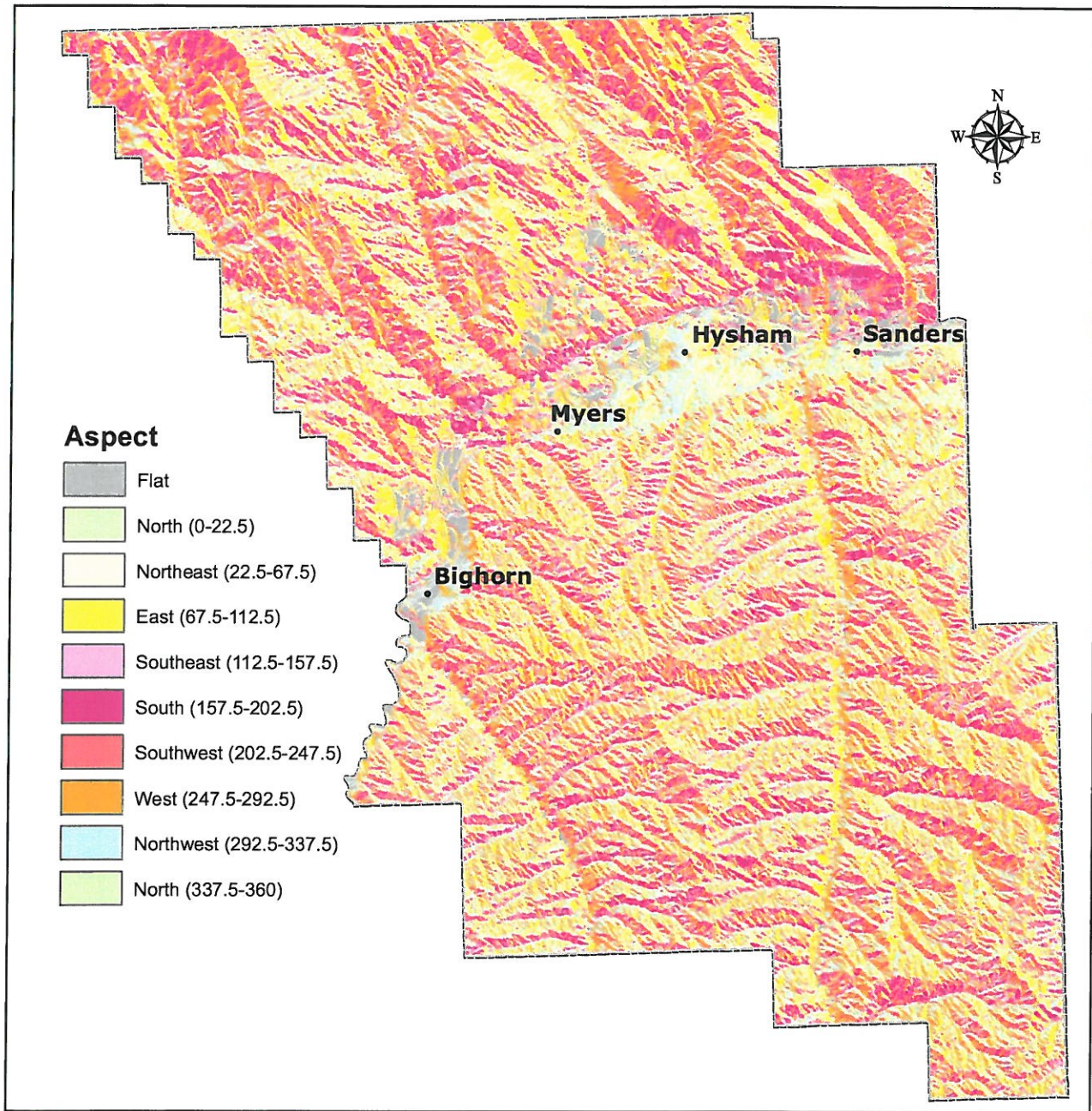




STATE AND FEDERAL AGENCY RESPONSIBILITIES FOR PREPAREDNESS AND RESPONSE TO DISASTERS

Map 4.5.14.5B

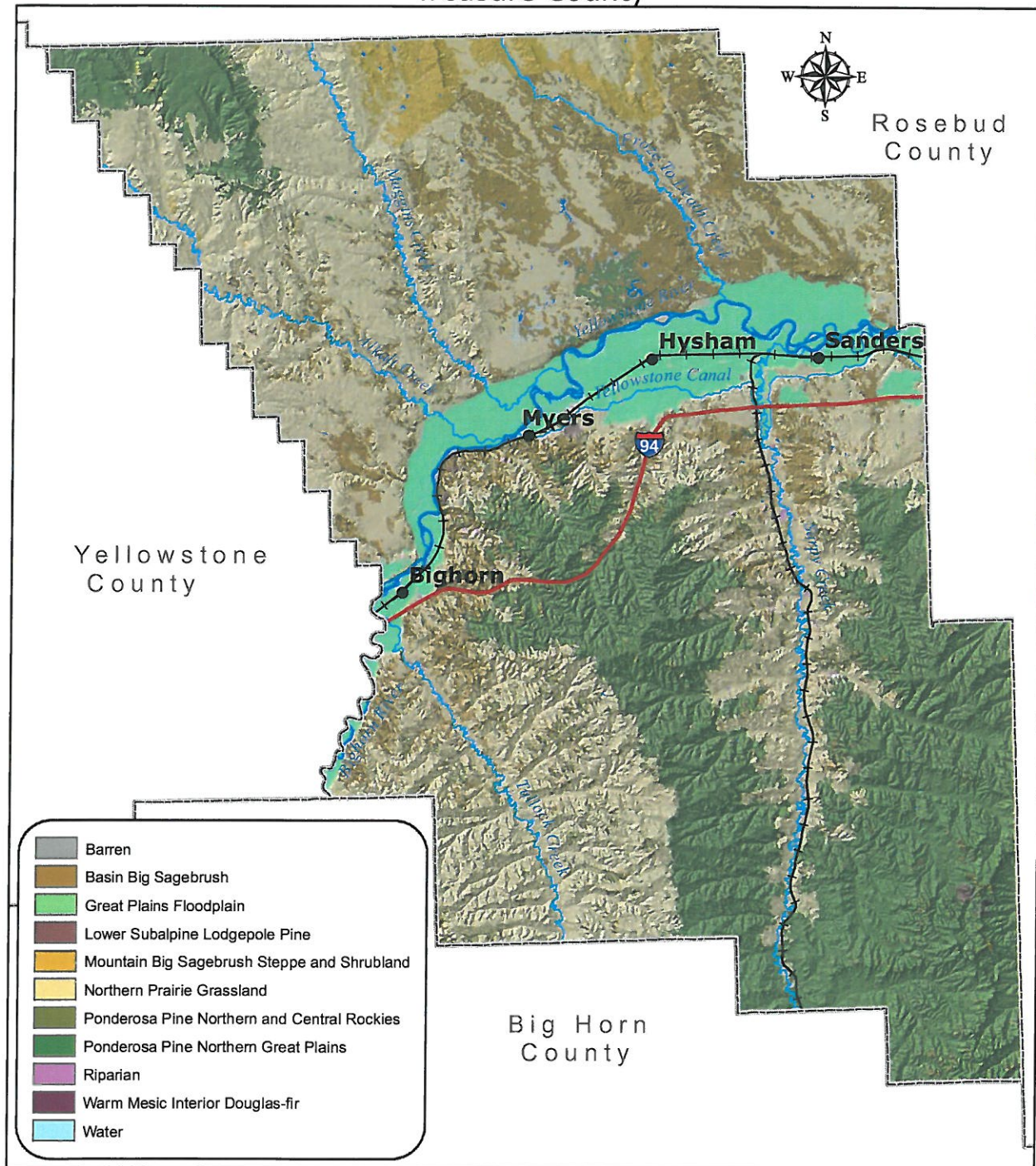
## Aspect Treasure County



Data Source: US Geological Survey  
