



PARK COUNTY
COMMUNITY WILDFIRE PROTECTION
PLAN

SPRING 2006



Before and after photo of a home in the Wildland Urban Interface.

PARK COUNTY COMMUNITY WILDFIRE PROTECTION PLAN
Participated in and Reviewed by:


DES Coordinator


BLM Representative


Ranger – Gardiner District


Forest Supervisor – Gallatin N.F.


County Commissioner


DNRC – Bozeman Unit Manager



Chief – Clyde Park City Fire Department

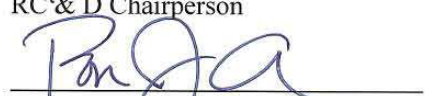

Chief – Cooke City/Silvagate Rural Fire District



Chief – Gardiner Fire District/Gateway Hose Co.

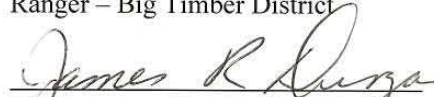

Chief – Paradise Valley Fire Service Area

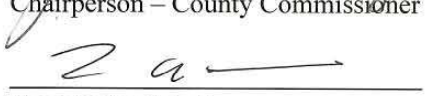

Chief – Park County Fire Department



RC & D Chairperson

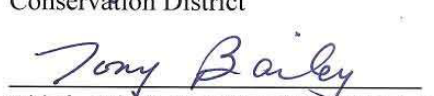

Ranger – Livingston District



Ranger – Big Timber District

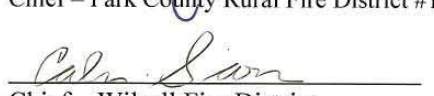

Chairperson – County Commissioner

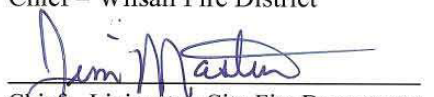

County Commissioner


Conservation District


Chief – Clyde Park Rural Fire District


Chief – Park County Rural Fire District #1


Chief – Wilsall Fire District


Chief – Livingston City Fire Department

STEERING COMMITTEE MEMBERS

**Bob Fry
Ron Archuleta
Josh Keller
Jim Dugan
Paula Rosenthal**

**Carrie Shockley
Craig Campbell
Diana Allen
Terina Mullen**



Left to right: Diana Allen, Bob Fry, Carrie Shockley and Josh Keller.

Contributors

**Tony Bailey
Calvin Sarver
Audrey Rixford
Jackie Robbins
Ed Hillman
Julianne Brown**

**Bill Sarrazin
Jeff Shanafelt
Alison Smyrk
Steve Caldwell
Mike Graham
Brad Wilson**

Thank you to all persons who spent time and effort making this plan possible!

Prepared by: ELKHORN FIRE AND FUELS MANAGEMENT, contact Jenn Wilke @ 406-579-2920, www.elkhornfire.com

TABLE OF CONTENTS

Executive Summary	5
Values at Risk	7
Objectives	8
Risk Assessment	15
Priorities	25
Structural Ignitability	26
Updating This Plan	34
Appendices	35
A Maps	36
B Sample Park County Home Risk Assessment Form	55
C Park County Rural Fire Department Numbers	56
D Public and Steering Committee Meetings	57
E References	58
F Acronyms	59
G Glossary	60

Executive Summary

Wildfires are a natural part of wildland ecosystems across Montana. Due to very successful fire suppression during the last 100 years, those ecosystems have been disrupted and damaged by the accumulation and decadence of fuels. As each new fire is suppressed, an even more hazardous situation is created. This has clearly been seen in the past decade as wildfire has ravaged Montana and Park County, (Fridley, 2001; Rough Draw, 2003.)

Park County's population, like much of western Montana, is growing. Many people are moving here to 'be a part of nature.' For that reason, they buy or build in those hazardous, prone to wildfire areas, or the 'Wildland Urban Interface.' This makes protecting their property a dangerous assignment for firefighters.

This development in the wildland urban interface along with fuels accumulation is not unique to Park County or Montana. Fire experts, government officials and the general public have seen a growing trend in the number of houses lost in wildfires in recent years. To address these growing issues the National Fire Plan, 10 Year Comprehensive Strategy and the Healthy Forest Initiative were penned in 2000, 2001 and 2002 respectively. These documents give Fire Protection Organizations directives and direction for reducing the risk of catastrophic losses of life and property from wildfire.

Locally, many community leaders such as home/landowners; Rural and Volunteer Fire Chiefs; the Montana Department of Natural Resources Conservation (DNRC), US Forest Service (USFS); and Bureau of Land Management (BLM) fire experts recognized the dangers that recent development in the WUI interface and fuels accumulation pose. This plan is the result of those community leaders' understanding the need to be proactive in wildfire disaster mitigation. This is the first, collaborative step to reducing the risk of devastating wildfires in Park County by implementing National Fire Plan directives.

To gain input from the public, interested groups, community leaders and agency experts, several community and steering committee meetings were held in Park County from August of 2005 through May 2006. The content of this plan was developed from that input. See Appendix D -1 for dates, attendance and where meeting notes can be found.

This Community Wildfire Protection Plan (CWPP) was designed for all of Park County, and crosses all state, federal and private protection boundaries, (*see Appendix A, A-3, A-4 and A-5.*) The steering committee believes that subdivisions and other private lands with structures in the Wildland Urban Interface are at risk from wildfire. These areas include Chico, Old Chico, Glastonbury area, Rock Creek South, Cottonwood Creek, Jardine, Livingston Peak, Ninth Street Island, Pine Creek, Silver Gate, Mill Creek, Deep Creek, Big Creek, Mission Creek, West Boulder, and the Wine Glass area.

This plan also includes several areas, such as Quinn Creek, Main Boulder and Smith Creek, which are just outside the county line. These areas have access or response issues that warrant Park County to take an active role assisting in their protection.

As the name suggests, a Community Wildfire Protection Plan (CWPP), is a plan that is intended to help protect the community from the wildfire. ***However, this plan does not include any strategic operational objectives or tactics to protect the community.*** (Strategic

operational plans are kept and managed by the Rural Fire Districts, Park County offices and the South Central Zone Coordinating Group.)

Instead, this plan uses mitigation ideas and techniques to help protect the communities involved.

The Purpose of this Community Wildfire Protection Plan is:

To create a collaborative relationship between Park County residents and all forms of government, that fosters an effective, proactive program to reduce adverse impacts of wildfire in our communities.

This CWPP accomplishes several components of Park County's overall WUI program:

- Identifying values at risk due to wildfire.
- Identifying objectives.
- Offering solutions to mitigate risk through a range of efforts including prevention through education, preparedness and planning, suppression, fuels reduction, community assistance, restoration and rehabilitation, and effective cooperation between land management agencies.
- Using a predetermined set of criteria to identify risk for all areas.
- Tentatively prioritizing areas/projects so that communities may be targeted for effective mitigation efforts.
- Identifying the ignitability of structures and offering strategies to reduce ignitability.

The next step in this process is to implement the County-wide program. With the completion of this CWPP, areas and projects identified are now able to apply for grant funding to implement mitigation efforts suggested within.

This plan is designed to be flexible and dynamic. The plan can easily be modified as policy, public attitude and the state of fuels in Park County evolve. These updates are the responsibility of the steering committee.

Although all of the members of the steering committee are dedicated to implementing this plan and building a program around it for the communities involved, they understand this is not a binding document. No person associated with this plan is legally bound to initiate, develop or follow through with any ideas, plans or tasks stated within.

VALUES AT RISK

As this plan was being developed several community meetings were held in the county, (*See Appendix D-1*). These were held to involve the public in the process and gather their input.

While many residents may not have first hand experience in fire suppression efforts, most have a good understanding of the effects when those efforts are ineffective. Wildland fires that cannot be controlled in a timely fashion can cause devastation to many important aspects of Park County. This portion of the plan looks at what our communities' value as worthy of protecting from wildfire.

- **Public and Firefighter Safety** – Human life is the most important thing we can protect. Fire suppression activities and evacuation of people during a wildfire can be dangerous, especially in places where fuels have been accumulating for decades.
- **Property** – Homes, buildings, land, and equipment are things every Montanan works hard for.
- **Infrastructure** – Hospitals, emergency services, schools, utilities, transportation and businesses.
- **Air quality** – Good air quality is one aspect that draws and keeps people in Montana. Recent high fire years have put levels of smoke and particulates in the air that are dangerous and have caused breathing problems for many during fire season.
- **Water quality** – Wildfire can devastate streams and municipal watersheds with sediment transported by runoff from erosion. This can in turn cause water shortages for fisheries and people.
- **Recreation** – Hunting, fishing, hiking, camping, nature photography, snowmobiling, skiing and rafting are just of the few activities that can be significantly diminished by wildfire and can be stopped due to closures when large wildfires occur.
- **Economics/Tourism** – A loss of visitors (Yellowstone National Park, rivers, campsites, etc.,) means a loss of revenue to many of the County's communities and businesses.
- **Wildlife** – Montana's diversity is amazing. While some habitats are increased by fire, others are destroyed and take years to recover.
- **Flora** – Many native species can be muscled out by invasive species, which can take advantage of wildfires to spread.
- **Aesthetics** – Many people visit and move to Montana for its scenery. Wildfire can devastate the landscape, which can take years to recover.
- **Cultural/Historical** – Montana has a rich history of the being the “West.” There are many ‘Historical’ sites and buildings. Archeological sites can be found throughout the County.



OBJECTIVES

The previous section described the values that our communities believe are at risk from wildfire. This section is focused on what can be done to reduce those risks using broad goals and general tasks.

The 10 year National Fire Plan has 4 primary goals:

1. Improve Prevention and Suppression
2. Reduce Hazardous Fuels
3. Restore Fire Adapted Ecosystems
4. Promote Community Assistance

The goals within this plan have the same direction as those in the National Fire Plan.

1. Program Development
2. Prevention
3. Community Assistance
4. Preparedness/Planning
5. Suppression
6. Reducing Hazardous Fuels
7. Rehabilitation/Restoration of Fire Adapted Ecosystems

Within these 7 categories, 8 goals have been defined. Tasks have been developed to accomplish each goal. These tasks are not all-inclusive. As new ideas are developed to accomplish the goals, they should be added to this plan and implemented.

PROGRAM DEVELOPMENT

The stakeholders believe in this program and want to include every resident, in every community. This is a large task and needs leadership, direction and agency cooperation.

Goal 1: Build and sustain a county wide effort that promotes the evolving goals within this plan.

Tasks

- Locate and secure funds to manage the implementation of the CWPP
- Modify CWPP steering committee into a committee that is dedicated to implementing this plans' goals. (Possibly use Fire council members.)
- Hold quarterly meetings to ensure the plans' success.
- Evaluate, yearly, the appropriateness of the goals and tasks within this plan.
- Update, yearly, the accomplishments of program in the Park County Community Wildfire Protection Plan.

Goal 2: Provide for effective cooperation of government resources on the priority areas identified by the community.

Tasks:

- Coordinate, when possible, mitigation efforts, so that all work will be more effective.
- Map (utilizing GIS) all accomplished treatments, by all land management agencies, into one accurate, updated data base.
- Develop a local Type 3 Incident Command team, or pool of qualified personnel.
- Develop an ‘all hazards’ map.

PREVENTION

This plan has noted that suppression of fires has had a negative impact on the current state of the Wildland Urban Interface. However, it is still true that we need to continue to prevent fires to save the things we value most. Local land and home owners need to understand the threats and take action themselves. To that end, this objective focuses on prevention through education.

Goal3: Raise community awareness of the issues and solutions of living in the wildland urban interface.

Tasks:

- Promote and participate in inter-organizational sponsored prevention events.
- Work with insurance providers to encourage homeowners to be proactive in achieving and maintaining a ‘Firewise’ property.
- Develop a brochure that targets community residents.
- Develop a presentation for homeowners on how to become ‘Firewise.’
- Attend homeowner meetings and provide information on assistance available for reducing the threat of wildfire.
- Use rural addressing to target homeowners in priority areas.
- Visit all Park County schools with the *Fire Trunk*.
- Set up an information booth at community events, (fairs, rodeos, etc.)
- Review and develop recommendations for subdivision regulations for fire safety. Promote fire-resistant building materials, access issues and vegetation manipulation. Promote maintenance regulations.
- Develop a presentation for builders, realtors and government officials to help them understand their part in reducing risk in the WUI.
- Develop and maintain a web site that promotes the ideas within this plan.



Dusty Rixford and Smokey Bear teaching local students the importance of their role in fire prevention.

COMMUNITY ASSISTANCE

The easier this plan and resulting program makes implementation, the more willing landowners will be to take part. Tasks in this category focus on helping the public through cost-share programs, insurance incentives and/or grants.

Goal 4: Assist local home and landowners to locate and secure resources for reducing risk.

Tasks:

- Develop an 'easy to apply' process that won't discourage property owners to get involved.
- Continually seek out and secure funds to implement fuels mitigation.
- Locate and secure funds for noxious weed programs.
- Work with insurance companies on incentives for homeowners that participate in the program.
- Recruit homeowners to recruit other homeowners.

PREPAREDNESS/PLANNING

While emergency personnel cannot prevent all fires from occurring, they can be prepared to act when a fire does occur. This goal and subsequent tasks are aimed at strategic planning and identifying, pre-incident, what actions are to be taken when wildfire strikes. This goal also focuses on area evaluation and information gathering as a tool for strategy and tactics.

Goal 5: Plan strategically for Wildland fire events in the WUI.

Tasks:

- Use the rural addressing to develop the following plans for each fire district, subdivision, or priority area:
 1. Population Protection plans
 2. Home assessment plans: each property is mapped, evaluated, rated and pictured for reference. Area ratings developed, (subdivisions, drainages etc.)
 3. Pre-incident plans: area is mapped; areas are identified for water sources, drop points, ICP, etc. Document MOU's that are signed with landowners for use. Areas of particular concern are noted and mapped.



Wisall Rural Fire
Department
Engine and Crew

SUPPRESSION

Within this plan area, many Fire Protection Organizations, (FPOs,) have protection responsibilities, (see Appendix C.) They should also be able to function together effortlessly. All these organizations should be adequately staffed, well trained and have the equipment needed to respond to all calls.

Goal 6: Assist fire protection organizations in acquiring the appropriate resources to maintain and improve protection from wildfires throughout the county.

Tasks:

- Actively recruit new volunteers for all districts or areas, (see Appendix C for current numbers.)
- Provide quality assignments and NWCG certified training courses to every firefighter regardless of FPO.
- Update cooperator MOU's yearly.
- Locate and secure funding for maintaining and upgrading equipment.
- Promote and participate in inter-organizational sponsored events.
- Evaluate individual FPO for deficiencies and respond accordingly.
- Create a local Type 3 Incident Command team or pool of qualified personnel.

Fridley Fire
2001



REDUCING HAZARDOUS FUELS

As noted earlier, because of persistent suppression measures, there is a dangerous level of fuels. More people are developing in the interface area because of the rural lifestyle and natural beauty it offers. To lessen hazard of loss of people and property in the interface, there must be a change in the arrangement of fuels, or a removal of fuels. This is commonly referred to as ‘Fuels Reduction,’ or ‘Fuels Mitigation.’ This goal focuses on building a program that uses fuel reduction strategies as effectively as possible.

Goal 7: Identify and prioritize WUI areas and use fuel reduction strategies to reduce the risk in those areas.

Tasks:

- Use risk assessment map to determine priority areas.
- Set up “ideal” model home for use in presentations, walking tours and reference in brochure and web site.
- Recruit property owners.
- Locate and secure funds (grants, cost share, etc.) for mitigation work.
- Promote an expansion of infrastructure for mitigation resources.
- Record and accumulate all accomplishments and annually add them to this CWPP.
- Update and reprioritize work in this CWPP as new data is received, (fuel types, fire starts, accomplishments, new federal directives, etc.)
- Develop and maintain a GIS mapping layer that is accessible and updatable by all agencies.

Park County home in the Wildland Urban Interface. Needs fuels reduction.



REHABILITATION AND RESTORATION OF FIRE ADAPTED ECOSYSTEMS

Restoring ecosystems to a pre-suppression state is a large task. It starts by promoting fire's natural role through Wildland Fire Use or prescribed fire. By monitoring long and short term fire effects of fire, we become aware of how to best use this tool.

Prescribed fire can be hazardous and so many people are reluctant to embrace it. Alternatives, that can mimic fire's role, are important. Research and the use of technology that develops ways to safely and effectively reduce fuel without fire is a rapidly growing arena, (Biomass Utilization.)

Preventing invasive species and promoting native flora assists in restoration of ecosystems affected by fire.

Maintaining or restoring watershed functions are essential to recovery efforts post-fire.

The following goal brings these four ideas together.

Goal 8: Develop strategic, scientific based, economically viable solutions that promote restoration and rehabilitation of ecosystem function.

Tasks:

- Research opportunities for Small Diameter Biomass Utilization. (Fuels for schools program, small diameter wood flooring, hog fuel, etc.)
- Designate a drop-off site for woody debris.
- Promote an infrastructure for Small Diameter Biomass Utilization.
- Promote Minimum Impact Tactics.
- Promote native plant species.
- Minimize the infestation and spreading of noxious weeds.

These 8 goals and multiple tasks support the direction and directives of the National Fire Plan and the 10 Year Comprehensive Strategy. As policy changes or is updated these objectives and tasks will be reviewed and/or revised. Tasks will be continually added and implemented as needed.

