Pitkin County
Wildfire Protection Plan

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TABLE OF CONTENTS

1. INTRODUCTION

In 2000, the Colorado Legislature passed legislation clarifying responsibilities for wildland fire management in the State. House Bill 1283 redefined the responsibilities of County Sheriffs, the State Board of Agriculture, and the State Forester to include the prevention, control and management of wildland fire. The Bill authorized Boards of County Commissioners to cooperate in managing as well as preventing and suppressing forest fires. The legislation authorized counties to prepare and implement a County Fire Plan.

In 2009, the Colorado Legislature passed Senate Bill 09-001, which requires the board of county commissioners of each county, with the assistance of the state forester, to determine whether there are fire hazard areas within the unincorporated portion of the county. SB 09-001 further requires the board of county commissioners (BOCC), in collaboration with the representatives of the organizations or entities that participated in establishing the guidelines and criteria, to prepare a Community Wildfire Protection Plan (CWPP) to address wildfires in fire hazard areas within the unincorporated portion of the county. SB 09-001 further specifies that a county that has already prepared a CWPP which considered the guidelines and criteria is not required to prepare a new CWPP to satisfy the requirements of the act.

SB 09-001
http://wwwstate.co.us/gov%20dir/leg%20dir/olls/sl2009a/sl%20189.htm

In early 2009, Pitkin County Emergency Management, local fire chiefs, US Forest Service, and Bureau of Land Management staff met with Colorado State Forest Service staff to review the intent and requirements of SB 09-001 and the 2005 Pitkin County Wildfire Protection Plan. Through this meeting it was decided that the 2005 Pitkin County Wildfire Protection Plan (PCWFP) was consistent with the intent and goals of SB 09-001, but should be updated to incorporate new CWPP guidance as well as the changed fire hazards associated with the ongoing mountain pine beetle (*Dendroctonus ponderosae*) epidemic. The 2009 Draft update and this 2011 draft update to the PCWFP meets the intent and goals of SB 09-001.

The Pitkin County Wildfire Protection Plan began with collaboration between local and state agencies in consultation with federal agencies and other interested parties. This understanding establishes a mutual commitment to the mission and objectives outlined in the Pitkin County Wildfire Protection Plan to facilitate interagency collaboration in the implementation of a wildland fire program in Pitkin County.

This plan includes identification and prioritization of areas for hazardous fuel reduction, recommended types of treatment, and provides guidance how to protect at-risk essential infrastructure through the development of sub-County level CWPPs. Recommended

measures for homeowners, business owners, and communities to reduce ignitability of structures within the community are available in the Firewise home protection programs, but the intent is that more detailed plans be developed at the sub-County level.

Firewise Wildfire Home Protection
http://www.ext.colostate.edu/pubs/natres/06304.html)

Preparing a Community Wildfire Protection Plan
http://www.stateforesters.org/files/cwpphandbook.pdf

The content of this plan is consistent with CWPP guidance as established by the Healthy Forest Restoration Act through the incorporation of:

- a definition of the community wildland-urban interface (WUI), preferably outlined on a map with an accompanying narrative,
- a discussion of the community's preparedness to respond to wildland fire,
- a community risk analysis that considers, at a minimum, fuel hazards, risk of wildfire occurrence, and community values to be protected, both in the immediate vicinity and the surrounding zone where potential fire spread poses a realistic threat,
- identification of fuels treatment priorities, including locations on the grounds and preferred methods of treatment
- recommendations regarding ways to reduce structural ignitability,
- an implementation plan or Action Plan, and
- the plan must specifically identify the community for which the plan is prepared.

The Pitkin County Wildfire Protection Plan and the 2009/2011 updates are intended to aid in the implementation of a seamless, coordinated effort among all relevant agencies in determining appropriate combinations of wildland fire management actions and programs in the county. The Pitkin County Wildfire Protection Plan outlines six interagency management objectives that are necessary to achieve and implement effective wildland fire management programs:

1. Prevention
2. Preparedness
3. Mitigation
4. Suppression
5. Reclamation /Rehabilitation
6. Fiscal

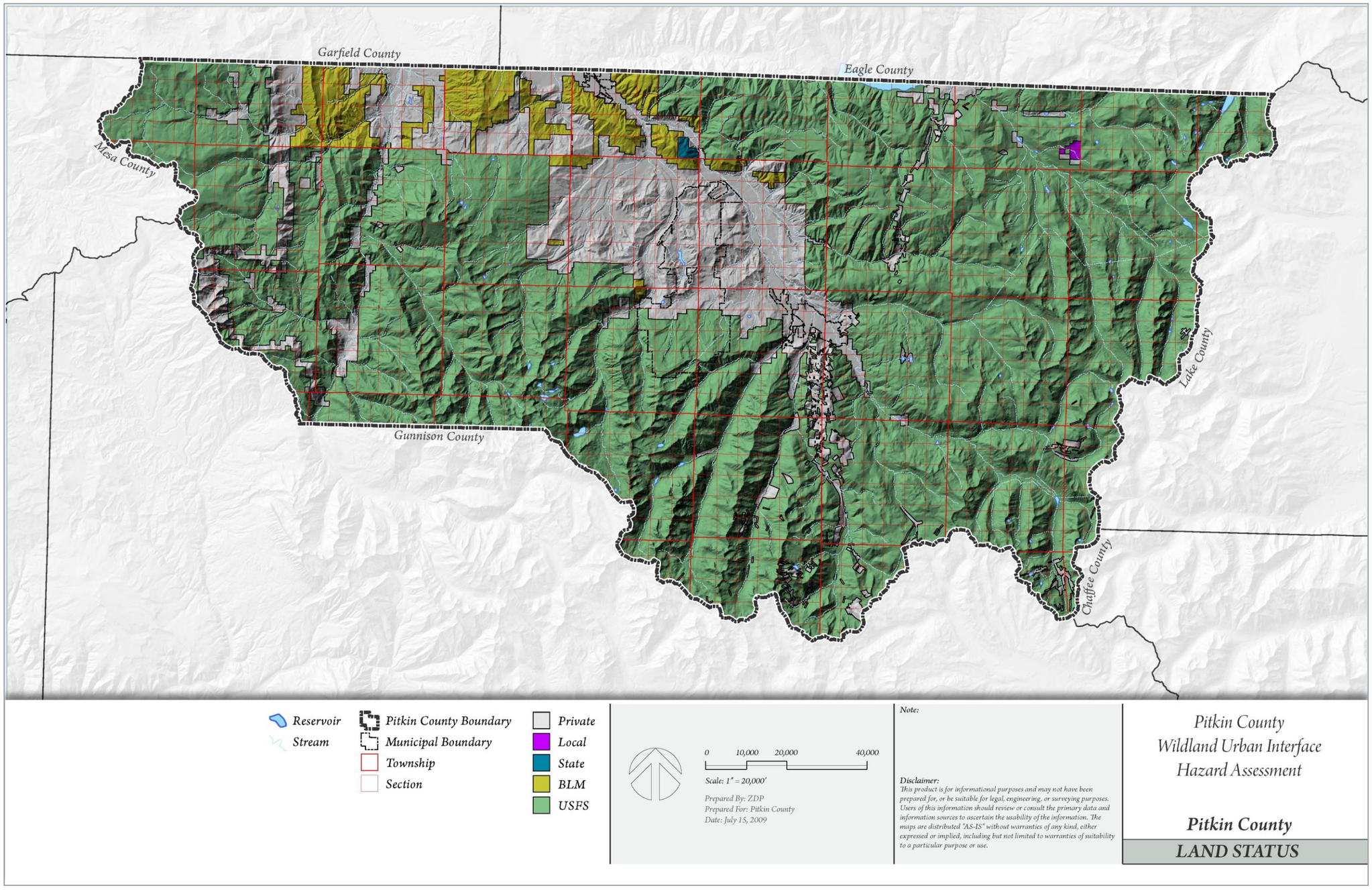
This plan identifies the roles and responsibilities of Pitkin County, the United States Forest Service - White River National Forest (Sopris and Aspen Ranger Districts), Colorado State Forest Service-Grand Junction District (CSFS), Aspen Fire Protection District (AFPD), Snowmass-Wildcat Fire Protection District (SWFPD), Basalt & Rural Fire Protection District (BFPD), and Carbondale & Rural Fire Protection District (CFPD), and specifies contacts for each agency. Activities needed to achieve the objectives are identified and prioritized.

Each activity listed contains a brief description of the issue, background information, and specifies agencies involved, estimated costs, funding sources and estimated completion date.