Data Date: February 1999  
Map Coordinates: NAD 1983, State Plane Montana



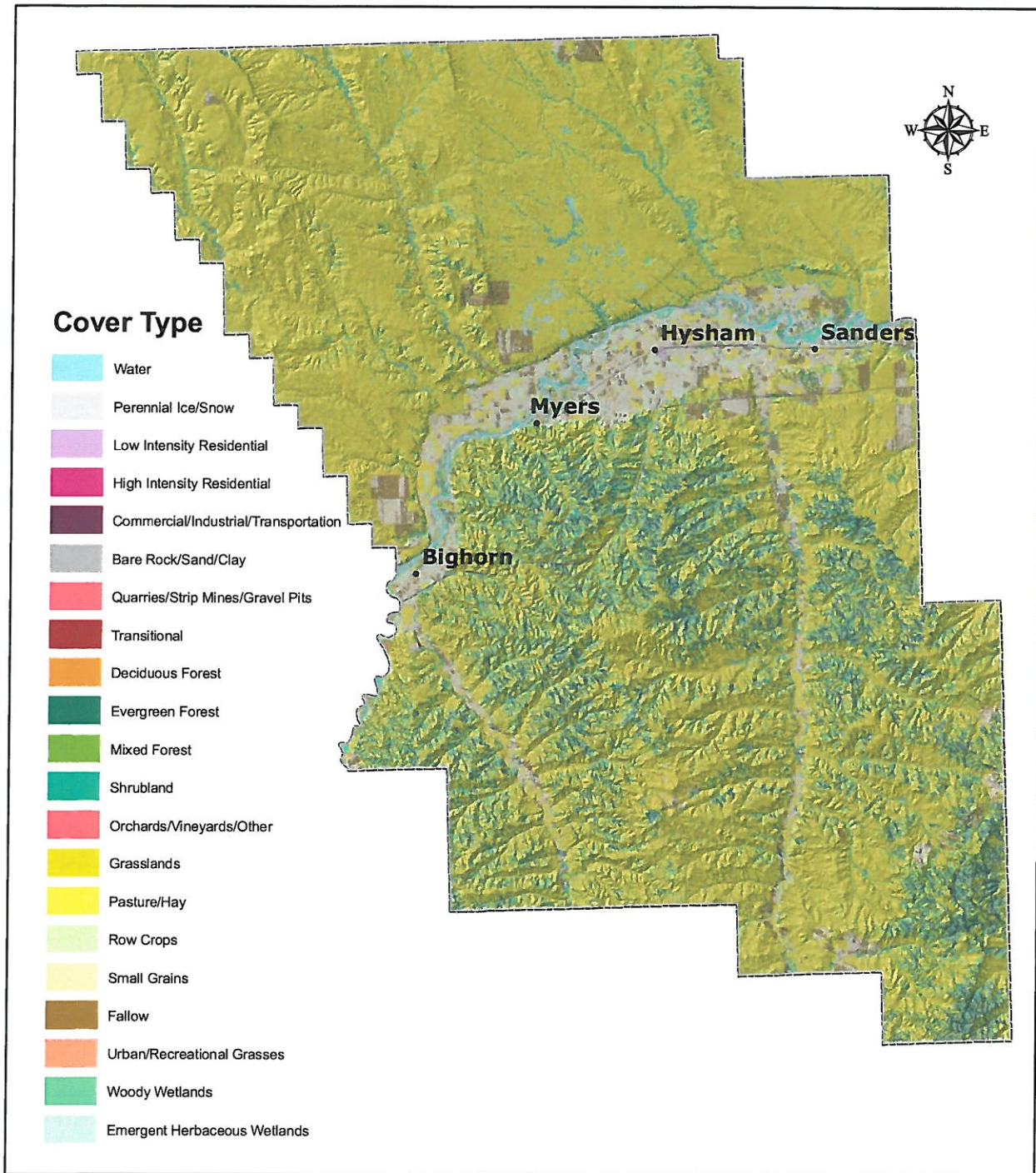
**Map 4.5.14.5C Potential Natural Vegetation Groups**  
Treasure County