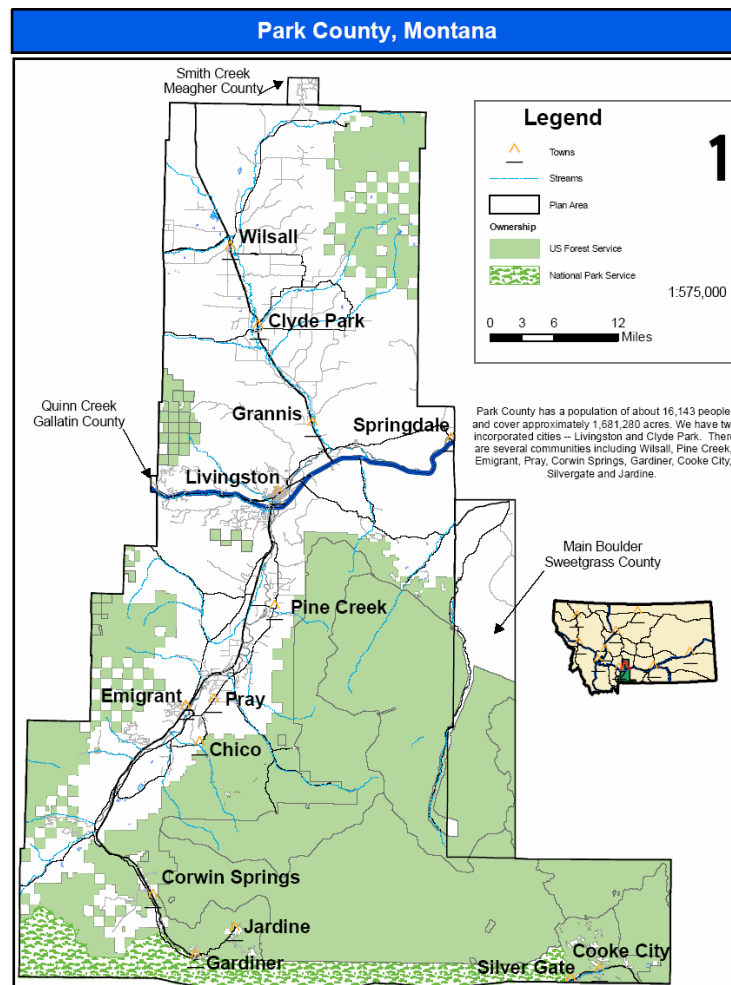
RISK ASSESSMENT

This section is dedicated to the explanation of the process determining high risk and priority areas for the communities involved.

This section includes:

- Areas Addressed by this Plan/At Risk Areas
- Definition of a Wildland Urban Interface Area
- Park County's Localized WUI Map
- Why a Map was Built.
- How the Risk Assessment Map was Developed.
- How to Use the Risk Assessment Map.
- Prioritization

Areas Addressed by this Plan/At Risk Areas



The steering committee started with a map of Park County and planned what communities were to be included. The Federal Registry lists Cooke City and Gardiner as at-risk communities. The steering committee believes that the following communities are also at-risk: Chico, Old Chico, Glastonbury area, Rock Creek South, Cottonwood Creek, Jardine, Livingston Peak, Ninth Street Island, Pine Creek, Silver Gate, Mill Creek, Deep Creek, Big

Creek, Mission Creek, West Boulder, and the Wine Glass area. These areas are all inclusive to Park County.

The following areas are just outside Park County, but are included because of access and response issues. They are noted on this map.

- **Smith Creek** – This drainage is North of Park County in Meagher County. The steering committee met with local land owners, Forest Service and Rural Fire District personnel. It was concluded that because Park County Volunteers are the first to respond to this area and firefighter safety is the highest priority, it would be included in both Meagher and Park County Plans. Meagher County will decide where the WUI boundary lies.
- **Quinn Creek** – This area is located in Gallatin and Park County. Both counties are working together to include all area residents.
- **Main Boulder** – The road accessing this area wanders between Sweet Grass and Park Counties. The steering committee concluded that an effective program does not exclude properties, (or rite-of-ways,) because of county lines and wanted to include any resident along this drainage. The Sweet Grass County CWPP includes this area and designates the WUI boundary. Both counties have agreed to work together in this drainage. Contact is the Sweet Grass Conservation District, (phone # 932-5160.)

Definition of Wildland Urban Interface

In 2004, the Healthy Forest Restoration Act (HFRA) defined the Wildland Urban Interface as:

1. An area within or adjacent to an at-risk community identified in recommendation to the Secretary in a Community Wildfire Protection Plan
- OR
2. In the case of any area for which a Community Wildfire Protection Plan is not in effect:
 - o An area extending ½ mile from the boundary of an at risk community,
 - o An area within 1 ½ miles of the boundary of an at-risk community, including any land that:

Has a sustained steep slope that creates the potential for wildland fire behavior endangering the at-risk community

Has geographic feature that aids in creating an effective firebreak, such as a road or ridge top.

OR

Is in Condition Class 3, as documented by the Secretary in the project-specific environment analysis

AND

- o An area that is adjacent to an evacuation route for an at-risk community that the Secretary determines - in cooperation with the at-risk community - requires hazardous-fuel reduction to provide safer evacuation.

The HFRA definition puts the Wildland Urban Interface about 1 ½ miles outside of the communities identified. The steering committee felt that this was not far enough to cover what they believe is the true Wildland Urban Interface.

Local experts know that while a ground or surface fire can move very quickly, a crown fire can move exceptional fast. Crown fires display the most extreme fire behavior, (intensity and spread,) and do the most damage. This group felt that that extreme should be their guide.

Response and evacuation times can be lengthy, especially at the outer limits of the County. This group wanted to define a WUI distance that provided adequate time to would allow people to be evacuated, and firefighters to respond with an effective suppression plan.

The local crown fire data is scarce. However in 1991, Richard Rothermel published a research paper called “Predicting Behavior and Size of Crown Fires in the Northern Rocky Mountains,” which was used here to formulate an alternate distance for our WUI. **Note:** *The initial idea for this method was taken from the Tri-County Fire Working Group and their Regional Community Wildfire Protection Plan, (Broadwater, Jefferson and Lewis & Clark Counties, 2005.)*

Rothermel collected data from 8 crown fires. The follow table shows the data.

	Distance in miles	Hours per run	Speed in mph
	7	5	1.4
	6	2	3
	2	4	0.5
	2.8	3	0.93
	3.12	3	1.04
	1.3	0.83	1.57
	2.2	4	0.55
	1.29	2.5	0.52
Average		3.04	1.19

3.61 miles Predicted distance the average crown fire will travel

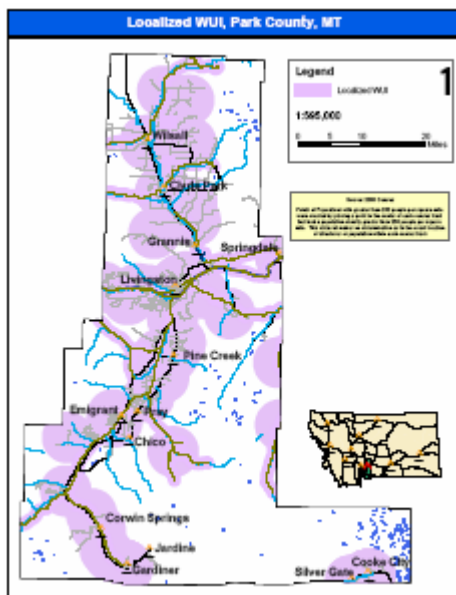
Using Rothermel’s data, it can be concluded that a crown fire ‘runs’ for an average of 3 hours at a time and the average speed of that run is 1.2 mph for certain fuel types. If you multiple the average speed by the average run time, you will calculate the average distance a crown fire will travel:

1.2 mph X 3.04 hours = 3.61 miles

To avoid confusion and assist in mapping, the 3.61 miles has been rounded to 4 miles. This distance was used to develop Park County’s Localized Wildland Urban Interface Map.

Park County’s Localized WUI Map.

The Steering Committee started with the population density map, (see A-9.) All areas with a 250 person per square mile density were plotted. Two areas, the 63 Ranch and the Church Camp in the Main Boulder were given plots as well. This is to account for the ‘seasonal population’ that was not captured in the 2000 census.



Then using the local WUI definition, circles with up to a four mile radius were plotted around those points. Finally, to ensure evacuation routes were included, corridors and access roads that would interconnect those WUI areas were added. The final WUI map is shown here and on page A-14.

The light purple area is the designated WUI.

It should be noted that while Smith Creek, Quinn Creek and part of the Main Boulder Drainages are included in this plan, the WUI designations for those areas are defined in the Meagher, Gallatin and Sweet Grass County plans, respectively.

Why Build a Risk Assessment Map

An objective process was needed to relatively rate all areas within our base area. This allows land agency managers to prioritize projects by risk, within their own agency lands and in conjunction with other land agencies. This will allow for more effective treatment to reduce the risk to people and structures in the WUI.

How the Risk Assessment Map Was Developed

There are many items that affect the risk of a devastating fire occurring. For the purposes of developing an objective, County-wide map, three layers were chosen:

- Structure Density
- Fuels
- Probability of Ignition

Each of these layers was given a scale of 1 (lowest) to 10 (highest risk). When all three layers are combined, it results in a scale of 0 (minimal risk) to 10 (highest risk.) The following section describes the process and data used in each layer and the resulting Risk Assessment Map.

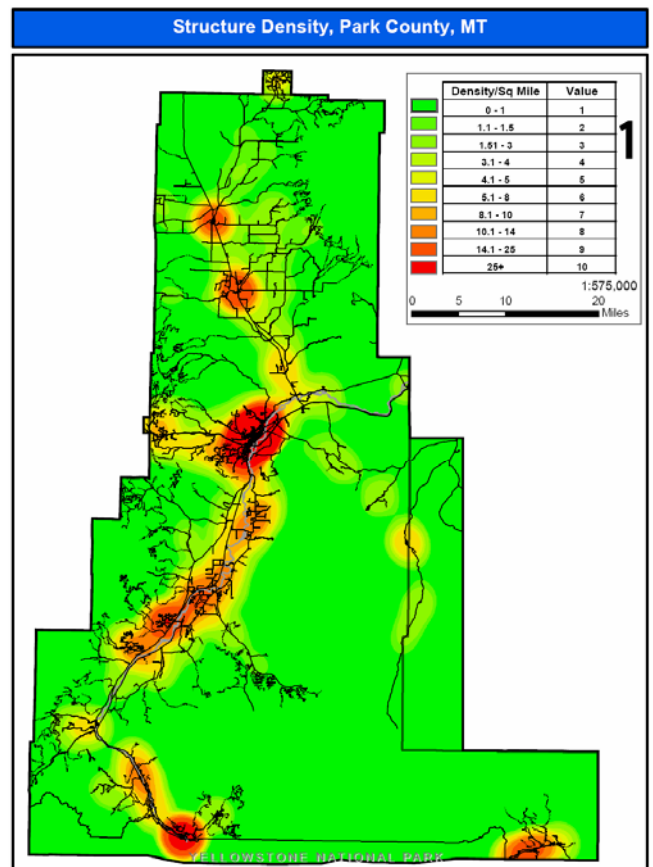
LAYER 1 Structure/Population.

The county has two data layers from the 2000 census and the rural addressing program: Population and Structure Density layers.

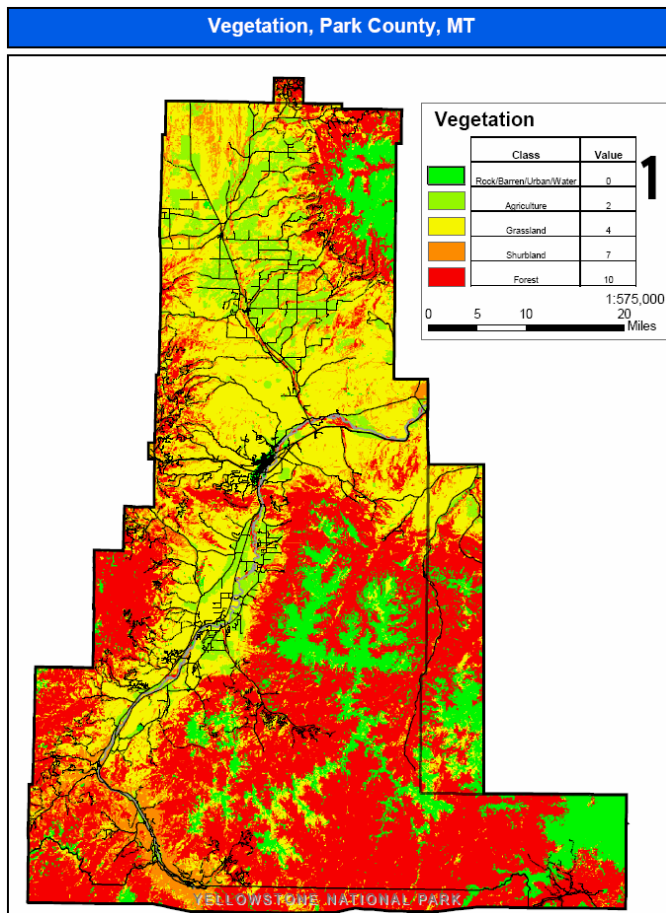
The Population Density layer, while accurate, is skewed because the data was collected in differing sized land tracks. Some tracks were fractions of an acre, while others were hundreds of acres. This causes some areas to appear more populated than they actually are.

The Structure Density layer data were collected in conjunction with the rural addressing program. This data layer has GPS accurateness. For this reason, the Structure Density layer was chosen.

A rating scale from 1 to 10 was chosen. The following chart shows the structure density ratings.



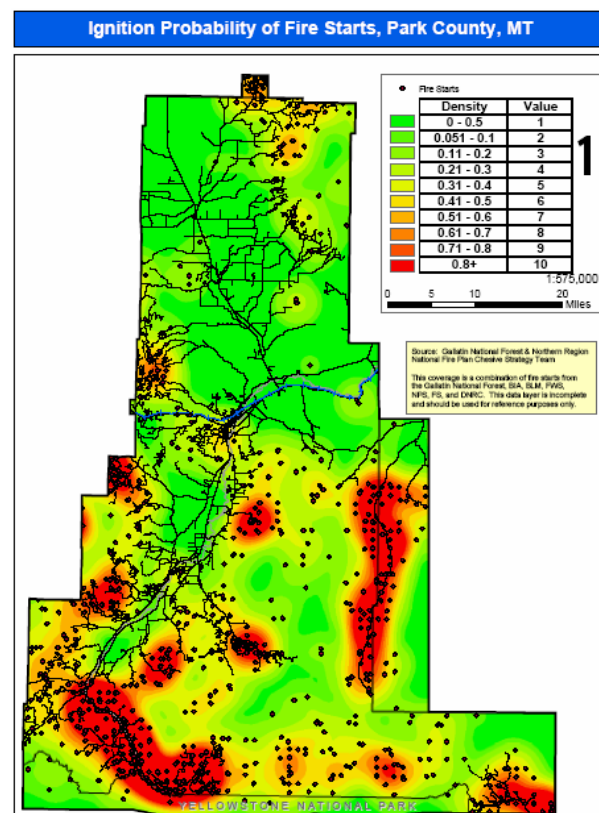
LAYER 2 Fuels



As this plan has noted in previous sections, the accumulation of fuel is a contributing factor to the hazardous situation in the WUI. Layer 2 addresses this by adding the natural vegetation fuel layer. This fuels layer data was obtained through the Northern Region National Fire Plan Cohesive Strategy Team. The data are organized from one (lowest risk) to ten (highest risk).

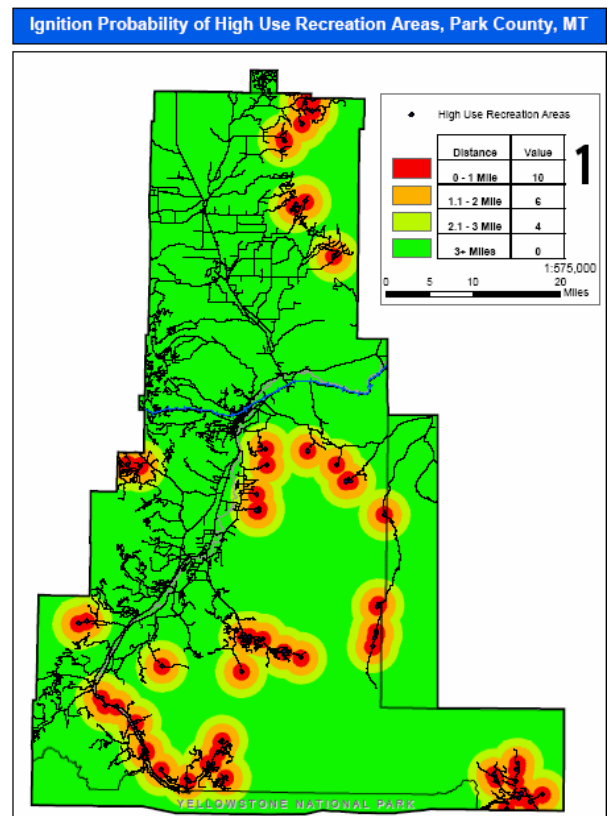
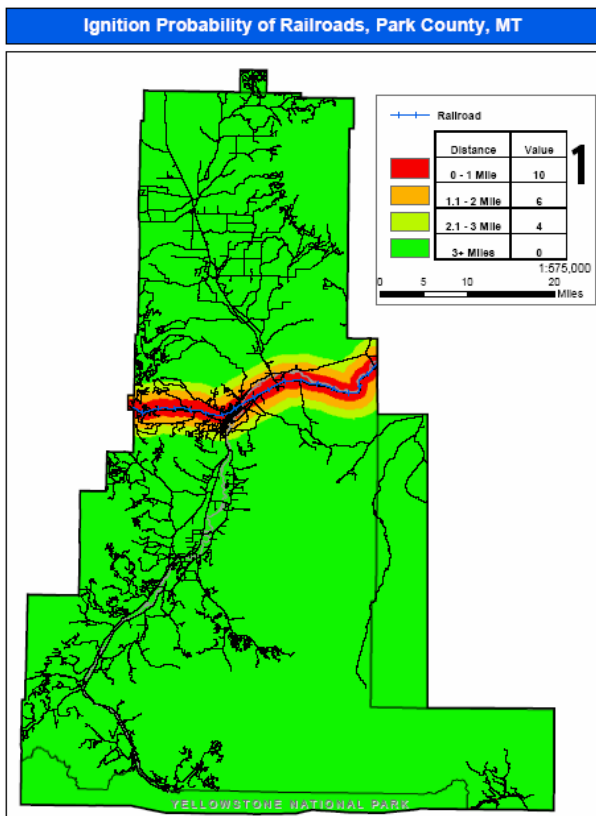
LAYER 3 Probability of Ignition

The Northern Region National Fire Plan Cohesive Strategy Team and the Gallatin National Forest lent their data for the Fire Starts data layer. While this data set is accurate, it is also less than complete, (some private lands as well as rural fire data are not included.) The following map shows the density, as rated from 1 to 10, (lowest to highest risk.)



Because of the data's incompleteness, the steering committee looked for other ways to reflect the actual probability that a fire would occur in a given area. There are many areas that are prone to human caused fires within Park County. Two data sets were chosen that would represent additional unaccounted threats; one industrial (the railroad,) and one man caused (high use recreation: campgrounds, church camps, trailheads, etc.).