1.1. Authority

The Pitkin County Wildfire Protection Plan is being prepared and implemented among various governmental authorities. This plan is consistent with the Healthy Forests Restoration Act, and guidance from the Colorado State Forest Service.

1.2. Figure 1: Pitkin County Land Status Map



2. Pitkin County Characteristics

Pitkin County is located in west-central Colorado. Pitkin is the 24th largest county in the state out of 64 counties, encompassing approximately 975 square miles (626,832 acres). The ownership of the County is dominated by United States Department of Agriculture, Forest Service lands, of which 490,760 acres (78% of the County) is owned by the White River National Forest, 27,915 acres (4.5%) is owned by the Bureau of Land Management, 800 acres (less than 1%) is owned by the State (primarily the Colorado Division of Wildlife), and 107,358 acres (17%) is privately held. Pitkin County's population is estimated at approximately 15,500 (according to the 2008 census), and the median cost of a home in Pitkin County is approximately $760,000.

The majority of private lands and homes are located along the major river corridors- the Roaring Fork and Crystal River valleys. Other homesites and developments follow other river drainages, including the Frying Pan River, Snowmass Creek, Woody Creek, Castle Creek, Conundrum Creek and East Sopris Creek. However, many of the new developments are occurring further from these main corridors, moving up onto hillsides and areas with more remote access.

Pitkin County is unique in its fire suppression, given that so much of the county is dominated by higher elevation fuel types that burn infrequently, and that more urban areas are located in areas surrounded by National Forest lands. Initial attack and extended attack is often done by the local Fire Protection Districts (FPD), with the support of the USFS and BLM. Because of this, the local FPDs have more extensive wildland fire fighting related skills, equipment and incident command experience than one would expect for organizations found outside of the Federal land management agencies. In other areas around the state with more frequent wildfires, the Federal fire fighting resources are often more heavily involved with initial attack, with incidental and opportunistic support from local FPDs.

Geography

Pitkin County is dominated by several large mountain ranges. The Elk Mountains roughly form the western and southern sides of the county, while the Sawatch Range runs the eastern boarder of the county. In between these mountain ranges, valleys hold the majority of the population, as well as the majority of private ownership lands. The elevations in the county range from 6,250' along the Crystal River south of Carbondale, to over 14,000' on a number of peaks in the Maroon Bells/Snowmass Wilderness Area. The majority of Pitkin County is dominated by high elevation forests and alpine environments, with the lower valleys dominated by irrigated farmlands and urban/suburban developments. In between the high elevation forests and alpine habitats and the lower farmlands lay pinion/juniper woodlands, oakbrush stands, aspen forests, lodgepole pine forests, and much of the rural population.