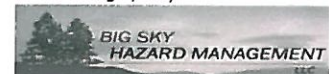
Map 4.5.14.5D

# Land Cover Treasure County



Data Source: Montana Natural Resource Information System  
Data Date: 2000  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, May 2006

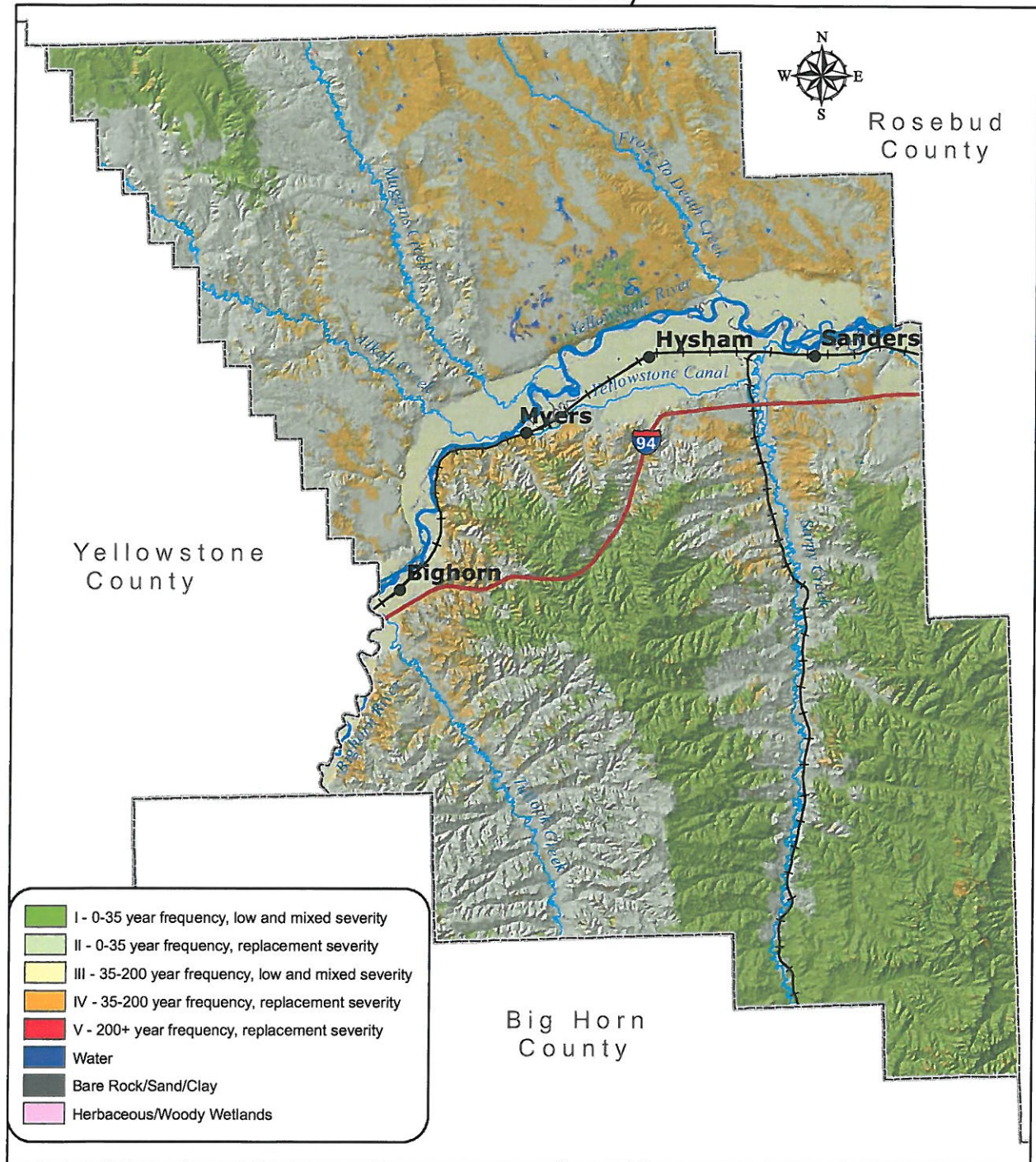




STATE OF MONTANA DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF FIRE MANAGEMENT

Map 4.5.14.5E

# Reference Fire Regime Treasure County



0 2.5 5 10 15 20 Miles

Data Source: Wildland Fire Leadership Council, LANDFIRE Project  
Data Date: 2006  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, December 2006