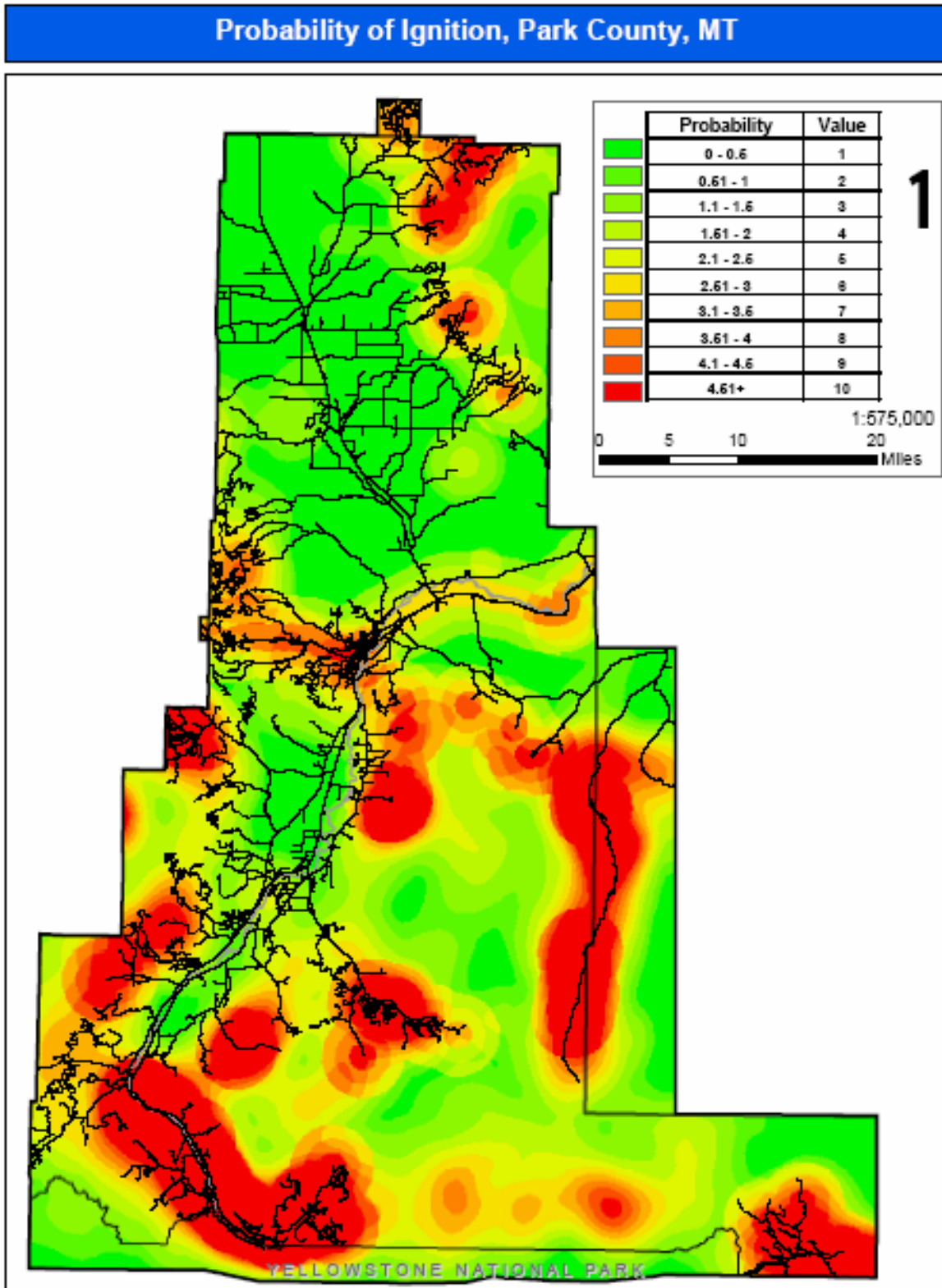
The data sets extend from the high use sites and rail line, outward 3 miles, in 1 mile increments. See A-7 and A-6.



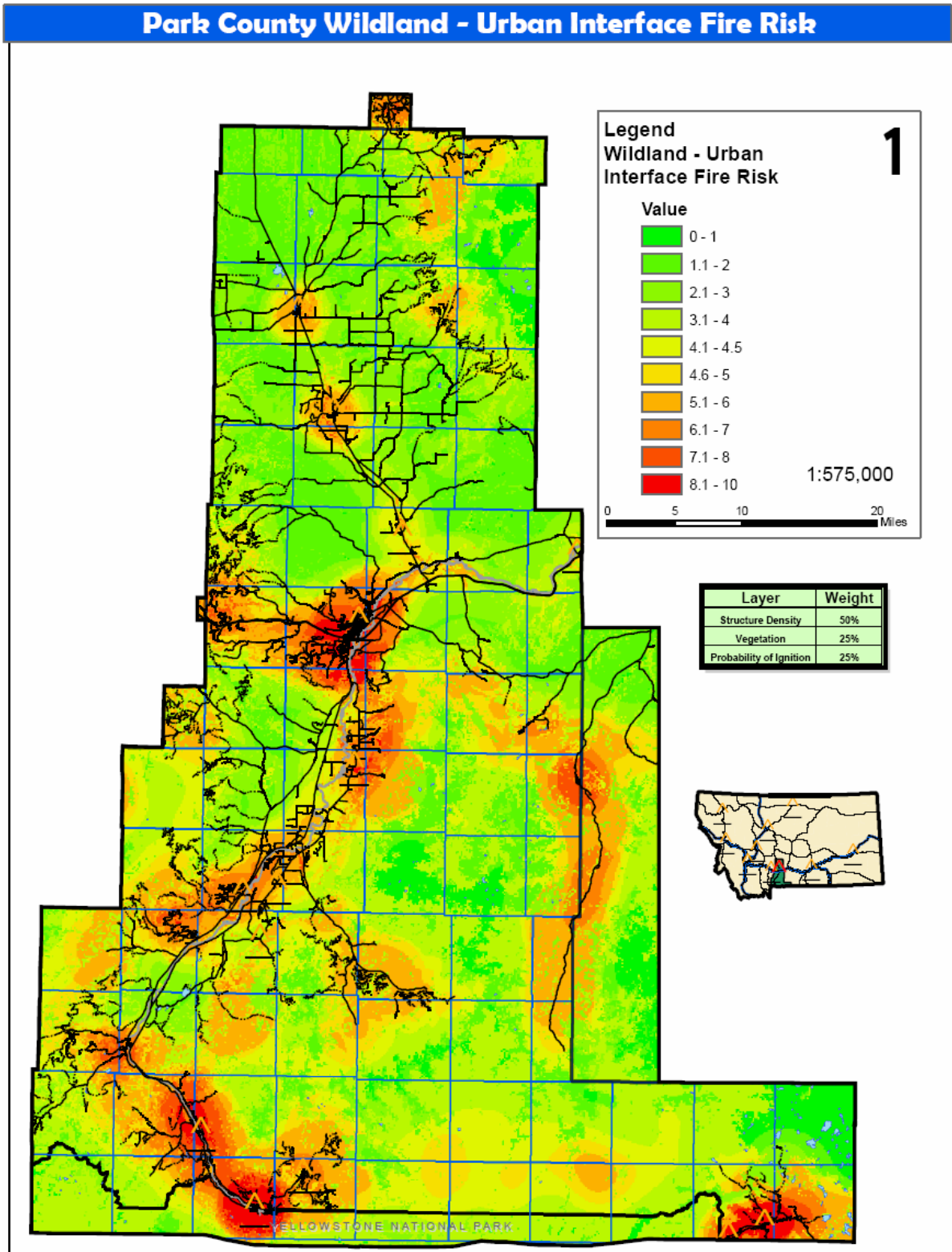
Both data layers are rated with the following system.

Distance in miles from area	Value
0 - 1	10
1 - 2	6
2 - 3	4
3 +	0

These 3 layers were combined into one map, 'Probability of Ignition', see A-8. The fire start data was given a weight of 50%, the railroad 25% and the high use recreation areas 25%. The Probability of Ignition is rated from 1 (low) to 10 (high).



With these three layers complete, a combined fire Risk Assessment Map was developed. The Structure Density layer is weighted at 50%. The Probability of Ignition layer and Fuels layer are both weighted at 25%. The overall score ranges from 0 (minimal risk) to 10 (highest risk.)



Other Considerations

There are many other data layers that could have been considered in rating the risk in our base map:

- Slope, A-17
- Wind, A-16
- Temperature
- Aspect, A-18
- Diseased/bug infested fuels
- Fire Regime, A-15
- Condition Class

Other factors are also important:

- community or homeowner willingness
- access
- position with regard to previous or planned projects
- ISO ratings
- water sources
- proximity to other high risk areas
- if one of the structures is a primary residence

The importance of these data layers and other factors led the steering committee to decide that they should be considered on an individual project basis. An area rating form or a property rating form can be used to consider any or all of these factors when choosing which projects to fund or accept into the program.

How to Use the Risk Assessment Map

This map is intended for identifying overall risk. Specific home or project data is not available at this time but is important when prioritizing specific projects. The Risk Assessment map should be used in conjunction with individual home or area rating systems. Appendix C-1 is an example of a form that can be used. DNRC F-710 and NFPA 1144 forms are also available for use. The exact forms are yet to be chosen.

PRIORITIES

After developing objectives and evaluating the county-wide risk, the steering committee set the following Park County Community Wildfire Protection Plan priorities:

- Locate and/or develop ‘model’ homes in high risk area
 - Cooke City
 - Smith Creek
 - West Boulder

- Education of Public
 - Schools
 - Subdivisions/Homeowners association
 - Public officials
 - Public events

- Recruitment of land/homeowners and implementation of fuels reduction of homes and landscapes in high risk areas, areas with a high risk rating or in areas where collaboration will make the work more effective.

- Develop, update and improve response plans.

STRUCTURAL IGNITABILITY

This plan has described the values at risk and actions that the steering committee and community feel are important to reduce those risks. The job of protecting those values is not theirs' alone. Reducing risk needs to start with each individual home/landowner. It is felt that the responsibility of owning a home or property in Park County comes with the personal accountability and responsibility to protect it.

This section is devoted to the average home owner and how they can help protect their home and property from wildfire. This section is not directed at just those in the high risk areas, but to everyone. Under the right circumstances, even structures in the low risk areas become susceptible to ignition. It is divided into three parts:

- **What is Structural Ignitability?** – a brief description
- **Existing Structures/Property** – ways to reduce your Structural Ignitability
 - Do it yourself tips
 - Remodeling ideas
 - Fuels reduction standards
 - Fuels reduction strategies and costs
 - What if I need help?
- **New construction** – things to consider when building a new home

What is Structural Ignitability?

Structural Ignitability is the susceptibility of your home starting on fire.

How fire spreads and with what intensity is 'Fire Behavior.' There are three factors that effect fire behavior, or the 'Fire Environment': Weather, Topography, and Fuels. Fuels are the only part of this environment that can readily be manipulated.

Fuels are anything that will burn. This means your home, items around your home, or other buildings and vegetation on your property. In this section we will look at how to modify your homes' construction and how to modify the surrounding vegetation to decrease your home's susceptibility of igniting. In other words, we will look at how to decrease your home's Structural Ignitability.

The following guidelines have been adapted from the DNRC's F-701 form and the nationally recognized 'Firewise' program. These guidelines promote using the appropriate construction for your home and creating a 'defensible space' to help protect it. Firewise defines defensible space as an area that "provides enough distance between the home and wildfire to ensure that the home can survive without extensive effort from either you or the fire department." While Firewise promotes a defensible space of 30 feet, recent studies have suggested that a larger area, of at least 100', is more defensible and will lead to greater success.

Existing Structures/Property

If you've bought a home and are unsure of its ignitability you can use the following three lists to help you assess your home.

What Can I Do To Reduce My Structural Ignitability?

General – Do it yourself

These are no cost, or relatively low cost items that homeowners can do themselves.

- Store your firewood 100' from your home and not downhill from your home.
- Insure all small motorized equipment such as lawnmowers and chainsaws have working spark arresters.
- Have the power company come and remove any branches near or overhanging power lines.
- Clean the roof and gutters of all combustible materials, (needles, leaves, etc.)
- Install a spark arrestor on your chimney.
- Keep branches 15 feet from your chimney.
- Keep and use your barbeque in an area with no combustible materials.
- Clearly display your name and house number or address at the front of your driveway to help firefighters find your home.
- Regularly mow your lawn.
- Enclose overhanging eaves, soffits, and vents. Metal mesh screens will work on small spaces (1/8" or smaller). This will keep hot embers out.
- Storage areas should be as clean as possible. Keep flammable material to a minimum, and keep what you have in unbreakable containers.
- Use fire retarding chemicals to treat wood shake roofs each year.
- Make sure your fence does not directly attach to any building. You can put a protective barrier like metal or stone between the fence and the building.

Remodeling

These suggestions, while considerably more expensive can be extremely effective. The less susceptible exterior of your home is the greater chance it has of surviving.

- Re-roofing your home and other buildings with Class A coverings: asphalt, fiberglass shingles, metal or clay.
- Re-siding buildings with heat resistant materials such as brick, stone, stucco, plaster, or cement.
- Replace single pane windows with double paned windows or tempered glass windows. Do the same for glass doors.
- Remove all materials under overhangs, decks, porches and balconies. Enclose these areas with fire resistant materials.
- Modifying your driveway. Increasing width, number of accesses, reinforcing bridges and replacing gates.

Fuels Reduction Standards

As previously stated, manipulating vegetation will help reduce your structure's chances of igniting. This manipulation, referred to as 'fuels reduction' or 'fuels mitigation,' is done by changing the arrangement of fuels or removing fuels from the area around structures.

The following diagrams demonstrate effective fuels reduction standards. They have been taken from DNRC Form F-701.

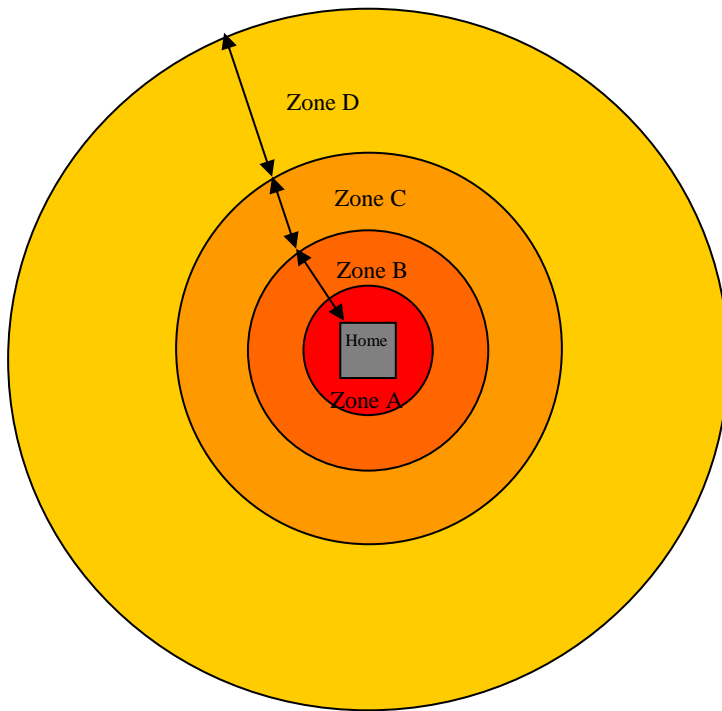


Figure 1.

Zone A – First 3 feet of Zone B. Remove all flammable materials.

Zone B – Remove all trees and forest debris, such as dead branches and logs. Keep grass short and well irrigated.

Zone C – Prune tree limbs 15 feet from the ground. Maintain surface vegetation below 3 inches. This removes ladder fuels. Thin out trees so that crowns are 10 feet apart. See Figure 3. Remove all downed woody debris.

Zone D – Prune and thin as in Zone C. Maintain surface vegetation below 1 foot. Remove woody debris larger than 3 inches in diameter.

Zone A is always the first three feet from the structure, inside Zone B. Because fire travels faster uphill, the other 3 zones will change distance as the slope from your home becomes steeper. The following table defines what distance each zone should be versus the slope.

SLOPE away from your home	ZONE A	ZONE B	ZONE C	ZONE D	TOTAL
Uphill or flat ground	3'	10'	20'	70'	100'
Downhill 10 -20 %	3'	15'	25'	80'	120'
Downhill 20 - 30 %	3'	20'	30'	100'	150'
Downhill 30 -45 %	3'	35'	50'	120' +	205' +

Table 1

Table 1 is shown again for reference with Figure 2.

SLOPE away from your home	ZONE A	ZONE B	ZONE C	ZONE D	TOTAL
Uphill or On flat ground	3'	10'	20'	70'	100'
Downhill 10 -20 %	3'	15'	25'	80'	120'
Downhill 20 - 30 %	3'	20'	30'	100'	150'
Downhill 30 -45 %	3'	30'	45'	120' +	195' +

Table 1.

Using Table 1, above, and Figure 2, below, you can determine how far to remove fuels from your home and other structures.

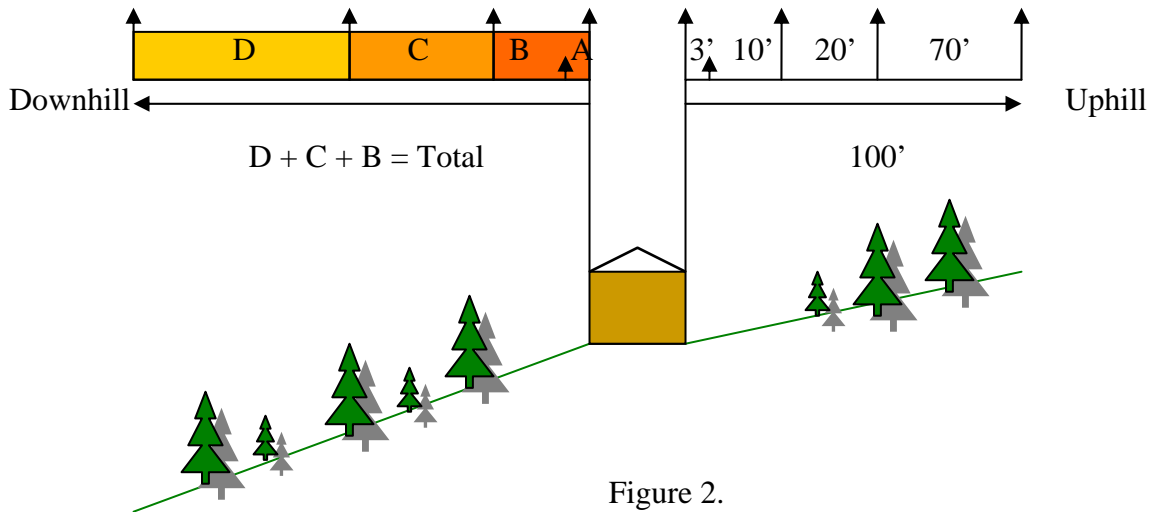


Figure 2.