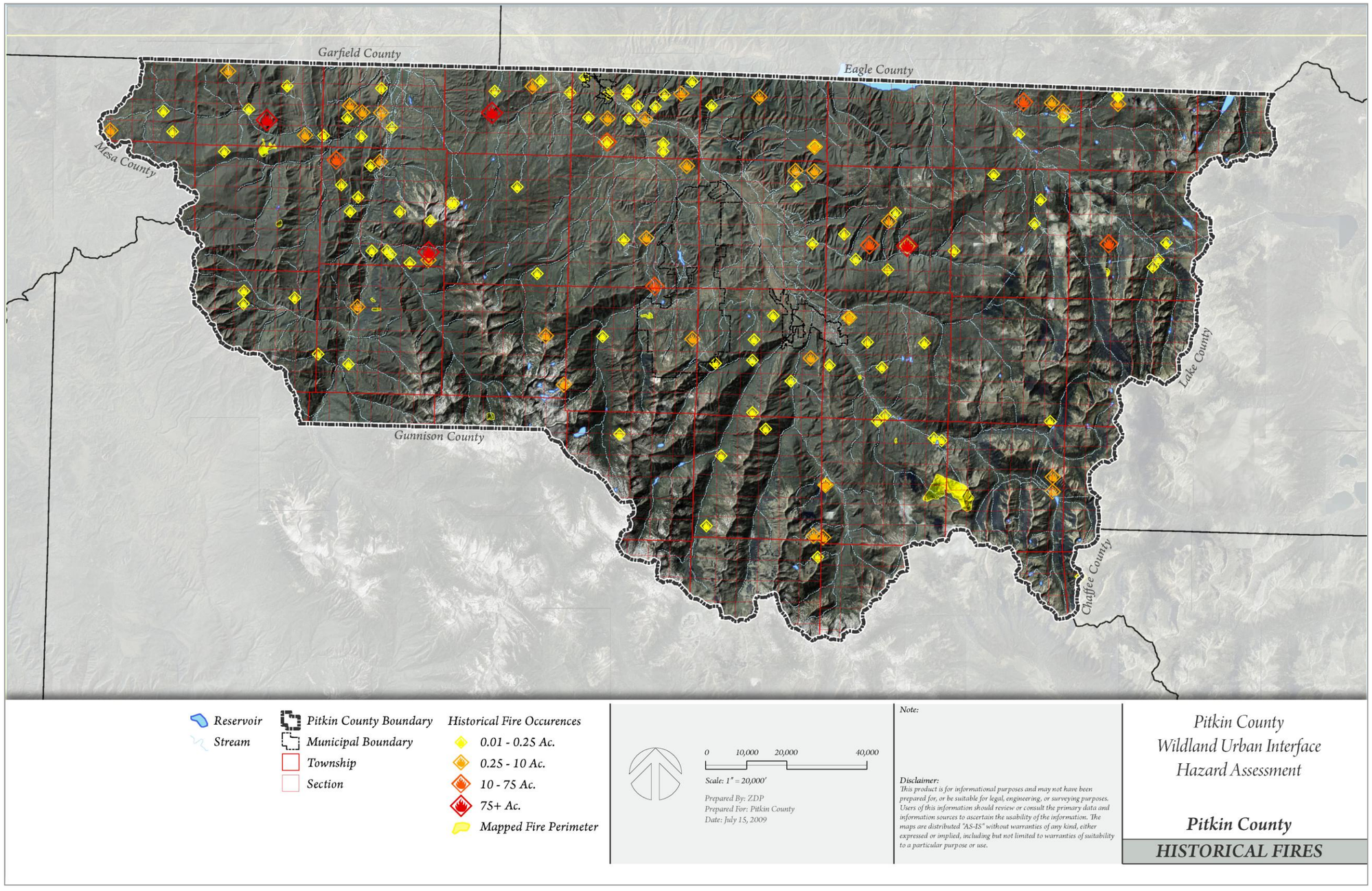
Rainfall in the county widely varies, from over 48" in the Maroon Bells, to a dry 13" in the lower Crystal River valley south of Carbondale, with average rainfall around 23".

2.1. Fire History

Wildland fire occurrence in Pitkin County is tracked by three agencies. The zoned management of the White River National Forest/Bureau of Land Management, records fire data from Federal lands. Colorado State Forest Service (CSFS) keeps records of fires on state and private lands. CSFS statistics only reflect those wildland fires reported by local fire departments.

As with most areas in Colorado, the majority of fires started are from human-caused (including equipment) ignitions. Likewise, only a few of the fires in the County end up accounting for the majority of acreages burned.

2.2. Pitkin County Historic Wildfire Occurrence Map



2.3. Mountain Pine Beetle

Mountain Pine Beetle (http://www.ext.colostate.edu/pubs/insect/05528.html)

Aspen Pitkin MPB Information & Links
(http://www.aspenpitkin.com/Portals/0/docs/county/Com%20Dev/EHNR/Mtn_Pine_Beetles.pdf)

The Colorado State Forest Service reports that the current mountain pine beetle epidemic in Colorado has impacted approximately 1.5 million acres to date. As this epidemic reaches Pitkin County, an update to the County Wildfire Plan was requested to provide planning information on how this epidemic may impact wildfire hazards in Pitkin County.

2.3.1. Forest Conditions

Pitkin County is approximately 50% forested with much of the remaining vegetation types dominated by pinyon/juniper, alpine meadows, rock & scree, willows and riparian shrublands, Gambel's oak, sagebrush and agricultural grasslands. The forested areas are primarily aspen stands with widespread mixed conifer stands. The percentage of lodgepole pine and ponderosa pine contained within mixed conifer stands is not quantitatively tracked by the USFS or Pitkin County. Without stand exams or stand-level analysis, the percentage of coniferous trees susceptible to MPB is not known. However, in order to predict fire behavior and thus appropriate prioritization for planning, we typed the general fuels found in stands with MPB susceptible trees. Wildland fuels are comprised of both live and dead vegetation that are available for combustion. Of greatest immediate concern in terms of hazard fuels are the lodgepole pine forests and mixed conifer stands that surround the WUI and are being subjected to the MPB epidemic

Lodgepole Pine http://csfs.colostate.edu/pages/forest-types-lpp.html

Approximately 20, 376 acres of stands dominated by lodgepole pine occur within Pitkin County. This is approximately 6% of the forested timber types found in Pitkin County.