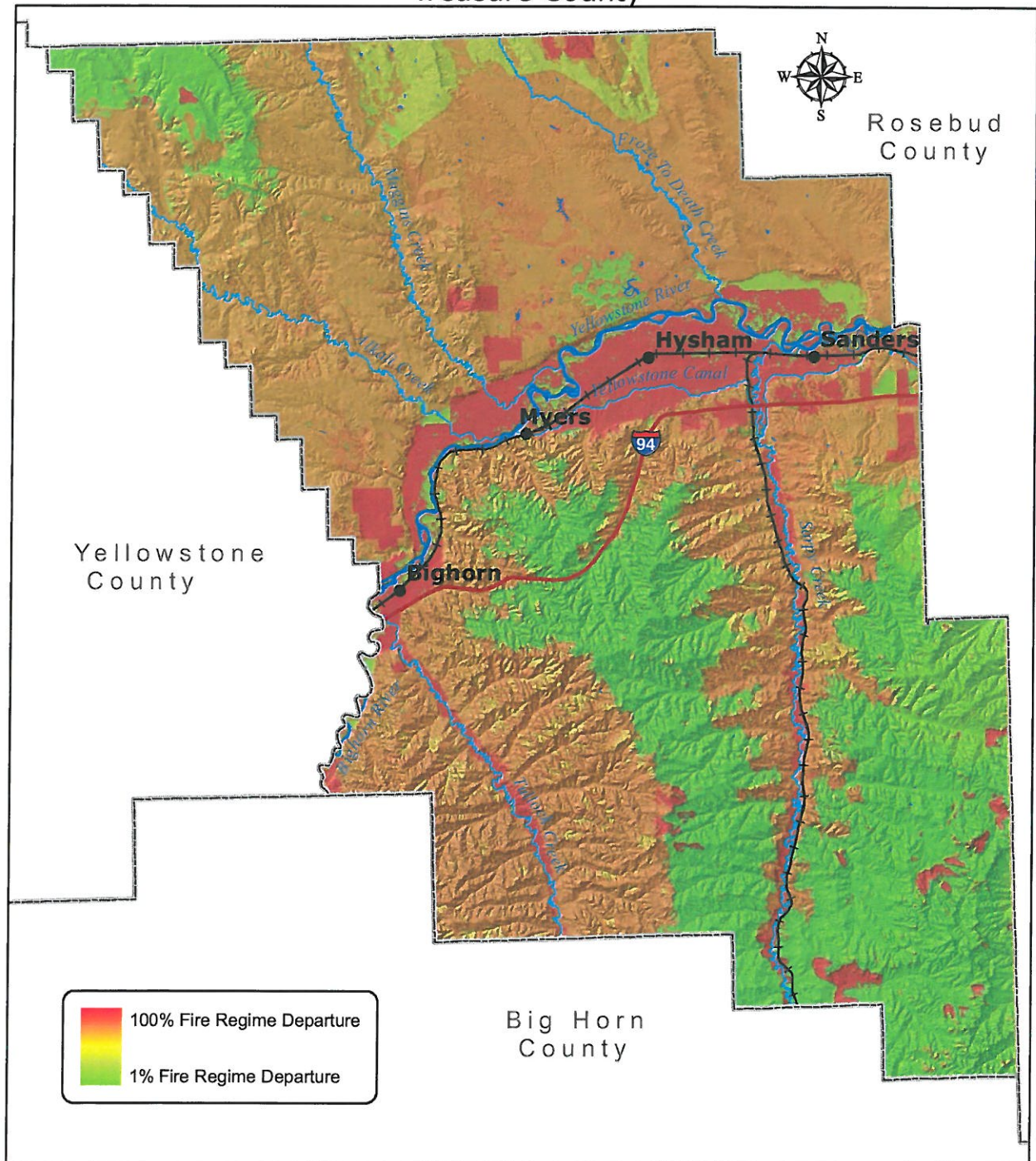




STATE OF MONTANA DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF FIRE MANAGEMENT

Map 4.5.14.5F

# Fire Regime Departure Treasure County



0 2.5 5 10 15 20 Miles  
Data Source: Wildland Fire Leadership Council, LANDFIRE Project  
Data Date: 2006  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, December 2006