Figure 3, below, gives a visual example of what thinning and pruning should look like.

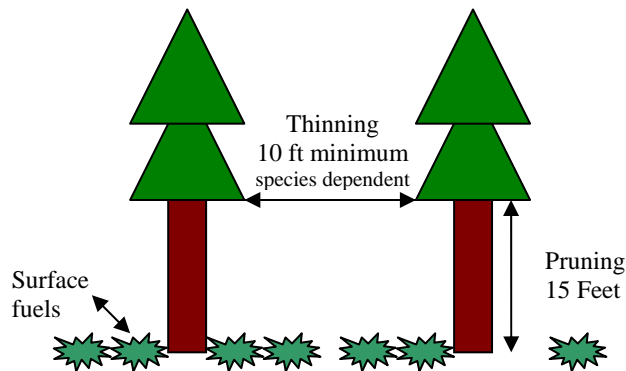


Figure 3.

Miscellaneous

- Start at your home and work outwards. Pay special attention to the downhill side as fire travels faster up hill.
- Make sure to dispose of material properly. If you plan to burn, acquire the necessary permits and equipment to do so. (Burn permit; reliable, adequate water source; tools etc.)
- Remove dead standing trees in all zones.
- Re-landscape. Replace flammable plants that contain oils and resins. Talk to your landscaper about available vegetation.
- Clear all roadside vegetation eight feet from the roads edge. 10 feet beyond that, thin, prune and reduce the vegetation height to below one foot.

Strategies for fuels reduction/modification

Fire Behavior is affected by three things: *weather, topography and fuels*. Only the fuel aspect can be modified, either by reducing the amount, or changing its arrangement. This modification can reduce the rate and/or intensity at which the wildfire reaches your home/property, giving it a better chance of surviving.

There are many ways to reduce the amount of fuel on your property. The following section lists various types, how they work and estimated cost. One or more techniques can be used depending on the state of vegetation, project size, time of year and the objectives you have for your property.

1. **Hand Piling** – Forest debris is picked up, moved to a safe area and piled to be burned at a later time. All surface materials, such as logs, branches, pruned material, tall grass and brush should be removed. This can help remove the ladder fuels that move fire into the crowns of trees. This method is the easiest for a homeowner to accomplish themselves, using chainsaws, rakes, mowers and pruning shears. This material could be removed completely from the property if an appropriate dump site were available.
2. **Mechanical Piling** – This method is similar in process to hand piling, however, larger equipment such as tractors and skidders are used to move the material. This method is better for areas that have an assortment of larger, denser material.
3. **Chipping** – This technique involves moving forest debris to an area where it can be chipped with a chipper. The chipper creates material that is small and easily moved. It can be moved to a dump site, sold or scattered back onto the landscape. In this form, the fuel is less of a hazard. This method also good for those that do not want to burn because of fire or smoke concerns.



4. **Thinning** – Removing select trees in an area. Usually leaving trees that have crowns 10 to 20 feet apart. This space created between fuels can lower the intensity of a fire and possibly force a crown fire to the ground.
5. **Pruning** – Removing all branches on the lower 1/3rd or 10-15 feet of the trees. This helps reduce ladder fuels. It can be effective, when used with thinning, to prevent fire from getting into the crowns and making high intensity runs.
6. **Logging** – Selective logging, dependent on tree species, size and quantity, can reduce large amounts of fuels. However the debris created from this process, (tops, branches, etc.) would still need to be removed. This method can also produce some revenue to offset the cost of doing the fuels reduction.
7. **Chemicals** – Spraying chemicals to kill certain types of vegetation or keep others from growing (weeds.)
8. **Burning** – *Prescribed fire* is the planned ignition of controlled fire to vegetation over an area. This can be done over large tracts or over small areas such as ditches. This is a very effective, but hazardous method. Only trained personnel should attempt this.

Pile burning is burning debris that is in one small area. This small scale burning can usually be accomplished by a property owner with an adequate water supply, tools and a burning permit.

9. **Irrigation** – Keeping your vegetations' moisture content high through water distribution.
10. **Grazing** – The amount of fuel in an area, grasses and shrubs, can be reduced using a variety of animals, depending on the type of vegetation present.



Prescribed Fire in a grass fuel model.

If You Need Help

If you are interested and willing to reduce your structural ignitability through fuels reduction and can not or do not want to do it yourself, the following list shows types of work fuels reduction contractors can do to help. This list shows each type and ESTIMATED COSTS for the work. If you are interested in hiring a contractor, the Northern Rocky Mountain Resource Development and Conservation has a list of contractors you can contact.

Cost of Fuels Reduction Strategies

The following chart gives ESTIMATED cost for Fuels Reduction Services. Costs can vary greatly depending on slope, the amount of fuel to be removed, density of trees/material, distance from town, accessibility, size of area to be treated and weather.

Service	Estimated Costs Per Acre
Hand piling	\$90 - \$1000
Machine piling	\$200 - \$600
Chipping	\$200 - \$4000
Thinning, Pre-commercial	\$60 - \$400
Pruning	\$60 - \$300
Logging	\$90 - \$600
Chemicals	\$30 - \$600
Prescribed Fire, under-burning	\$20 - \$300
Irrigation	\$50 - \$500
Grazing	\$20 - \$400

New Construction

When building a new home there are many available options. The following is a list of things to consider. However, most subdivisions have regulations that must be followed. This list is not intended to usurp or replace those regulations. It is a list of suggestions to use if you have the option. Some of these suggestions are expensive. If you are only able to follow two or three items, they should be items concerning the roof, siding and the surrounding fuels.

- Clearly post your address and name at the end of your drive so it is visible from the road. Make sure signs are noncombustible.
- Use gates that swing in towards your property and that are 30 feet off the main road as to let vehicles pull off the road to open the gate.
- Bridges should have a weight limit not less than 40,000 pounds to allow for emergency vehicles to cross.
- Make sure your driveway is at least 12 feet wide and has clearance of 12 feet high for easy access.
- Do not build at the end of a dead end road. If you do build at the end of a dead end road, build a cul-de-sac that is 45 feet in diameter to allow emergency vehicles to get turned around.
- Make sure you have more than one way in and one way out of your property.
- Build your home in an area that has no or little slope, (fire travels faster uphill.)
- Install power lines underground.
- Build your roof with Class A coverings: asphalt, fiberglass shingles, metal or clay.
- Side buildings with heat resistant materials such as brick, stone, stucco, plaster, or cement.
- Side your home with heat resistant materials such as brick, stone, stucco, plaster, or cement.
- Use windows that are double paned or have tempered glass. Do the same for glass doors.
- Enclose soffits, eaves, overhangs, decks, porches and balconies with fire resistant materials.
- Put spark arrestors on chimneys.
- Fire resistant vegetation for landscaping.
- Use the previous section's fuels reduction criteria.
- Make sure there are no flammable materials within 3 feet of your home.
- Thin trees so that the crowns are at least 10 feet from each other.
- Prune trees and remove ladder fuels out to at least 100 feet.
- Propane tanks should be at least 10 feet from structures and be in a spot free of vegetation.
- Install a sprinkler system that will cover a 100' radius around your home.

In summary, a home/landowner has a responsibility to reduce the structural ignitability of his/her home. That can be accomplished by a variety of options suggested here, regardless of its risk rating, (low moderate or high.) Regardless of what risk rating your property is in, focus should be on the materials the roof and siding are made of, making sure flammable material is not continuous to the structure and reducing ladder fuels, (surface to crown fuel.)

UPDATING THIS PLAN

As new data sets are available, new directives are given and as projects are accomplished, this information should be use to reevaluate the appropriateness of the maps, objectives and tasks within this plan. A review of the plan should be scheduled for no later than every five years, (Spring 2011.)

There are many opportunities for success in this plan. As those opportunities become reality, they need to be documented. The follow form can be use to track successes or a similar yearly update can be added.

Date	Objective	Success

APPENDICIES

Appendix A	Maps
Appendix B	Sample Park County Home Risk Assessment Form
Appendix C	Park County Rural Fire Department Numbers
Appendix D	Steering and Community Meeting Dates
Appendix E	References
Appendix F	Acronyms
Appendix G	Glossary

APPENDIX A

Maps

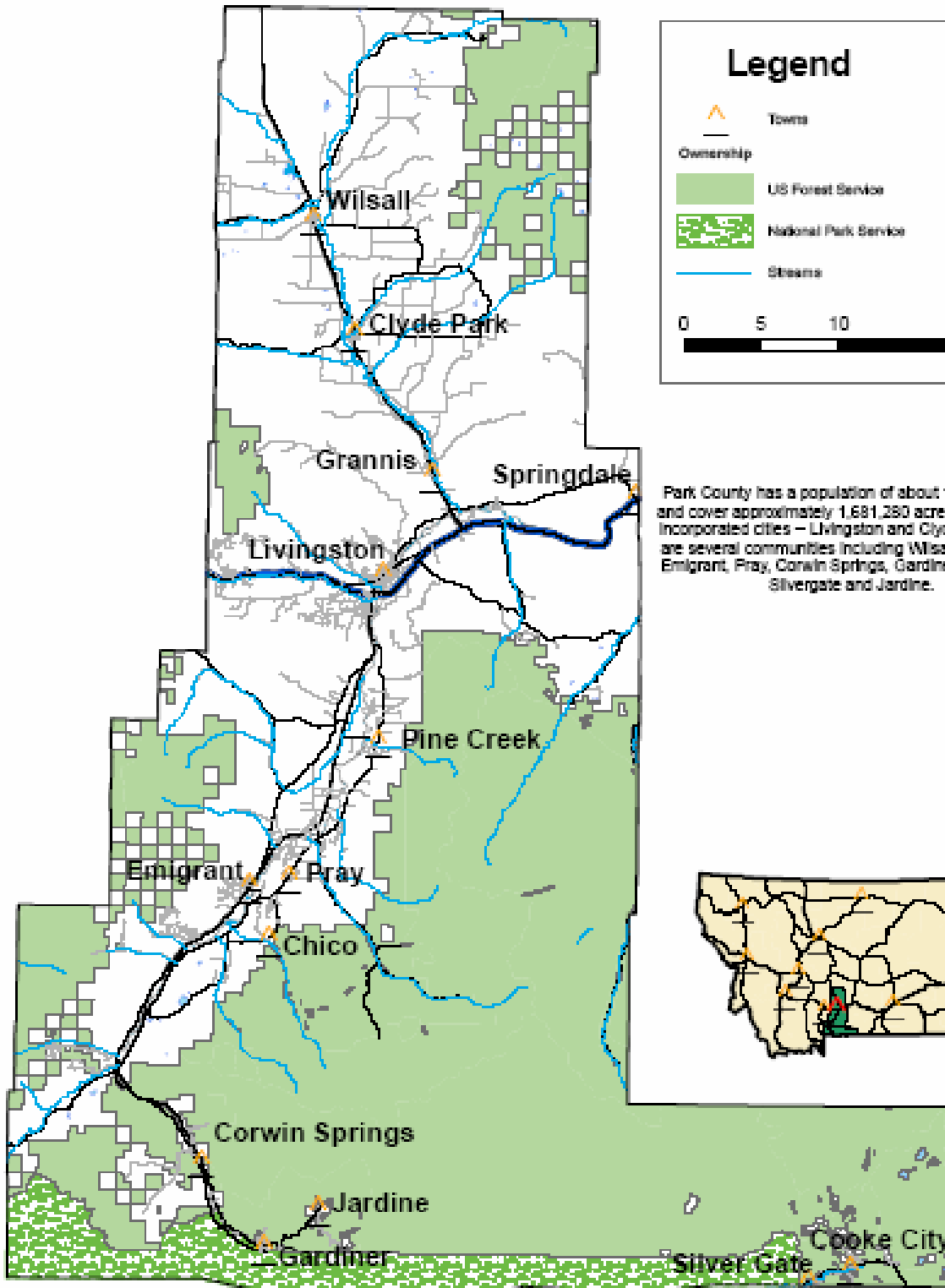
All maps were constructed by the Park County GIS Department

- A-1 Park County Vicinity Map
- A-2 Base Area Map: Park County, Quinn Creek, Main Boulder, Smith Creek
- A-3 Wildland Fire Protection Boundaries Map
- A-4 Structural Fire District Boundaries
- A-5 Ignition Probability of Fire Starts
- A-6 Ignition Probability of High Use Areas
- A-7 Ignition Probability of Railroad
- A-8 Probability of Ignition
- A-9 Population Density
- A-10 Structural Density
- A-11 Vegetation
- A-12 Final Risk Assessment
- A-13 Final Risk Assessment with Components
- A-14 Localized WUI
- A-15 Fire Regime/Condition Class
- A-16 Wind Speed
- A-17 Slope
- A-18 Aspect







Bob Fry with Park County GIS Department Head Carrie Shockley. GIS intern Alison Smyrk not pictured.

Park County, Montana

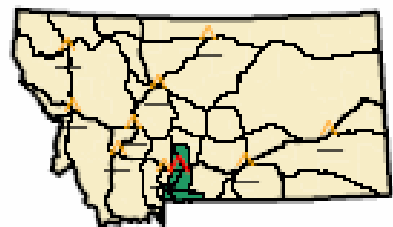


Legend

1

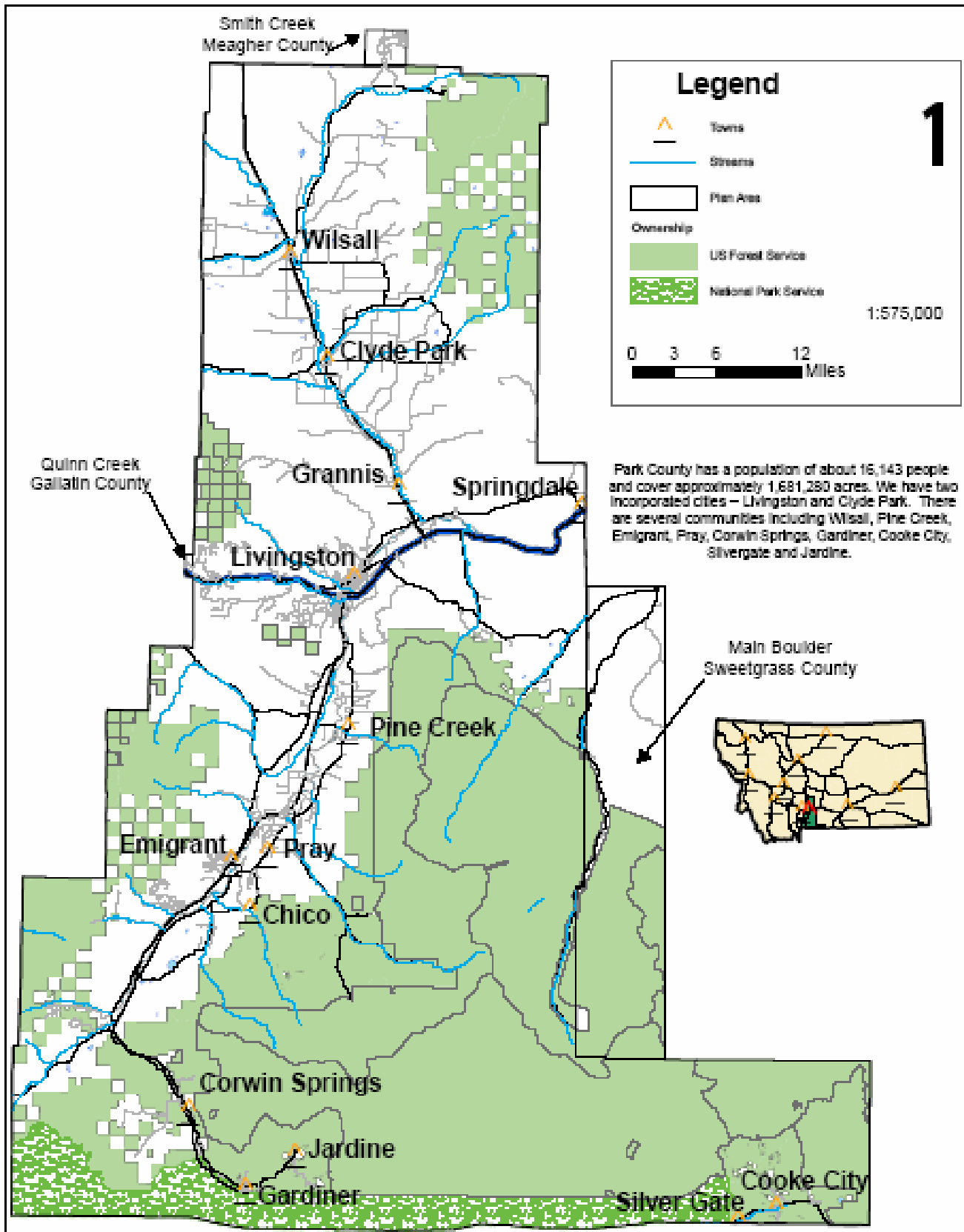
-  Towns
 - Ownership**
 -  US Forest Service
 -  National Park Service
 -  Streams
- 1:595,000
- 0 5 10 20 Miles

Park County has a population of about 16,143 people and cover approximately 1,681,280 acres. We have two incorporated cities – Livingston and Clyde Park. There are several communities including Wilsall, Pine Creek, Emigrant, Pray, Corwin Springs, Gardiner, Cooke City, Silvergate and Jardine.