The fire return interval for this species is extremely variable, but is generally 25 to 75 years in stands experiencing mixed severity fire and 100 to 300 years in stand replacement fire regimes (Anderson 2003, Lotan et al 1985, Arno and Fielder 2005).

Landfire analysis classifies the majority of local lodgepole forests as mixed to stand replacement fire severity on order of every 100 to 300 years.

In many stands the lodgepole pine grows tall and the lower limbs are self pruned, offering little opportunity for fire to climb into the tree crowns. The forest floor is covered by densely packed needles, with a noticeable paucity of understory vegetation, which only supports very low intensity surface fire. If fire does reach the crowns in such stands, they can support crown fire. More open lodgepole woodlands have a lower crown density, lower limbs, and heavier understory growth. Fire is more likely to torch the crowns of individual or small groups of trees, but less likely to be carried from crown to crown.

These stands are currently suffering heavy mortality resulting from the MPB epidemic as documented by the USFS (USDA 2007). If the infestation continues at its current rate, mortality of mature lodgepole pine may exceed 90%. The mortality is currently most pronounced on Mount Sopris, in Woody Creek, on Independence Pass and on Smuggler Mountain. Known work on fuelbreaks, overlot thinning, and defensible space has been performed near Smuggler Mountain (east of Aspen) at this time, but other smaller projects may be occurring on other lands. Many of the other stands with lodgepole pine do not occur near the WUI.

Engelmann Spruce - Subalpine Fir
http://www.uwsp.edu/geo/projects/virtdept/ipvft/subalp.html

Spruce-fir stands develop on moist, cool sites typically above 10,200 feet and experience infrequent stand replacing fires on order of 150 to over 300 years apart. The low branches in these stands allow for the initiation of crown fire, and crown fire is readily propagated through the dense canopy under the right conditions. It requires unusually dry conditions to support large scale fires in these forests, but the abundance of ladder fuels and closed canopy can support high intensity crown fires. The spruce/fir community type accounts for approximately 59% of the timber type in Pitkin County, however a significant portion of this is also mixed with aspen timber types.

These thin barked species are extremely sensitive to fire and will be killed by even low intensity fires (Schoennagel et al 2004, Uchytil 1991a, Uchytil 1991b). While both species are shade tolerant, subalpine fir will tend to slowly dominate the stand.

While the lodgepole forests of Pitkin County are currently experiencing a MPB epidemic, spruce and fir can also be impacted by insect outbreaks. The presence of

spruce beetles was noted during recent field surveys of the County, as well as armellaria root rot and balsam fir beetle in subalpine fir stands. No wide-spread infestations or disease of spruce or fir were noted in field visits for this project. In the County, lodgepole pine is often a component of spruce/fir stands at lower elevations.

Quaking Aspen

http://plants.usda.gov/plantguide/pdf/cs_potr5.pdf

Aspen exist in a post-disturbance seral stage or in stable, self perpetuating stands. This thin barked species is easily top-killed by fire, but readily regenerates from the surviving root system. From many standpoints, aspen stands are a desired forest type in the WUI. They provide some privacy screening for residences, are widely used by wildlife species, and are aesthetically pleasing while being generally fire resistant. Aspen stands also provide summer shade while allowing for winter sun. In Pitkin County, approximately 74,000 acres (24% of timbered vegetation) of occurs, but another 39,865 acres (13% of total timbered vegetation) of aspen occurs as a codominant with other evergreen trees species.

Aspen, MPB infested lodgepole pine and spruce/fir stands juxtaposing near Capitol Peak

Fire is the most important disturbance agent for aspen regeneration in Colorado, but aspen stands are generally considered fire resistant (Romme 2001). The high thin crowns resist crown fire initiation and spread. Fire return intervals for Colorado aspen are believed to be approximately 140 years, but stand health may tend to decline after about 80 years without disturbance (Romme 2001). Fire exclusion may result in the decadence and decline of an aspen stand or in conifer encroachment. Both cases jeopardize stand survival and create conditions prone to higher intensity fires.