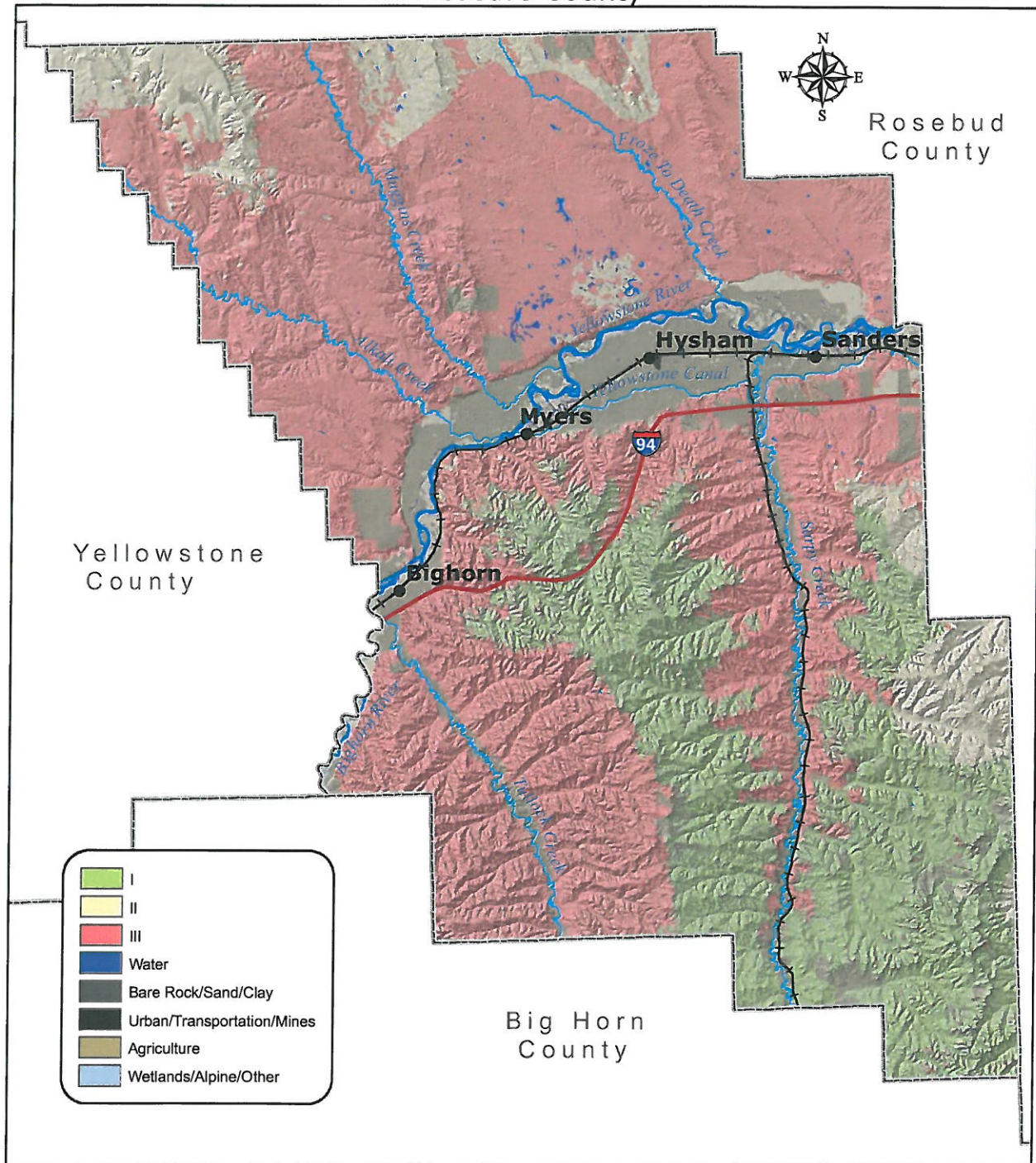




Map 4.5.14.5G

# Fire Regime Condition Class

Treasure County



Data Source: Wildland Fire Leadership Council, LANDFIRE Project  
Data Date: 2006  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, December 2006





**Table 4.5.14.5H Fire Regime Condition Class**

Condition Class	Description
I	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.
II	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.
III	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

Source: US Forest Service, 2002.

As described in the Wildland Urban Interface description, Section 4.5.14.1.3, generally, the hazard areas in Treasure County are as follows:

High Hazard Areas: Southern Treasure County, including Sarpy Creek and Tullock Creek

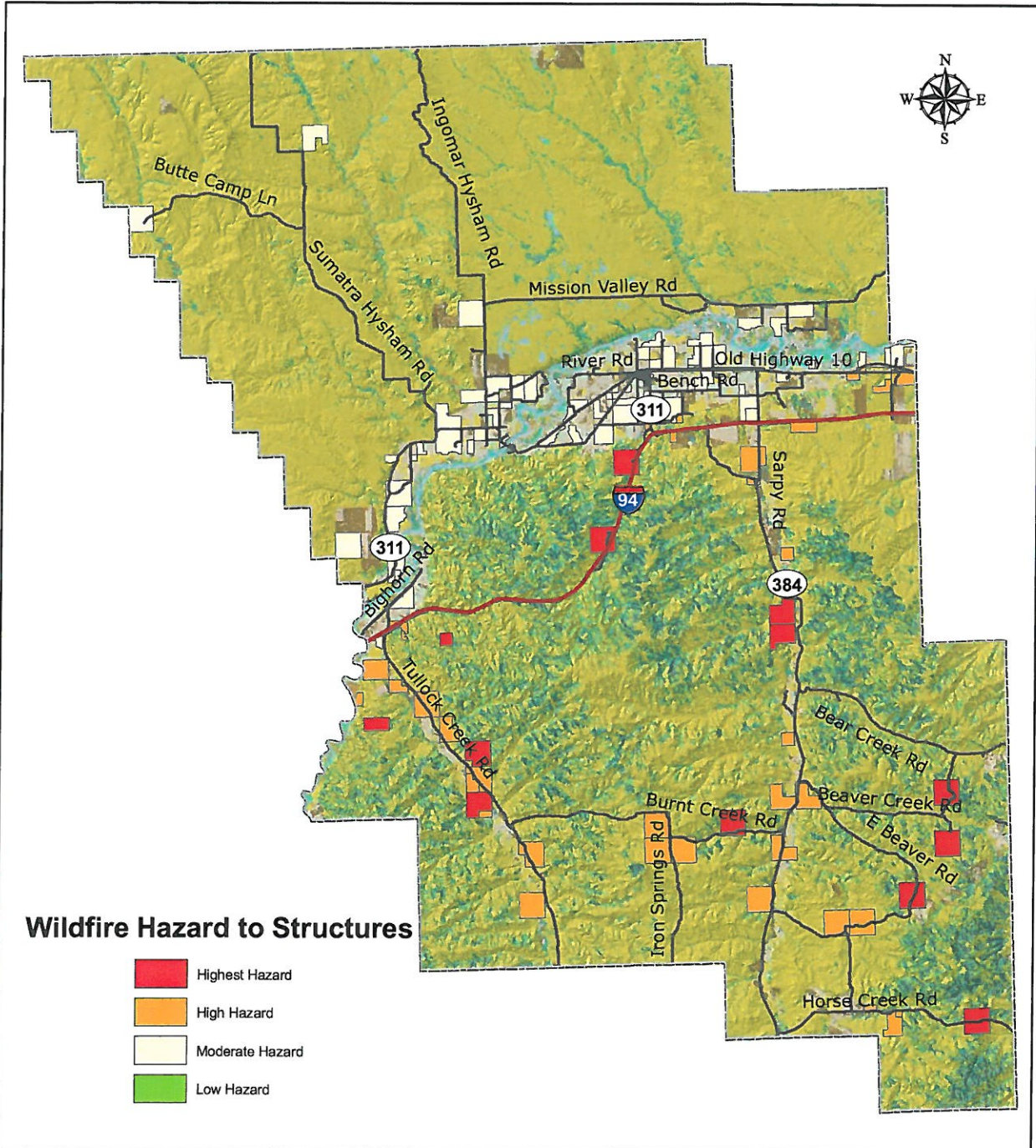
Moderate Hazard Areas: Along the Yellowstone River in the river bottoms including Howrey Island, Isaac Homestead, and Manuel Lisa Fishing Access