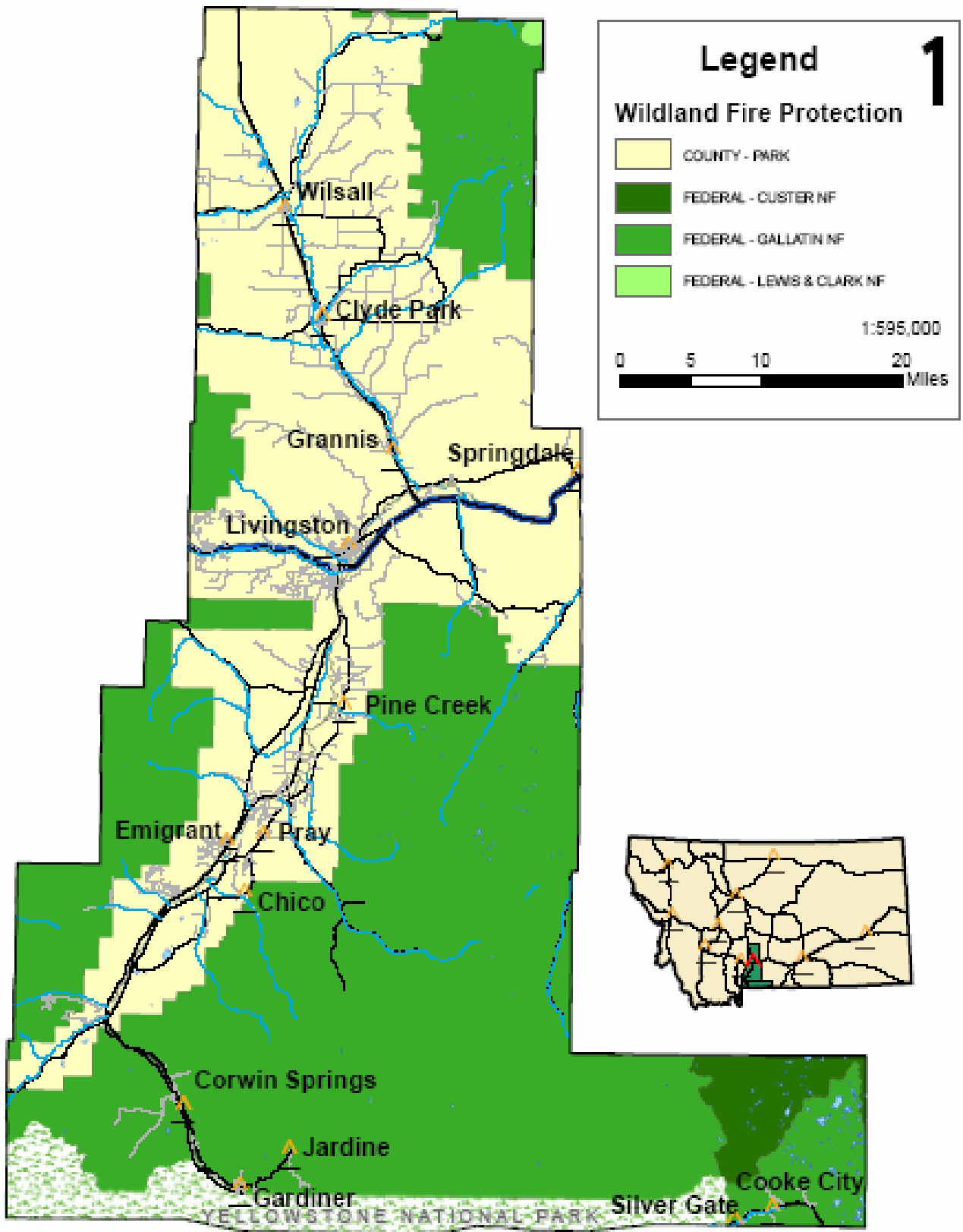


Created by the City of Livingston & Park County GIS Department 10/20/17

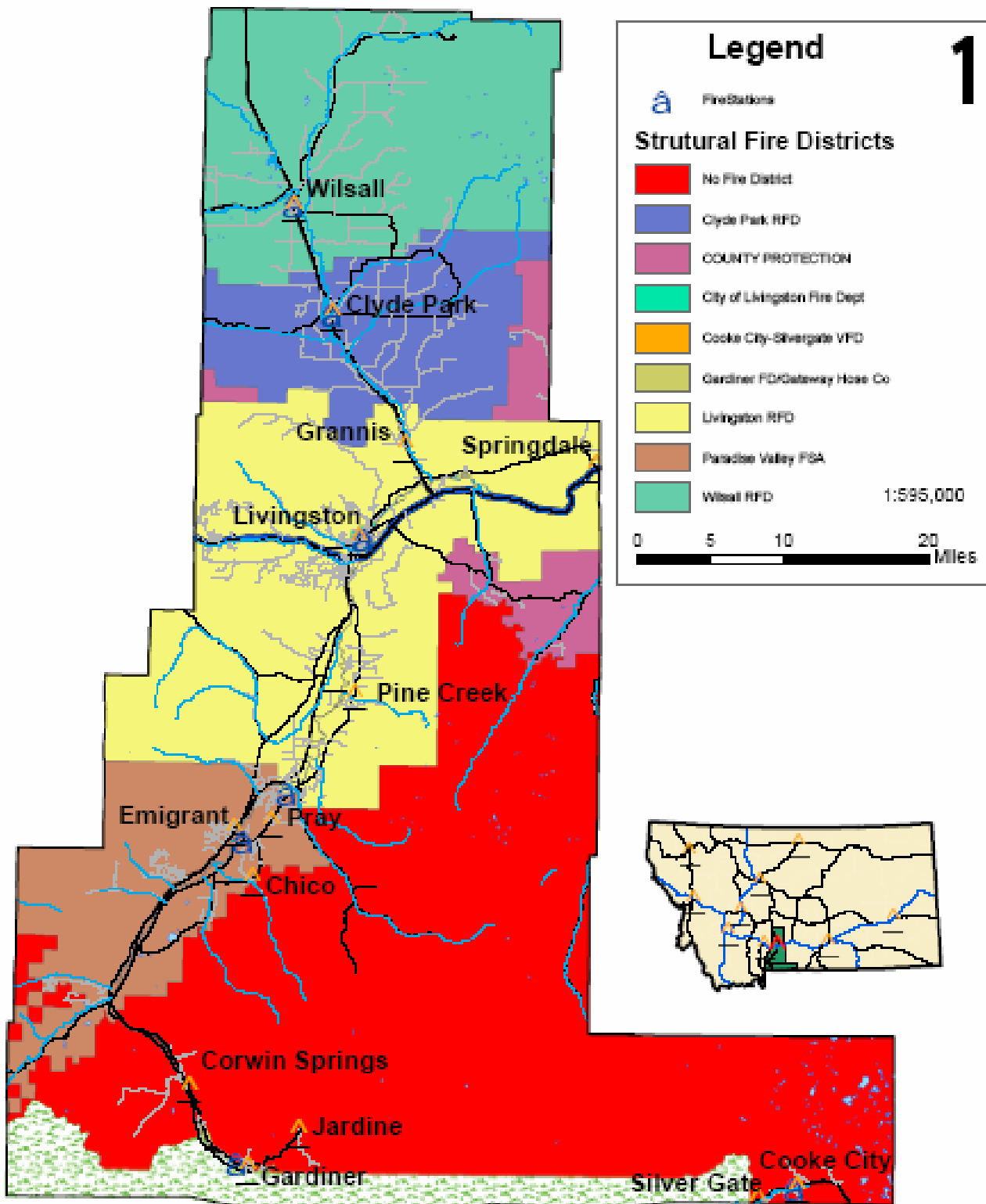
Park County, Montana



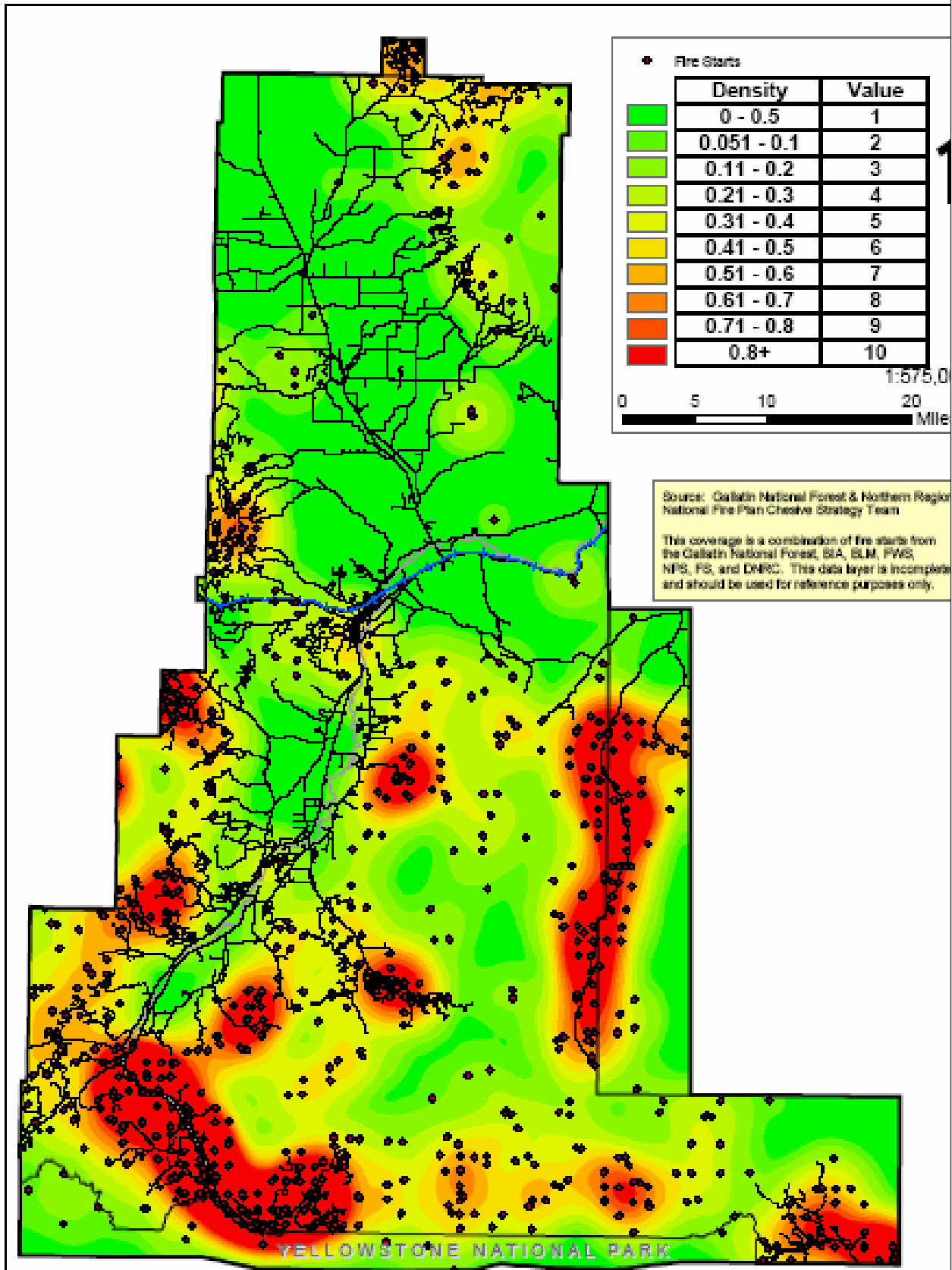
Wildland Fire Protection, Park County, MT



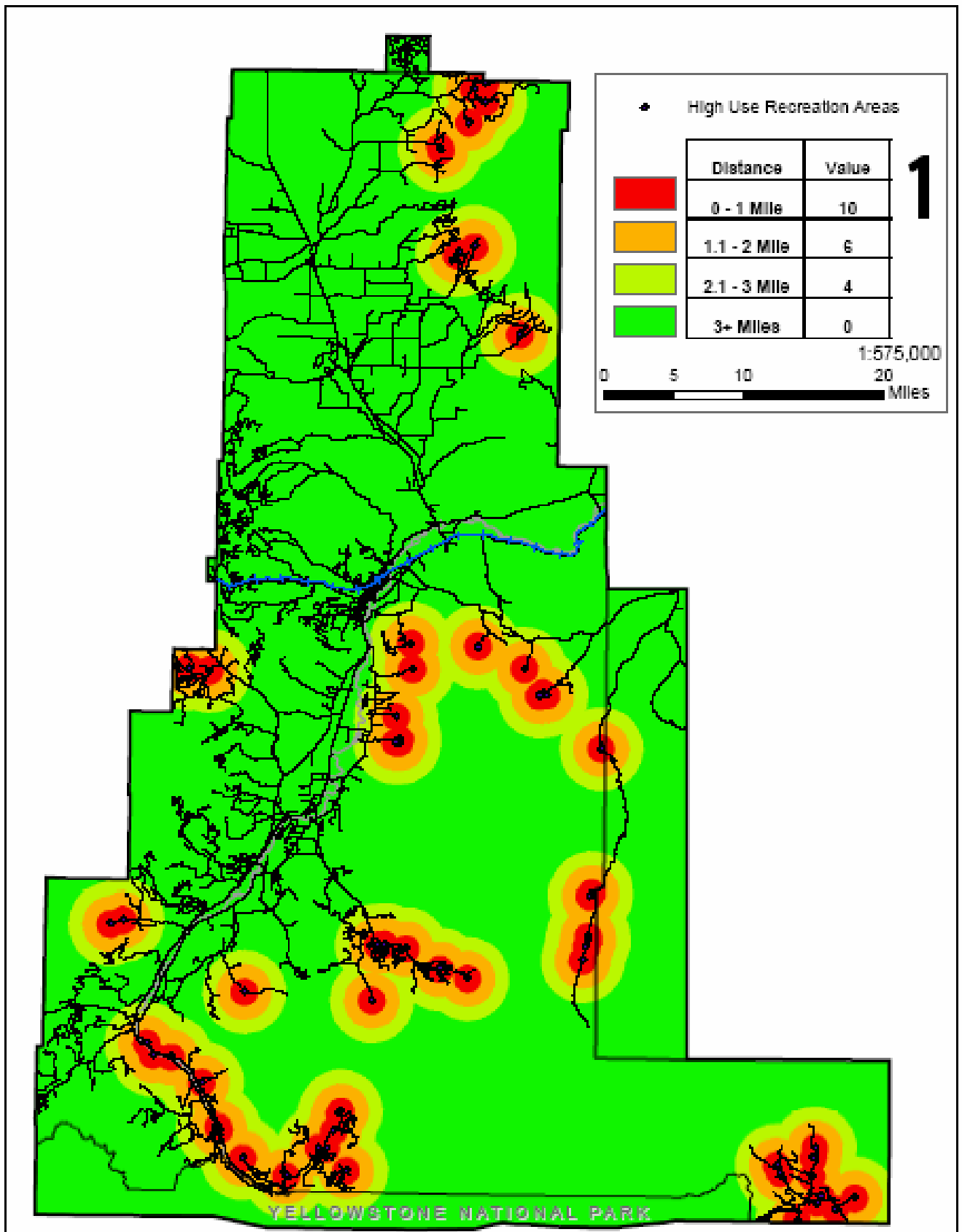
Structural Fire Districts, Park County, MT



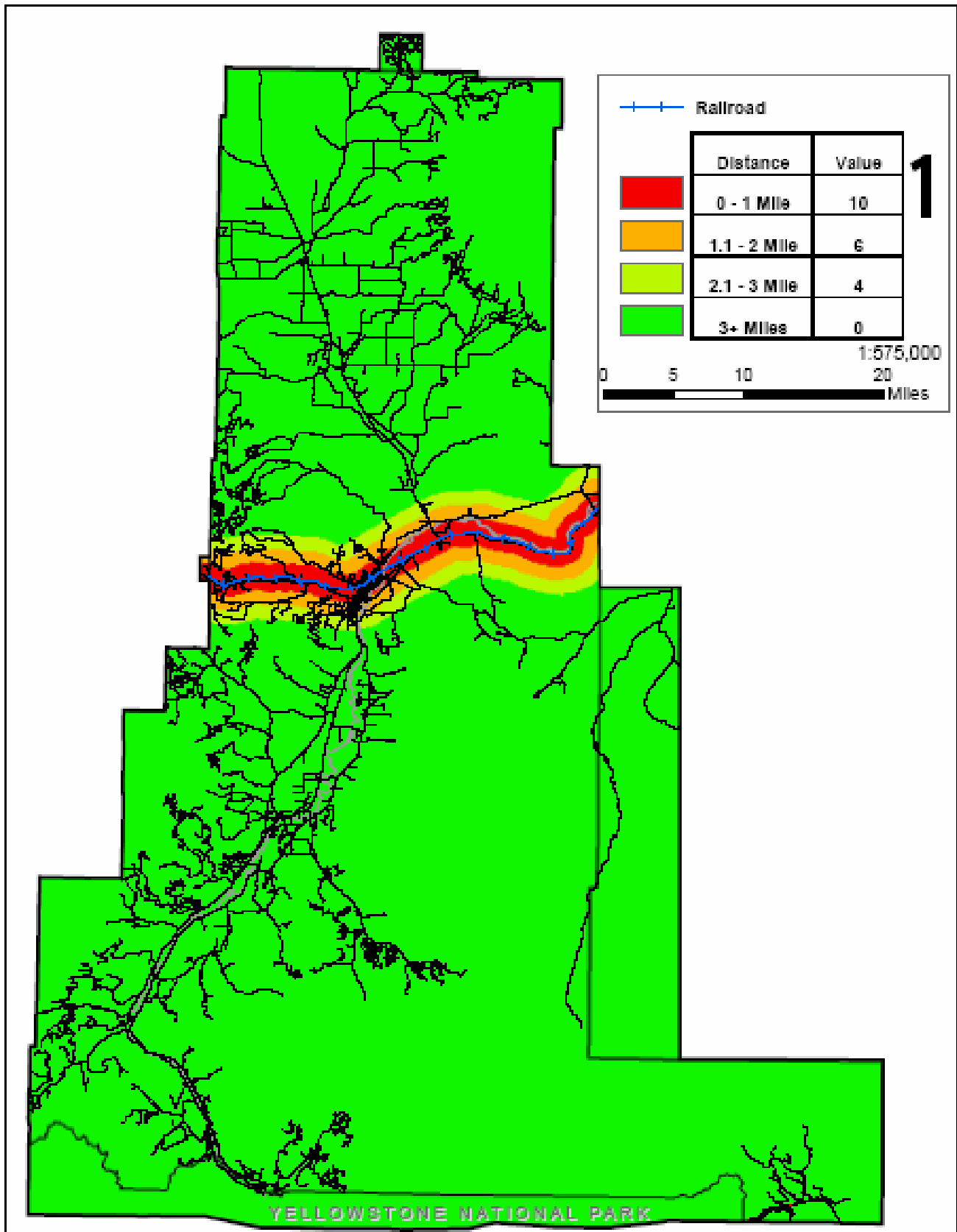
Ignition Probability of Fire Starts, Park County, MT