Low Hazard Areas: Northern Treasure County

Using the state CAMA database that identifies the land parcels with structures on them, a more detailed assessment of the wildland urban interface can be made. Comparing the developed parcels to the land cover and topography data, each parcel can be ranked based on their general wildfire hazard. Note this assessment does not replace an on-site field assessment of individual properties. This assessment should only be used for planning purposes. Those with highest, high, and moderate rankings are particularly encouraged to get an individual risk assessment for their properties. Map 4.5.14.5I shows the hazard designations. Those within close proximity to timber and steep topography were given a "highest" ranking. The remainder in the more rugged, southern part of the county were given a "high" ranking. Those in the Yellowstone River bottoms and in the isolated parts of northern Treasure County were given a "moderate" ranking, and those in the Town of Hysham were given a "low" ranking because of the more urbanized setting and nearby firefighting resources.

Map 4.5.14.5I

# Land Cover Comparison to Parcels with Structures Treasure County



0 2.5 5 10 15 20 Miles

Data Source: Montana Natural Resource Information System  
Data Date: 2000; April 2006  
Map Coordinates: NAD 1983, State Plane Montana

Map Created By:  
Pam Shrauger, February 2007





#### 4.5.14.6 Associated Hazards and Other Factors

As if a raging wildfire isn't bad enough, the charred ground and thick smoke plumes it produces can create other hazards. The heavy smoke may lead to unhealthy air conditions affecting those with respiratory problems and otherwise healthy people. The air conditions are often monitored and alerts may be issued. Smoky conditions can also lead to poor visibility and an increased probability of transportation accidents. Air quality advisories and forecasts are issued daily during the wildfire season by the Montana Department of Environmental Quality. Table 4.5.14.6A lists the categories used when rating air quality.

**Table 4.5.14.6A Air Quality Index for Particulate Matter**

Category	Visibility	Health Effects
Good	10 miles or greater	None
Moderate	6-9 miles	Possibility of aggravation of heart or lung disease among persons with cardiopulmonary disease and the elderly.
Unhealthy for Sensitive Groups	3-5 miles	Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.
Unhealthy	1½-2½ miles	Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in the general population.
Very Unhealthy	1-1¼ miles	Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant risk of respiratory effects in the general population.
Hazardous	¾ mile or less	Serious aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; serious risk of respiratory effects in the general population.

Source: Montana Department of Environmental Quality, 2007.

With vegetation removed and the ground seared from a wildfire, the area also becomes more prone to flash floods and landslides because of the ground's reduced ability to hold water. Following high-intensity wildfires or wildfires that result in water-repellent soils, the loss of protective soil cover, or excessive sediments, special



actions may be taken to mitigate the flood potential. The National Weather Service may also lower precipitation thresholds for issuing flash flood watches and warnings in the burnt area.

#### 4.5.14.7 Vulnerabilities

##### 4.5.14.7.1 Critical and Special Needs Facilities

Wildfires have the greatest potential to threaten structures lacking defensible space. Defensible space is a buffer zone between a structure and flammable fuels. Irrigation, mowed areas, tree thinning, roads, and waterways can serve as buffers to wildfires in some cases. The threat to a structure can truly only be assessed on a case-by-case basis. With respect to the hazards in Treasure County, the more rugged southern part of the county has the greatest wildfire risk. The Town of Hysham is probably the least threatened by wildfires due to the buffers provided by irrigated lands and development. Using the wildland urban interface parameters discussed in Section 4.5.14.5, the critical and special needs facilities in Treasure County can be grouped as shown in Table 4.5.14.7.1A based on their general wildfire hazard.

**Table 4.5.14.7.1A Critical and Special Needs Facilities in Highest, High, and Moderate Wildfire Hazard Areas**

Facility	Wildfire Hazard Area
Sarpy Site Repeater	Highest Hazard
Grierson Site Repeater	Highest Hazard
Hysham Water Plant	Moderate Hazard
Hysham Sewer Lagoons	Moderate Hazard
Bighorn Post Office	Moderate Hazard
Simplot (HazMat)	Moderate Hazard
Farmer's Union Bulk Fuel Tanks (HazMat)	Moderate Hazard

##### 4.5.14.7.2 Structures

Residences, ranches, and businesses are threatened by wildfires just as critical and special needs facilities are. Using the same criteria for hazard areas, Table 4.5.14.7.2A shows the number of parcels with structures estimated in the various hazard areas. Note that most farmsteads in the area have several outbuildings in addition to the primary residence. Therefore, the number of structures in the hazard areas are likely much greater.

**Table 4.5.14.7.2A Structures in the Wildfire Hazard Areas**

Wildfire Hazard Area	Estimated Number of Parcels with Structures
Highest Hazard	15 parcels with structures
High Hazard	38 parcels with structures
Moderate Hazard	92 parcels with structures
Low Hazard	164 parcels with structures

The total estimated value of the structures in the highest hazard area is \$451,000 and in the high hazard area is \$2,008,670 (based on building values listed in the CAMA data). A potential damage factor is rather difficult to determine because the losses will be highly dependent on the fire characteristics and its location. Not all areas in the highest or high hazard categorizations will be affected by one particular wildfire, however, structures in the fire perimeter could have a high loss rate. Given an assumption that 15% of the structures in the highest and high hazard areas could be lost in a probable wildfire, the structure losses from that fire would roughly total \$368,951 or about 10 structures. History has shown that personal property losses can be much greater than just that of residences. Outbuildings, fences, equipment, livestock, pastures, and crops are often additional losses.