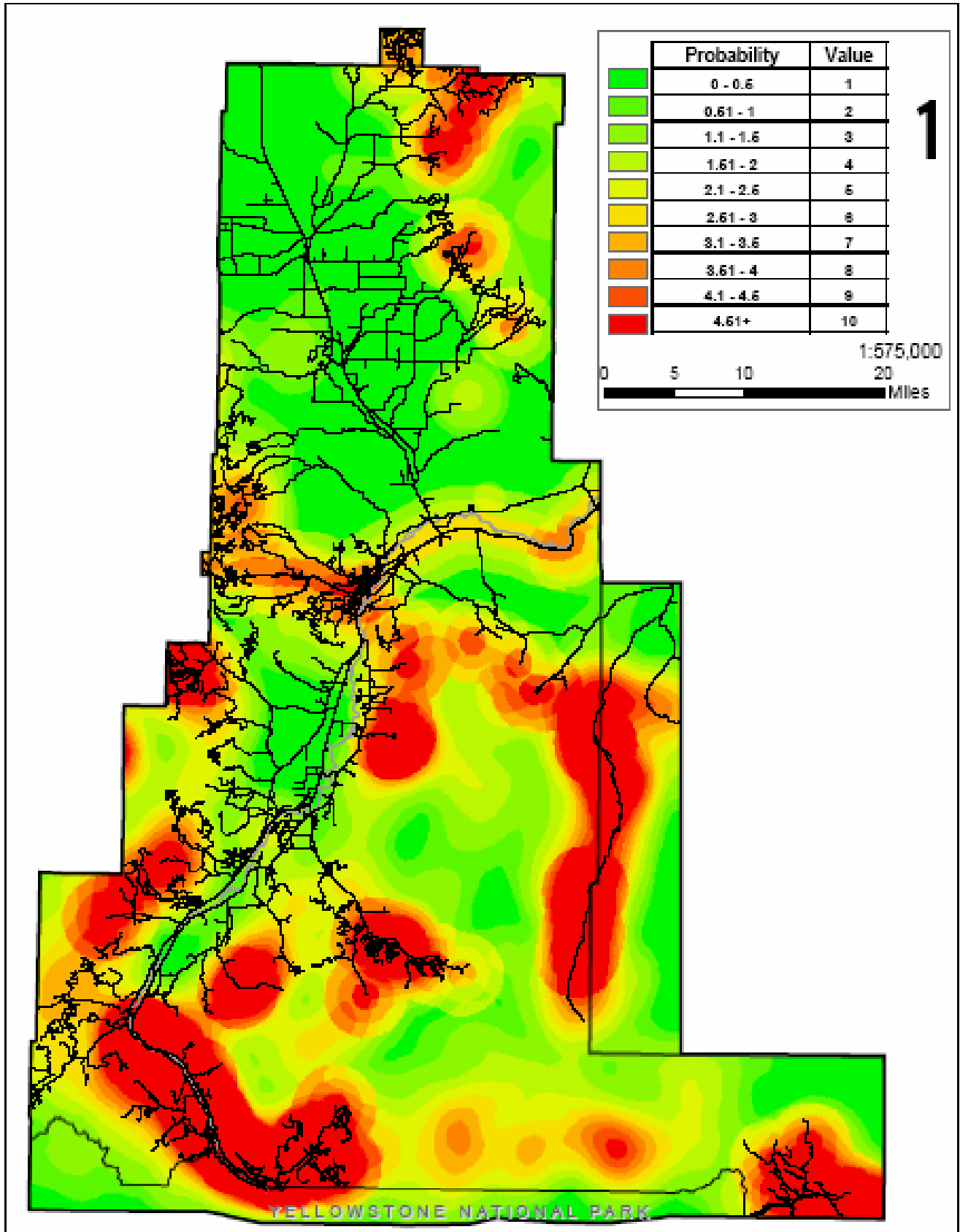
Ignition Probability of High Use Recreation Areas, Park County, MT



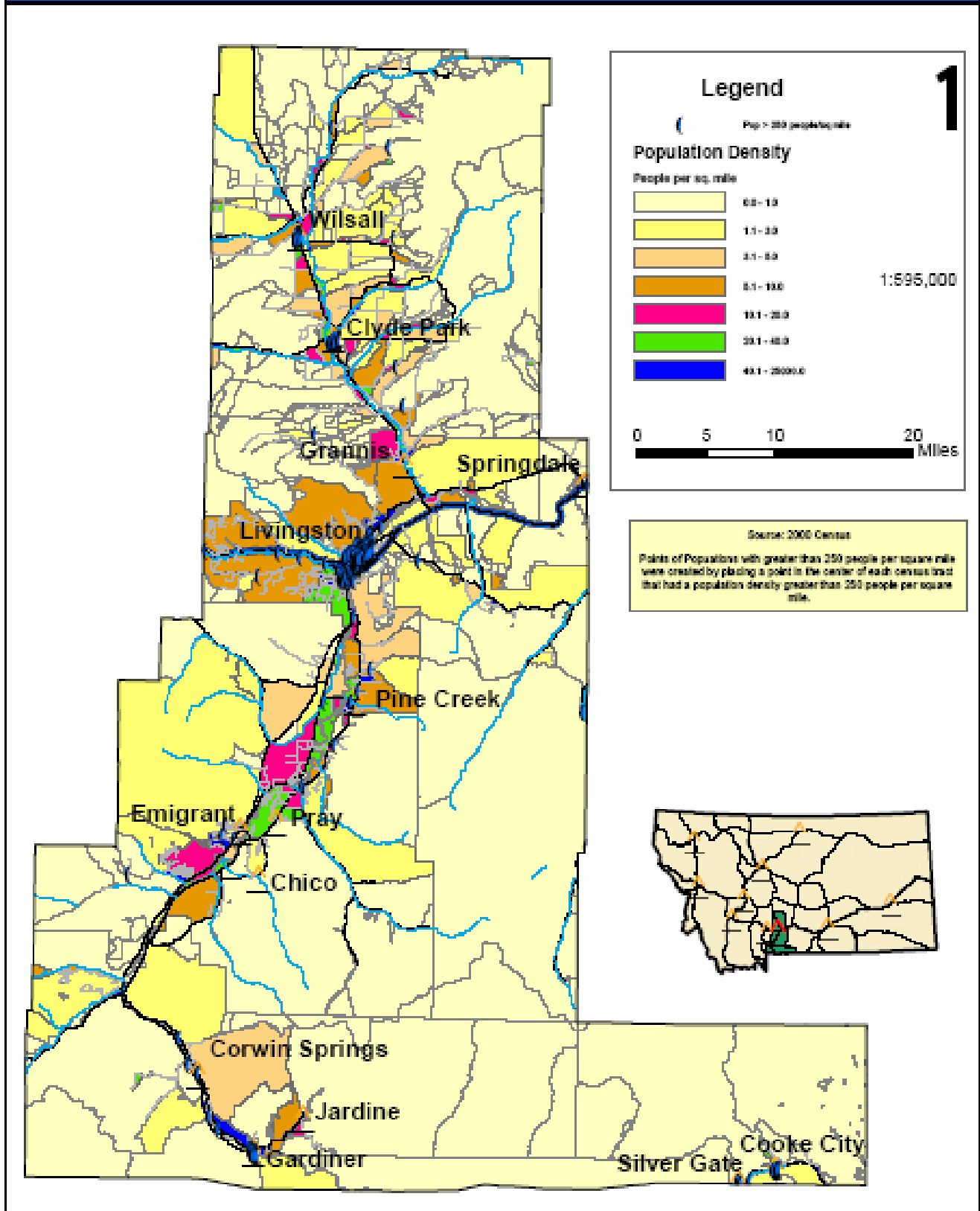
Ignition Probability of Railroads, Park County, MT



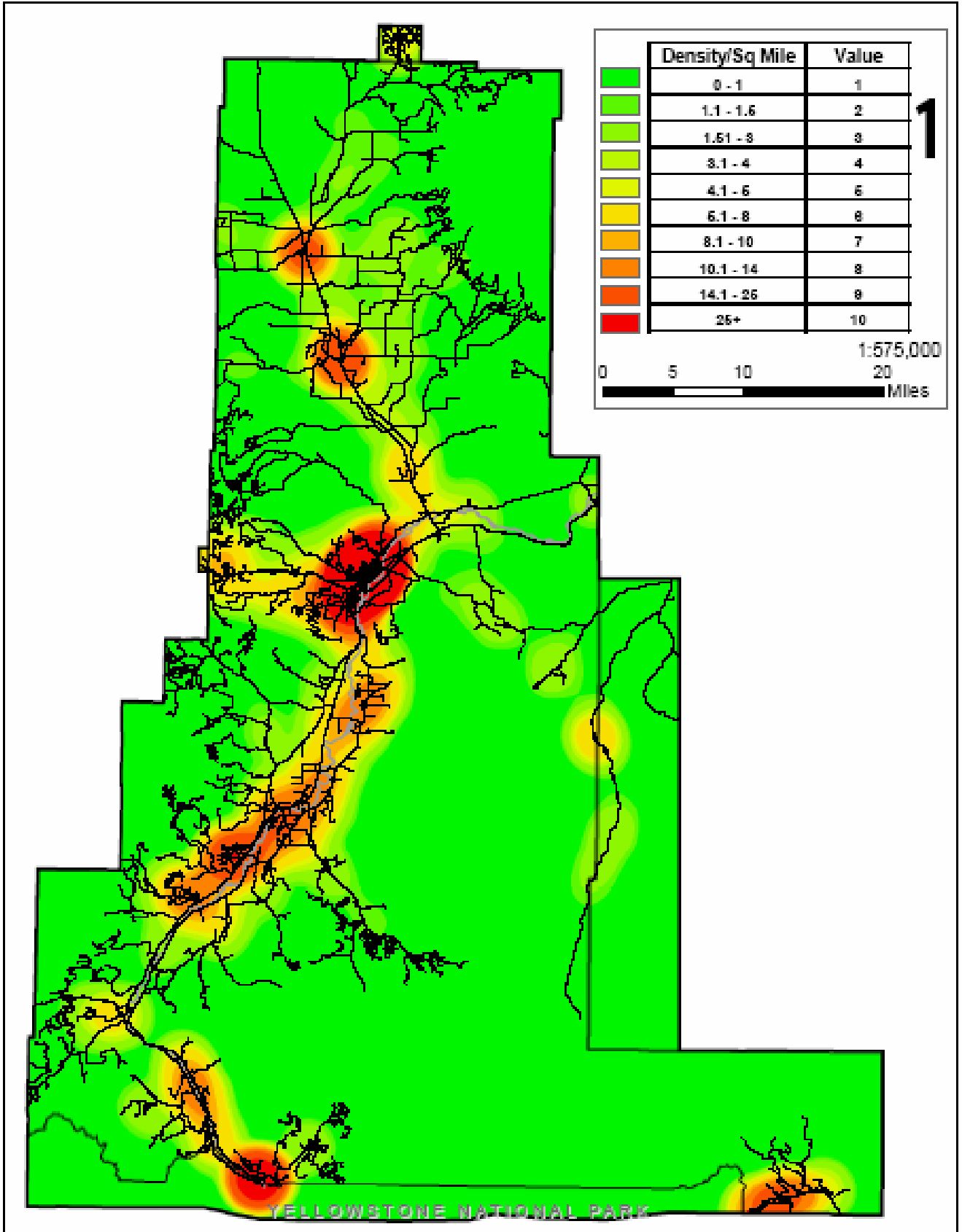
Probability of Ignition, Park County, MT



Population Density, Park County, MT

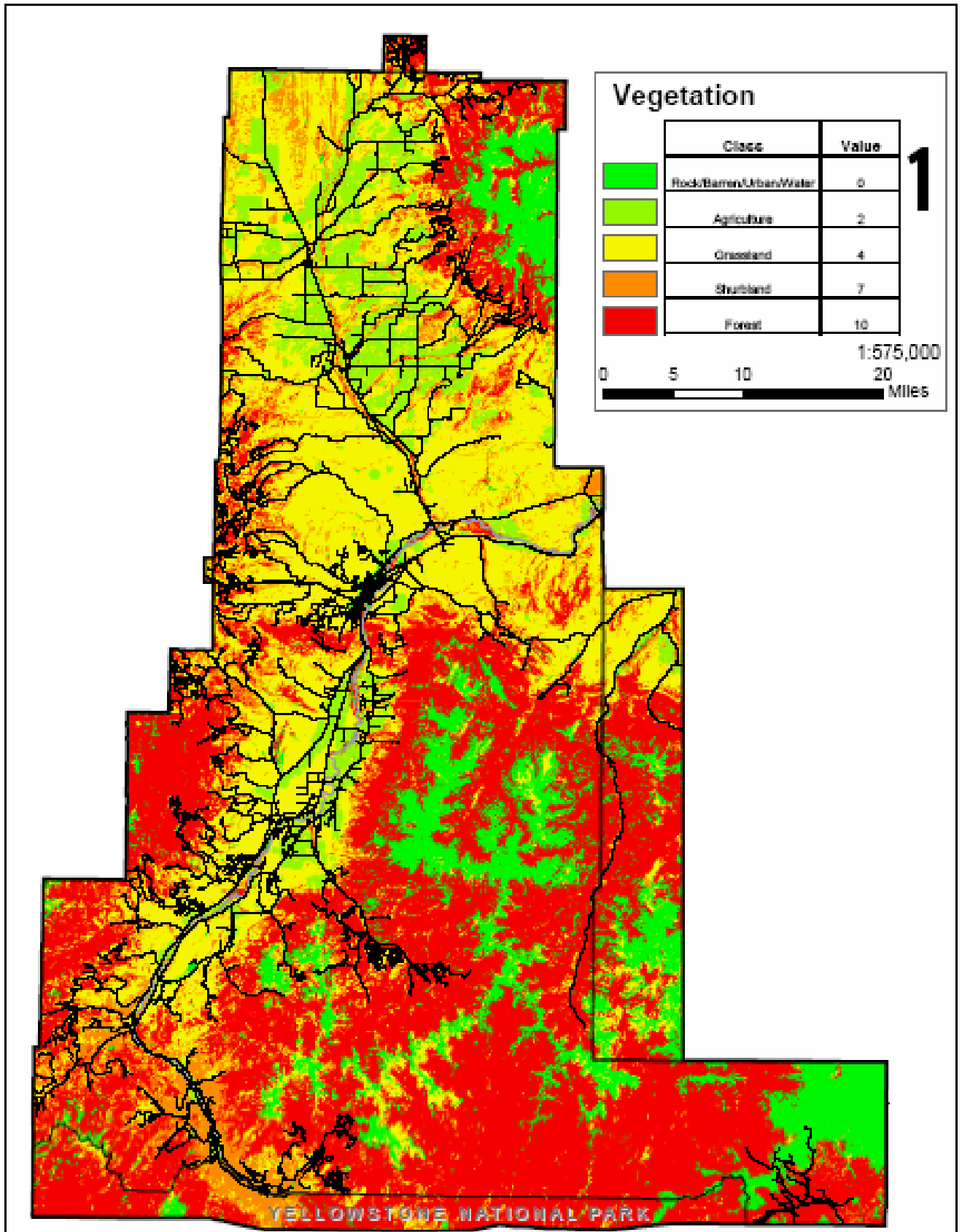


Structure Density, Park County, MT

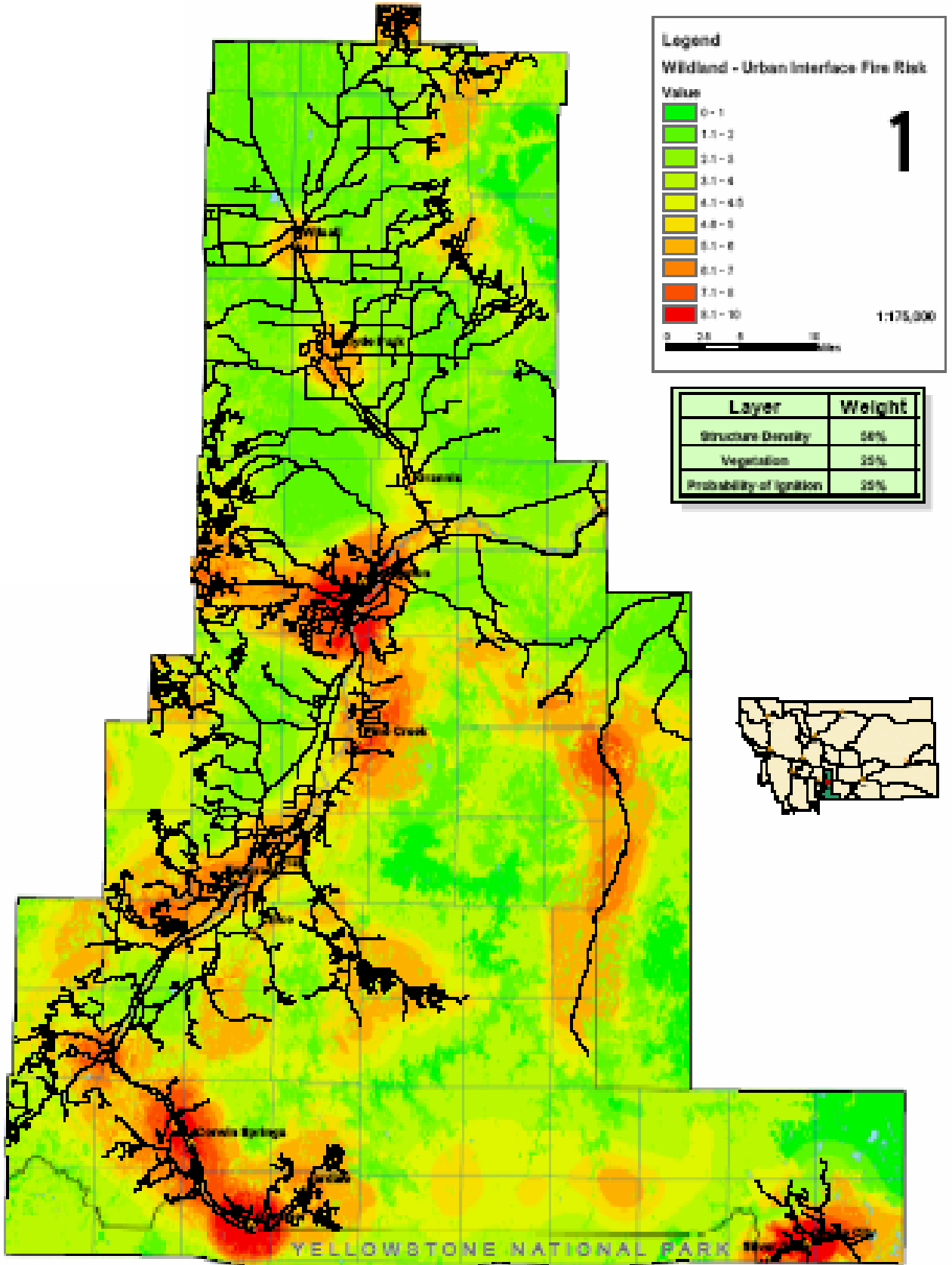


A-10

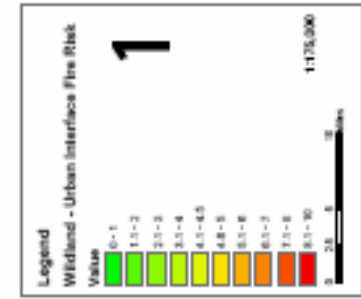
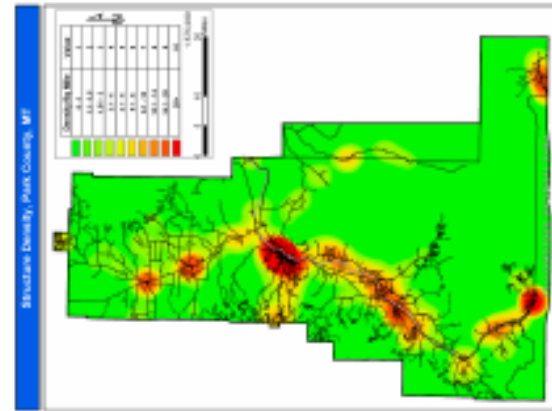
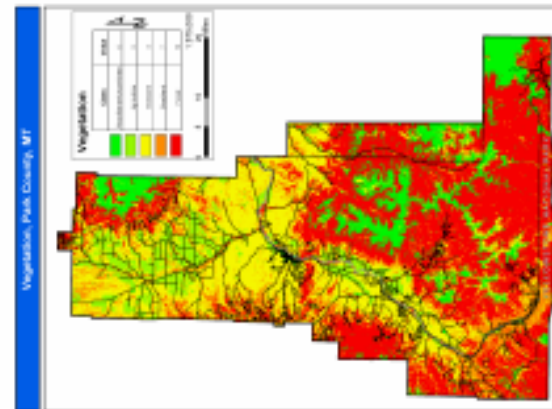
Vegetation, Park County, MT



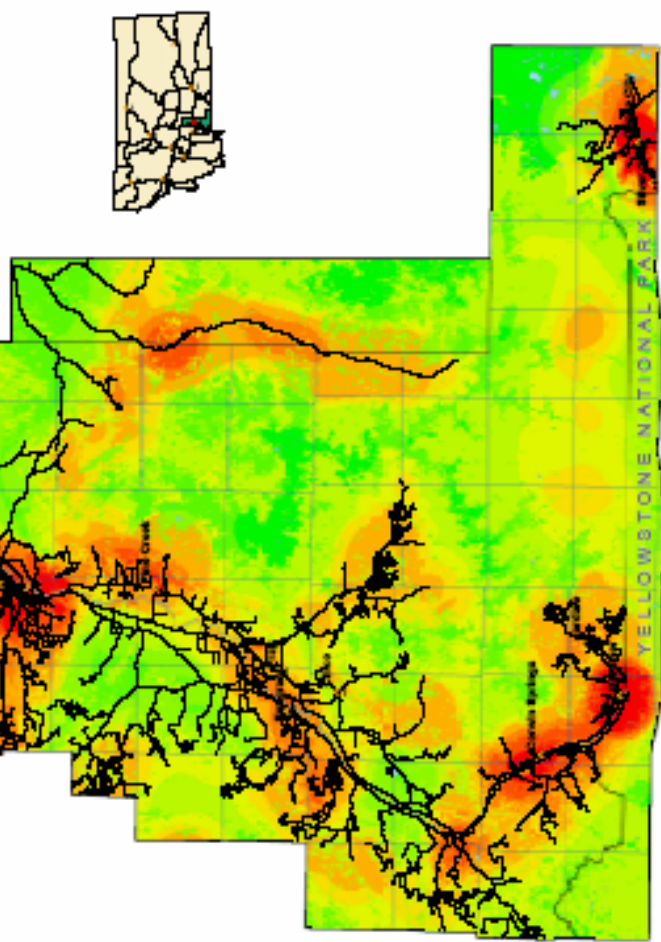
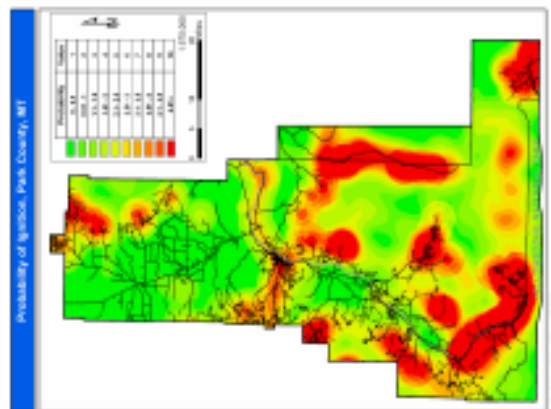
Park County Wildland - Urban Interface Fire Risk



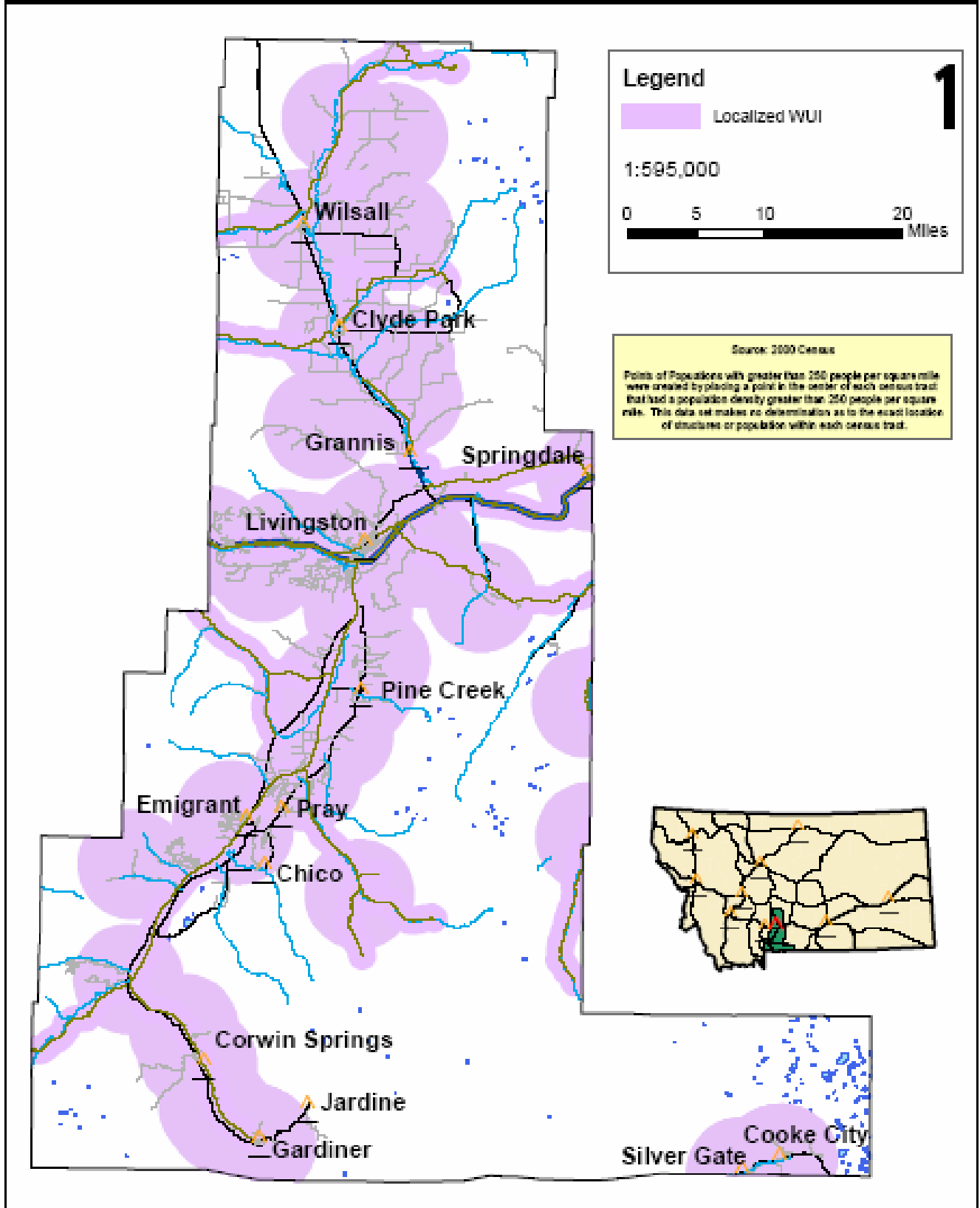
Park County Wildland - Urban Interface Fire Risk



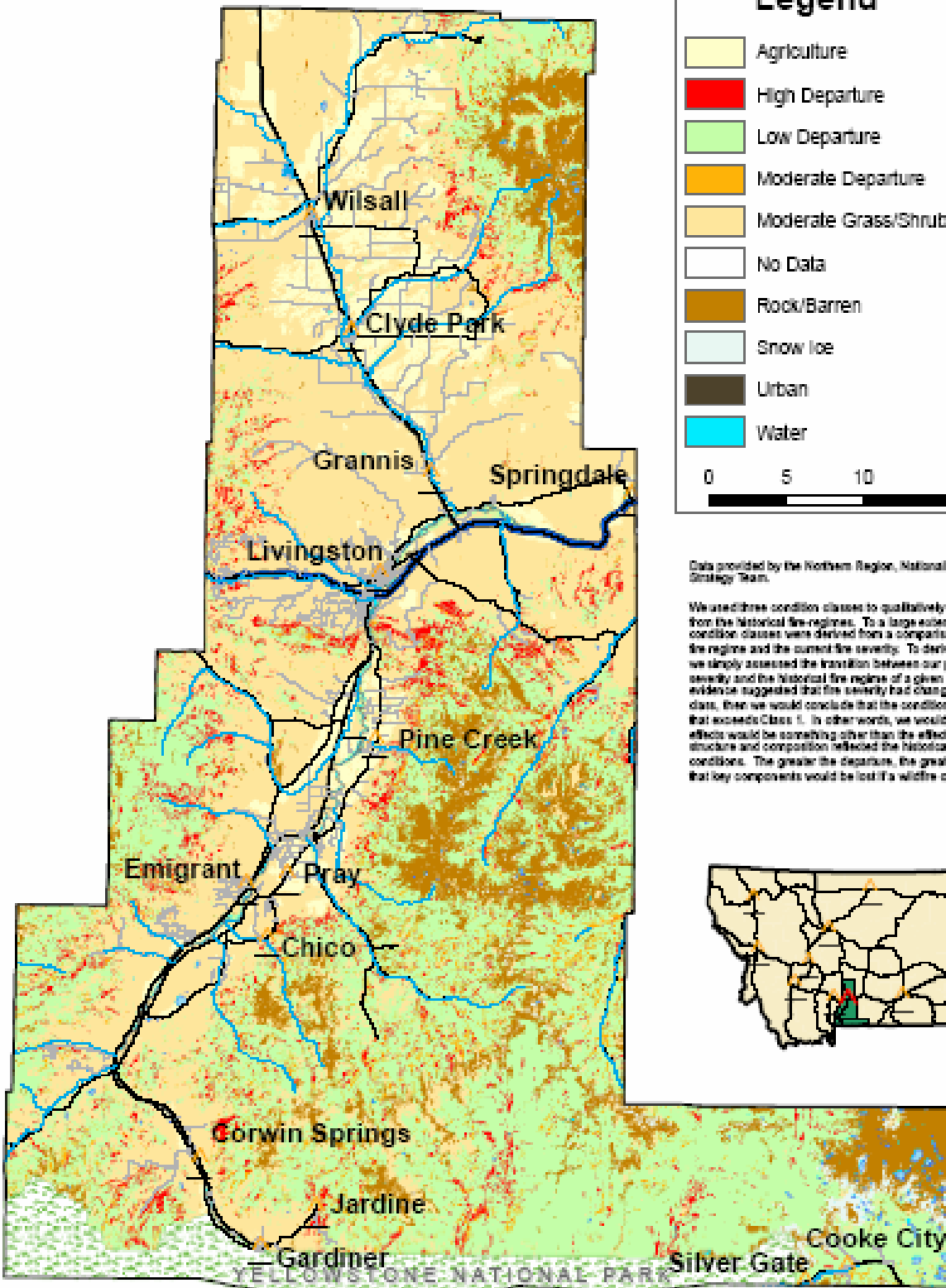
Layer	Weight
Structure Density	50%
Vegetation	35%
Probability of Ignition	15%



Localized WUI, Park County, MT



Fire Regime Condition Class, Park County, MT



Legend

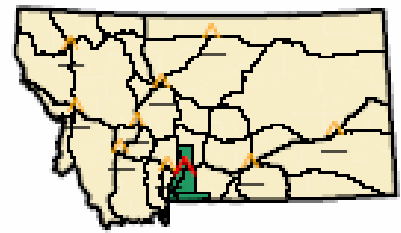
- Agriculture
- High Departure
- Low Departure
- Moderate Departure
- Moderate Grass/Shrub
- No Data
- Rock/Barren
- Snow Ice
- Urban
- Water

1

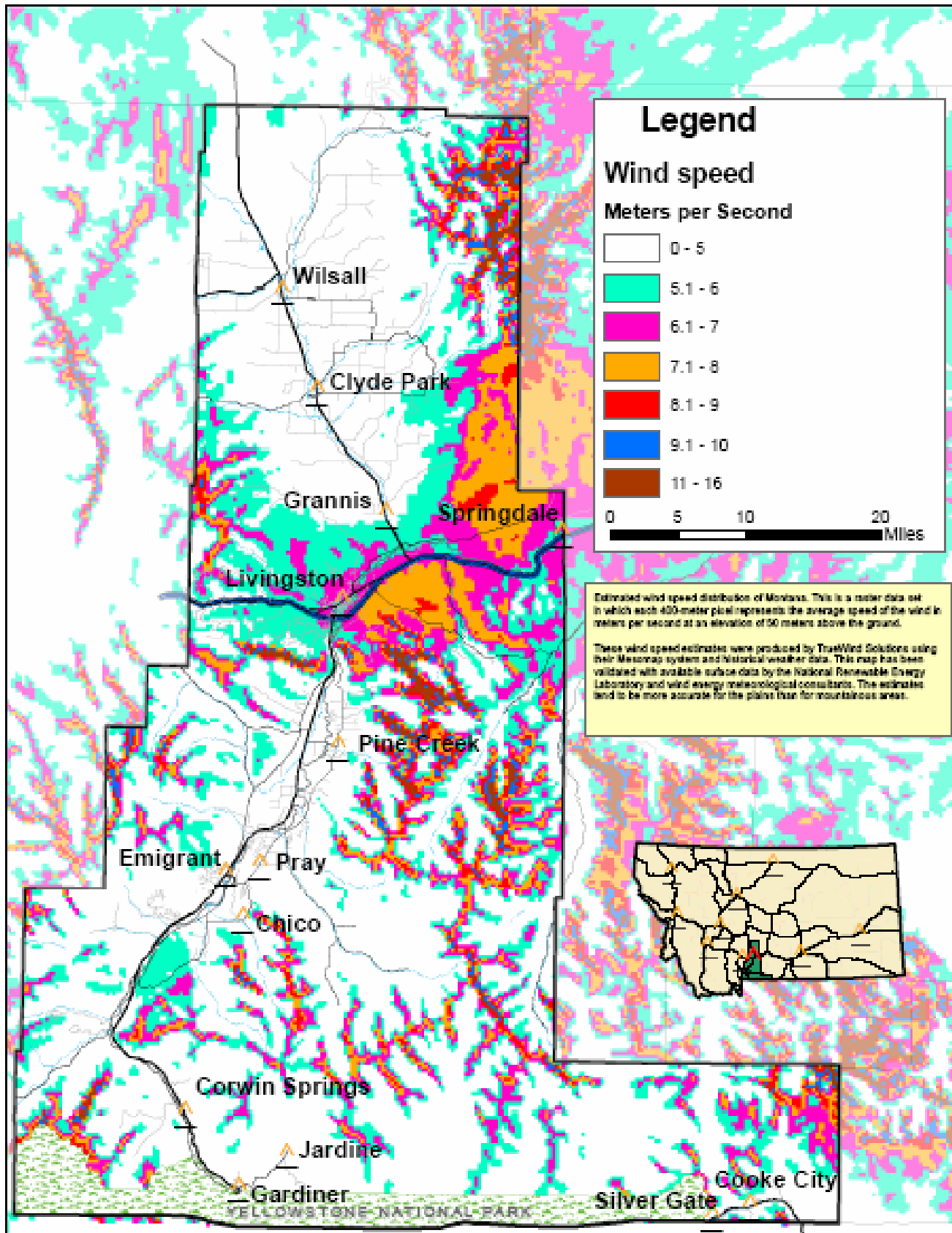
1:600,000
0 5 10 20 Miles

Data provided by the Northern Region, National Fire Plan Cohesive Strategy Team.