Structures typically catch on fire through one of three mechanisms: firebrands, radiation, or convection. Firebrands are pieces of burning materials that are carried by fire drafts and winds. The burning embers can land on a structure and ignite it depending on the size of the firebrand, how long it burns after contact, and the materials, design, and construction of the structure. Radiation is the



**Figure 4.5.14.7.2B** A ranch off of Sarpy Creek Road.

transfer of heat through light wavelengths. A sunburn is an example of a burn created by sun radiation. Structures near a wildfire can ignite through radiation depending on the intensity, duration, and proximity of the flaming front. Ignition by convection occurs when the flame comes in direct contact with the structure. Structures on a slope have a greater probability of ignition by convection as the flames climb up a hill. (National Wildland/Urban Interface Fire Protection Program, 1998)



THE BUILDING MATERIALS AND SURROUNDING VEGETATION ARE CRITICAL FACTORS IN THE PROBABILITY OF A STRUCTURE IGNITING FROM A WILDFIRE. STRUCTURES CONSTRUCTED WITH NON-FLAMMABLE, CLASS A ROOFING MATERIALS WITH SCREENED VENTS AND NO GAPS FOR FIREBRANDS TO TRAVEL INTO THE RAFTERS IS MUCH MORE RESISTANT TO WILDFIRES THAN ONE THAT HAS A WOOD SHAKE ROOF, FOR EXAMPLE. FIRE-RESISTANT SIDING AND DECKING CAN ALSO PREVENT FIRE FROM ENGULFING A HOME. THE LANDSCAPING AROUND A STRUCTURE CAN ALSO MAKE A BIG DIFFERENCE IN THE PROBABILITY OF IGNITION FROM A WILDFIRE. REMOVING DEAD VEGETATION SUCH AS LEAVES AND BRANCHES FROM THE IMMEDIATE VICINITY OF THE STRUCTURE, MOVING FIREWOOD PILES FROM AWAY FROM THE STRUCTURE, CLEARING SLASH PILES, AND THINNING TREES SURROUNDING THE STRUCTURE CAN MAKE THE AREA MORE FIRE RESISTANT. (FireWise Communities, 2007)

#### 4.5.14.7.3 Infrastructure

Often regional electric infrastructure passes through wildland and non-irrigated agricultural areas. In particular, the electric substations and transmission lines are usually buffered by or overhang natural fuels. A wildfire could disrupt electricity should this infrastructure be damaged. Two sets of major electric transmission lines cross the southern part of the county from the Colstrip power plants. Another crosses the middle of the county in the general vicinity of Interstate 94. All three pass through areas at the highest risk for significant wildfires.



**Figure 4.5.14.7.3A** Major electric transmission line off of Sarpy Creek Road.

Propane tanks also become hazardous infrastructure when a wildfire encroaches on a structure. Temporary disruptions or low flows on the public water system may occur if large amounts of water are used to fight a fire, particularly during periods of drought or peak usage times. Overhead and road infrastructure can be better protected during wildfires if excess vegetation is removed from the road right-of-ways and slash piles in the vicinity are removed. Dirt and gravel roads, particularly private roads, can become very rugged and sometimes impassable for emergency response vehicles. It is often the responsibility of the road or driveway owner to maintain these access points for fire suppression.



#### *4.5.14.7.4 Population*

Generally, the population at risk can evacuate before a wildfire moves into their area. Using the estimate of 53 structures or farmsteads in the highest and high hazard areas, roughly 150 people live in areas at enhanced risk for wildfires (53 residences x 2.8 people/residence).

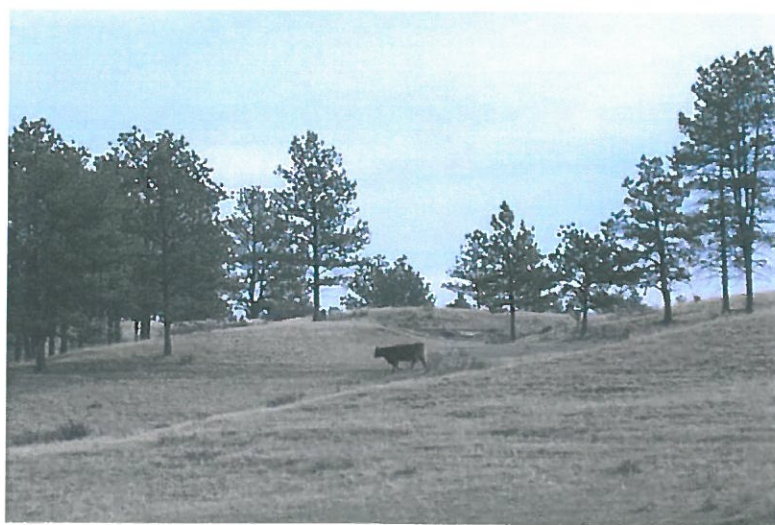
Occasionally when strong winds are in place, wildfires can move very rapidly and catch people by surprise, or people may just refuse to evacuate; fatalities are possible. In these types of situations, firefighters can also be at risk from rapidly moving wildfires. Many strong-willed Montanans are often reluctant to leave their pets and livestock behind or want to stay behind and protect their property. Many times, wildfire fatalities of the evacuating population occur when frantic drivers or poor visibilities due to smoke cause an accident.