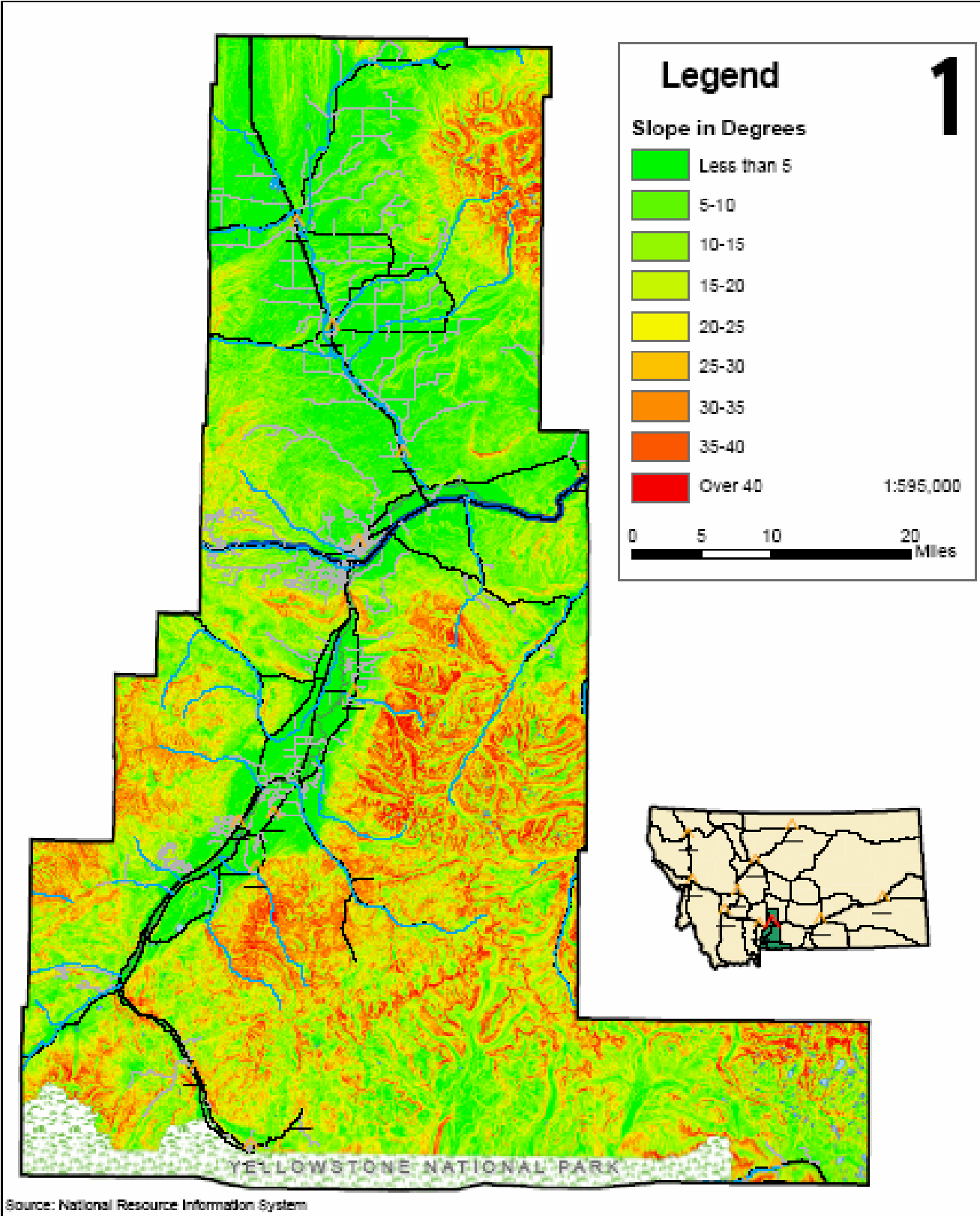
We used three condition classes to qualitatively rank the departure from the historical fire regimes. To a large extent, fire regime condition classes were derived from a comparison of the historical fire regime and the current fire severity. To derive condition class, we simply assessed the transition between our projected current fire severity and the historical fire regime of a given site. If the evidence suggested that the severity had changed by at least one class, then we would conclude that the condition class has a value that exceeds Class 1. In other words, we would infer that the fire effects would be something other than the effects expected if the structure and composition reflected the historical range of conditions. The greater the departure, the greater the probability that key components would be lost if a wildfire occurred.



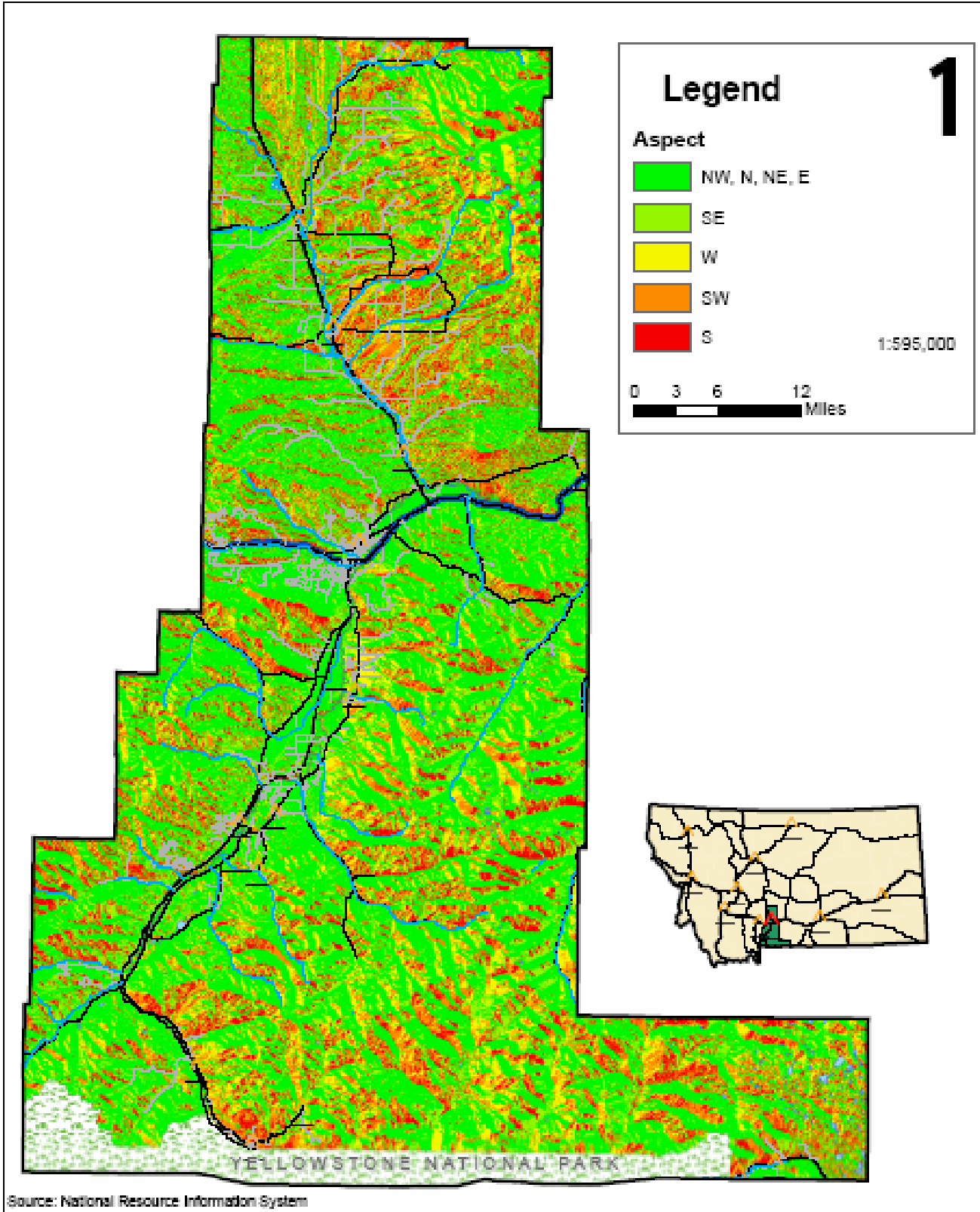
Wind Speed, Park County, MT



Slope of Park County, MT



Aspect, Park County, MT



Appendix B-1

Sample Park County Home Assessment Form

Name: _____ Location: _____ Date: _____

Risk	Rating	Points possible	Points assigned
Fire Risk Rating from Risk Assessment Map	Use Map to find rating	10	
Condition Class	CC3	6	
	CC2	2	
	CC1	0	
ISO Rating	Rating from fire protection	10	
Ingress/egress	Only one route in and out	2	
	Travel over bridges with load limits	2	
	Route condition		
	Narrow, two way traffic difficult	2	
	Poor condition, hard for emergency vehicles to travel	2	
	Moderate or above fuel loading along route	2	
Access to viable water source	No	4	
	Yes	0	
Proximity to other high risk areas See Risk Assessment Map	2 or more sides	2	
	< 2 sides	0	
Values at risk Within 2 miles from home	Municipal watersheds	1	
	High voltage substations	1	
	Communication towers and arrays	1	
	Historical sites/ archeological sites	1	
	Commercial companies that would result in damage to local economy if lost	1	
	Government facilities	1	
	Hospital or clinic	1	
Recently treated	No	4	
	Yes	0	
Adjacent to recently or planned treatment areas	No	0	
	Yes	2	
	Planned	4	
Homeowner interested	No	6	
	Yes	0	
Fire Behavior/suppression efforts <i>Areas where these are of special concern</i>	Topography		
	Slope over 25%	2	
	Aspect, s,sw,w	2	
	Winds, > 8 meters per second	2	
	Diseased fuels, beetle or worm	2	
Primary Residence	Yes	10	
	No	0	
Rating		TOTAL	
LOW 0 - 30 MODERATE 31-59 HIGH 60 - 85		SCORE	

APPENDIX C

RURAL FIRE DEPARTMENT NUMBERS

Park County consists of the following Fire Districts:

Clyde Park City Fire Department	Clyde Park Rural Fire District
Cooke City/Silvergate Rural Fire District	Park County Rural Fire District #1
Gardiner Fire District/Gateway Hose Co.	Wilsall Fire District
Paradise Valley Fire Service Area	Livingston City Fire Department
Park County Fire Department	

2005, Park County numbers:

Total Permanent positions and Volunteers: 160

Vehicle class	Numbers	Personnel Capacity
Engines (Type 1,2,3)	16	63
Tenders	5	12
Aerial Apparatus	2	9
Brush/Quick Attack	17	44
Rescue Vehicles	2	6
Other	15	50

Response Type	Number
Structural Fire	56
Vehicle Fire	19
Vegetation Fire, Wildland	145
EMS Response Calls	1363
Rescue	131
Hazardous Condition/Material Calls	41
Service Calls	101
False Alarms	114
Other	51
Total Responses	2021

APPENDIX D

Public and Steering Committee Meetings

Public Meetings

Spring 2005	Mill Creek
June 16, 2005	Cooke City
July 10, 2005	Livingston Peak Homeowners Association
March 10, 2006	Wilsall
April 2006	Livingston
June 5, 2006	Livingston

Public Comment Notices

Newspaper: Livingston Enterprise, 3 issues in May.

Draft Copies were posted on the following websites:

www.nrmrcd.org

www.parkcountyrfd.org

Steering Committee Meetings

February 6, 2006	Livingston	Notes held at NRMRC& D
March 13, 2006	Livingston	
March 24, 2006	Livingston	
June 6, 2006	Livingston	

APPENDIX E

REFERENCE MATERIALS

The following documents were used as references for the writing of the Park County Community Wildfire Protection Plan.

- Preparing a Community Wildfire Protection Plan – A Handbook for Wildland-Urban Interface Communities.
- A Homeowner’s Guide to Retrofit. 2001
- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment. 10 Year Comprehensive Strategy. 2001, 2002
- Fire Risk Rating. Montana Department of Department of State Lands. 1993
- Regional Community Wildfire Protection Plan, Tri-County Fire Working Group. 2005
- Community Wildfire Protection Plan, Leaders Guide Supplement, International Association of Fire Chiefs. May, 2005.
- Predicting Behavior and Size of Crown Fires in the Northern Rocky Mountains. Richard Rothermel, 1991.
- Managing the Impact of Wildfires on Communities and the Environment, A Report to the President In Response to the Wildfires of 2000. September, 2000.
- The Healthy Forests Initiative and Healthy Forests Restoration Act, Interim Field Guide. February 2004.
- Field Guidance, Identifying and Prioritizing Communities at Risk. National Association of State Foresters, June 2003.
- Federal Registry, Part III, Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire. August 2001.
- Reducing the Wildland Fire Threat to Homes: Where and How Much? Jack D. Cohen, 1990.
- Structure Ignition Assessment Can Help Reduce Fire Damages In The W-UI, Jack D. Cohen, Jim Saveland, Volume 57, Number 4, 1997.
- Structure Ignition Assessment Model. Jack D. Cohen, 1997.
- What is the Wildland Fire Threat to Homes?, Presented as the Thompson Memorial Lecture, April 10, 2000, at School of Forestry, Northern Arizona University, Flagstaff, AZ. Jack D. Cohen.
- DNRC Form F-710.

APPENDIX F

ACRONYMS

BLM	Bureau of Land Management
CNF	Custer National Forest
CWPP	Community Wildfire Protection Plan
DNRC	Department of Natural Resources and Conservation
FPO	Fire Protection Organizations
GIS	Global Information System
GNF	Gallatin National Forest
GPS	Global Positioning System
HFRA	Healthy Forest Restoration Act
ICP	Incident Command Post
ICT3 team	Incident Command Type 3 team
ISO (rating)	Insurance Service Organization
L&C NF	Lewis and Clark National Forest
MOU	Memorandum of Understanding
NFP	National Fire Plan
NRMRC&D	Northern Rocky Mountain Resource Conservation and Development
PCCWPP	Park County Community Wildfire Protection Plan
NRNFPCST	Northern Rockies National Fire Plan Cohesive Strategy Team
RFD	Rural Fire Department
SCZ	South Central Zone
USFS	United States Forest Service
VFD	Volunteer Fire Department
WUI	Wildland Urban Interface

APPENDIX G

GLOSSARY

Aspect: The direction in which a sloped tract of land faces.

Brush: A collective term that refers to stands of vegetation dominated by shrubby, woody plants or low-growing trees, usually of a type undesirable for livestock or timber management.

Community at Risk: A collection of homes and structures that is intertwined with forest fuels and is considered to have high potential to be lost if a wildfire starts in that area.

Condition Class 1: 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 the historical range.

Condition Class 2: 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 and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.

Condition Class 3: 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 departure 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.

Crown Fire: The movement of fire through the crowns or tops of trees or shrubs independently of the surface fire. A fire is said to be crowning when the flames get up into the tops of trees and spreads.

Defensible Space: An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and resources or lives at risk. In practice, defensible space is generally defined as an area of 30 feet or more around a structure that is cleared of flammable brush or vegetation or other fuels.

Ecosystem: An interacting natural system including all the component organisms together with the biotic environment and processes affecting them.

Extreme Fire Behavior: "Extreme" implies a level of fire behavior characteristics that ordinarily precludes methods of direct control action. One or more of the following are usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, a strong convection column. Predictability is difficult because such fires often exercise influence on their environment and behave erratically, sometimes dangerously.

Firewise: A public education program developed by the National Wildland Fire Coordinating Group that assists communities located in proximity to fire-prone lands. (Comprehensive Strategy, 2001.)

FPO: Fire Protection Organization. Such as a volunteer fire department or federal agency.

Fire Behavior: The manner in which a fire reacts to the influences of fuels, weather, and topography.

Fire Break: A natural or constructed barrier used to stop or check fires, or to provide a control line from which to work.

Fire Intensity: The amount of heat a fire is generating.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Regime : Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval.

Fire Regime Current Condition Class: A qualitative measure classified into three classes describing the relative degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings.

Fire Regime Groups: A classification of fire regimes into a discrete number of categories based on frequency and severity. The national, coarse-scale classification of fire regime groups commonly used includes five groups: I - frequent (0-35 years), low severity; II - frequent (0-35 years), stand replacement severity; III - 35-100+ years, mixed severity; IV - 35-100+ years, stand replacement severity; and V - 200+ years, stand replacement severity.

Fire resistant: Refers to ability to resist igniting. Fire resistant floras are less ignitable under the same circumstances.

Fuel: Combustible material. Includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees that feed a fire. Also includes homes and other buildings.

Fuel Loading:

The amount of fuels present expressed quantitatively in terms of weight per unit area.

Fuel Model: Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Fuel Moisture: The quantity of moisture in fuels expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit. Also referred to as fuel moisture content.

Fuels Reduction: Manipulation, including combustion or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. Often includes thinning and/or prescribed burning.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Ground Fuels: All combustible materials below the surface litter, including duff, tree or shrub roots, punky wood, peat, sawdust, and other materials that can support a glowing combustion without flame.

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Infrastructure: Essential businesses, building, services that form the foundation of a community: hospital, police, etc.

Initial Attack: The actions taken by the first resources upon arrival at a wildfire to protect lives and property and prevent further expansion of the fire.

Ladder Fuels: Fuels which provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help start and continue crowning on a fire.

Litter:

Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer. It's composed of loose

debris including sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

Mitigation: Actions that moderates the severity of a fire hazard or risk.

National Wildlife Coordinating Group (NWCG): A group formed under the direction of the Secretaries of Agriculture and the Interior that includes representatives of the U.S. Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, and National Association of State Foresters. The group's purpose is to handle coordination and effectiveness of wildland fire activities and provide a forum to discuss and resolve issues and problems of substantive nature. NWCG is the certifying body for all courses in the National Fire Curriculum.

Normal Fire Season: 1) A season during which the weather, fire danger, and number and distribution of fires are about average. 2) Period of the year that normally comprises the fire season.

Preparedness: Condition or degree of being ready to cope with a potential fire situation. Preparedness Levels are determined by region and nationally as the season progresses, based on current and expected conditions.

Prescribed Fire: Any fire ignited by management actions under certain pre-determined conditions to meet specific objectives related to hazardous fuels reduction or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met prior to ignition. Prescribed fires are ignited and managed within a "window" of very specific conditions including winds, temperatures, humidity, and other factors specified in the burn plan.

Prevention: Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuels hazards.

Probability of Ignition: The chance that a firebrand will cause an ignition when it lands on receptive fuels.

RFD: Rural Fire Department.

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as a rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually it is expressed in chains or acres per hour for a specific period in the fire's history. (A chain is 66 feet.)

Restoration: The active or passive management of an ecosystem towards its original structure, natural compliment of species, and functions or ecological processes. (Cohesive Strategy, 2000.)

Rehabilitation: Commonly referred to as "rehab," the work necessary to repair damage or disturbance caused by wildland fire or suppression activities. Often includes restoration of firelines or dozer work, and projects such as erosion control, installation of water bars or culverts, re-seeding or other rehab of fire-damaged areas.

Risk: The chance of a fire starting.

Slash: Debris left after logging, pruning, thinning, or brush cutting; can include logs, chips, bark, branches, stumps and broken understory trees or brush.

Slope: The amount a landscape rises of over distance.

Small Diameter Biomass Utilization: Finding uses for forest material that has typically been too small for practical use.

Structural Ignitibility: The ease of which a structure ignites.

Structure Fire: Fire burning any part or all of any building or structure.

Suppression: All the work of extinguishing or containing a fire, beginning with its discovery.

Surface Fuels: Loose litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Tactics: Deploying and directing resources on an incident to accomplish the objectives designated by strategy.

Thinning: Selectively removing trees within a stand to reduce tree density.

Uncontrolled Fire: Any fire which threatens life, property, or natural resources.

Underburn: A fire that consumes surface or ground fuels but not trees or shrubs.

Values at Risk: Concrete and abstract items, (homes or aesthetics,) that are at risk of being damaged from potential wildfire.

VFD: Volunteer Fire Department.

Wildland Fire Implementation Plan (WFIP): A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire that is managed for resource benefits.

Wildland Urban Interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Wildland Fire: Any non-structure fire, other than prescribed fire, that occurs in a wildland area.

Woody Debris: Remnants of forest components on the forest floor: branches, downed trees etc.

These definitions, unless otherwise noted were taken from the National Fire Protection Agency's web site.