**Figure 4.5.14.7.4A** Fuels along Interstate 94.

#### *4.5.14.7.5 Economic, Ecologic, Historic, and Social Values*

Wildfires can certainly have an effect on the regional economy. With annual agricultural sales of nearly \$20 million, rapidly moving wildfires can result in direct livestock, feed, and crop losses and additional losses to miles of fences and outbuildings. As of January 1, 2006, Treasure County had 23,000 head of cattle and calves. (US Department of Agriculture, 2006a) Significant wildfires can force ranchers to evacuate or release their cattle to try to preserve their investment. Often the evacuation of livestock becomes a significant



**Figure 4.5.14.7.5A** A cow along Sarpy Creek Road. Livestock welfare is a common concern for ranchers during an encroaching wildfire.



challenge, and severe livestock losses can result. Wildfires may also temporarily destroy land used for grazing.

Natural resources are often lost during wildfires, but since wildfires are an important part of the ecosystem, such losses are usually only financial. Timber can be harvested in parts of Treasure County, however, the industry does not make up a large part of the county's economy. Ecologic diversity could be lost with the only two known locations of birchleaf mountain-mahogany (*Cercocarpus montanus var. glaber*) in the state being in Treasure County. (Treasure County, 2003) This species is heat and drought tolerant, however, it would not likely survive an intense wildfire. Howrey Island and Isaac Homestead are two wildlife areas that do have significant wildfire hazards. Wildlife and scenic values could be lost if a significant wildfire occurred. For example, Howrey Island is one of only four known active bald eagle nesting sites in southeast Montana. (State of Montana, 2007)

Depending on the location, historic losses could also occur. Places such as homes and barns from original homesteads could be lost in a wildfire. Locations on the National Register of Historic Places within Treasure County include the Sanders Gymnasium and Community Hall on Old Highway 10 in Sanders and the Yucca Theatre on Division Street in Hysham. (Montana Historical Society, 2002) This area is also rich in Lewis and Clark early exploration history. Social values may be impacted for those under evacuation orders and others supporting the firefighting effort. Fire restrictions may prevent campfires, hunting, and other recreational activities people often enjoy.

#### 4.5.14.7.6 Future Development

Remote, isolated, forested areas are becoming more popular places to live or to have a second home, as national trends show. Growth in these parts of Treasure County is possible and even likely. Regulating growth in these areas is a delicate balance between protecting private property rights and promoting public safety. Future development could increase wildfire vulnerabilities, putting



**Figure 4.5.14.7.6A** A farmstead off of Tullock Creek Road.

more people and property in harm's way. The Treasure County Subdivision Regulations do address the wildfire hazard and have very specific requirements with regard to ingress and egress, water supplies, building sites, road design, densities, and defensible space on road right-of-ways. A synopsis follows.

The regulations don't prohibit development in wildfire hazard areas, rather they require the infrastructure be in place to safely fight the fire. More specifically, subdivisions must comply with the Uniform Fire Code and local fire codes. The regulations require two entrance/exit roads, roads, bridges, and gates designed to allow access by fire equipment, proper placement of residences to minimize the potential for fire spread, and provisions for defensible spaces around structures (see Montana Fire Protection Guidelines for Wildland Residential Interface Development). Subdivisions must meet the water supply requirements set forth by the local fire protection authority or in the absence of such standards:

- A central water system with a minimum flow of 1,000 gallons/minute.
- With no central water system, the subdivision must have cisterns, reservoirs, or fill ponds with dry hydrants with a minimum storage capacity of 2,500 gallons per dwelling for single-family residences, or for five or more dwellings per unit, 500 gallons per dwelling.
- The water supply must be all-season and accessible by fire equipment including all weather turn-arounds on roads.
- Dry hydrants must have a minimum six inch diameter with the appropriate fixtures.
- Water sources that are dependent on electric power for pumping must have a backup source of power.

Areas outside established fire service areas are considered High Fire Hazard Areas, as well as those areas subject to high wildfire hazard as determined by the planning board, local fire protection authority, US Forest Service, or Montana Department of Natural Resources and Conservation. In addition to complying with the Uniform Fire Code and the other regulations, these subdivisions must meet the following additional requirements:

- Road right of way must be maintained free of slash, trees, tall grass/weeds, and other fire fuels.
- Structures are prohibited on slopes greater than 25% and on specific topographical features ("fire chimneys").
- Densities must be reduced through the following minimum lot standards shown in Table 4.3C.



**Table 4.3C Wildfire Minimum Lot Sizes**

<b>Slope</b>	<b>Open Grass</b>	<b>Forest &amp; Brush</b>
0%-10%	1 acre	2 acres
10%-20%	2 acres	3 acres
20%-25%	3 acres	4 acres
Over 25%	5 acres	Not permitted

- Open space, park land and recreation areas (including green belts, riding or hiking trails) should be located, where appropriate, to separate residences and other buildings from densely forested areas.
- With no central water system, the subdivision must have cisterns, reservoirs, or fill ponds with dry hydrants with a minimum storage capacity of 3,500 gallons per dwelling for single-family residences, or for five or more dwellings per unit, 700 gallons per dwelling.
- Minimum flow of 500 gallons per minute for lots of one acre or larger and a minimum flow of 750 gallons per minute for lots of less than one acre.

#### **4.5.14.8 Data Limitations**

The addition of more detailed fuels mapping would allow for a better analysis of the risk from wildfires. The maps generally change over time as fuels build up, fires occur, and mitigation takes place. A comprehensive historical wildland fire digital database for the county encompassing all firefighting agencies that includes data on start location, cause, area burned, duration, fuel type, suppression costs, and damage would prove highly beneficial in better pinpointing the hazard areas. LANDFIRE, a multi-agency initiative to produce consistent and comprehensive maps and data describing vegetation, wildland fuel, and fire regimes across the United States will likely have more detailed data available to Treasure County by 2008.