2.3.1.1. Table 2: Existing Vegetation Types in Pitkin County

Pitkin County Existing Vegetation Summary

Date: 07.16.2009

Vegetation Class	*Description*	*Acres*	*Percent*
Water	*Lakes, reservoirs, rivers, streams.*	1,140.4	0.2%
Riparian	*Cottonwood, willow, sedges along waterways.*	2,403.7	0.4%
Snow	*Perennial snow fields.*	2,964.7	0.5%
Alpine Meadow	*> 11,500' tundra vegetation including grasses, forbs, sedges.*	50,640.1	8.1%
Talus Slopes & Rock Outcrops	*Talus and scree slopes, nearly 100% rock.*	14,087.8	2.3%
Rock	*< 10% vegetation, rock outcrops, red sandstones, etc.*	54,624.6	8.8%
Barren Land	*< 10% vegetation.*	9,647.7	1.6%
Douglas Fir/Aspen Mix	*Mixed forest codominated by PSME and Aspen.*	18,556.3	3.0%
Spruce/Fir/Aspen Mix	*Mixed forest codominated by PIEN, ABLA, and Aspen.*	21,309.0	3.4%
Lodgepole Pine	*Coniferous forest dominated by PICO.*	20,386.7	3.3%
Douglas Fir	*Coniferous forest dominated by PSME.*	13,020.2	2.1%
Englemann Spruce/Fir Mix	*Coniferous forest codominated by PIEN and ABLA.*	161,199.2	25.9%
Aspen	*Deciduous forest dominated by Aspen.*	74,444.6	12.0%
PJ-Mtn Shrub Mix	*Codominate Pinon-Juniper and Oak, Mtn. Mahogany or other deciduous shrubs.*	7,046.0	1.1%
PJ-Sagebrush Mix	*Codominate Pinon-Juniper and Sagebrush.*	1,242.1	0.2%
Upland Willow/Shrub Mix	*High elevation shrubland dominated by willow and mixed shrubs.*	34,845.1	5.6%
Mesic Mountain Shrub Mix	*Oak dominant with sagebrush, snowberry, grass.*	16,663.6	2.7%
Gambel Oak	*Deciduous woodland (or tall shrubland) dominated by Gambel oak.*	40,224.4	6.5%
Pinon-Juniper	*Pinon-Juniper woodland with mixed understory.*	764.7	0.1%
Sagebrush/Grass Mix	*Codominate sagebrush shrubland and perennial grassland.*	24,455.6	3.9%
Sagebrush Community	*Sagebrush with rabbitbrush, bitterbrush.*	432.9	0.1%
Grass/Forb Rangeland	*Perennial and annual grasslands and/or mixed forbs.*	30,371.0	4.9%
Agriculture Land	*Row crops, irrigated pasture, dry farm crops.*	7,767.6	1.3%
Urban/Built Up	*High density commercial or high density residential areas.*	213.6	0.0%
UNCLASSIFIED	*Areas not mapped within Pitkin County vegetation data.*	12,924.8	2.1%
	Total	**621,376.5**	

2.3.2. Fuels Analysis

To analyze potential fire behavior, these forests must be considered in terms of how they support combustion and fire spread. Current fuel conditions are discussed here while projected fuel conditions are discussed in **Section 2.3.5.**

Vegetation communities are described in terms of fuel models, which do not always correspond directly to species composition. The load and arrangement of surface fuels, the distance to the base of the forest canopy, and the density of the forest canopy are subject to specific evaluation. These characteristics help determine the surface fire intensity, the likelihood of crown fire initiation and propagation.

Potential surface fire behavior may be estimated by classifying vegetation in terms of fire behavior fuel models (FBFMs) and using established mathematical models to predict potential fire behavior under specific climatic conditions. These models represent points along a continuum and are used here to illustrate potential fire hazard. In this analysis, the standard fire behavior fuel models developed by Scott and Burgan (2005) were used as obtained from Landfire data (U.S. Department of Interior, Geological Survey 2006). Canopy characteristics for fire behavior modeling were also obtained from Landfire and were then linked to the appropriate FBFM. Field observations were generally consistent with the Landfire fuel model data.

2.3.2.1. Table 3: Fire behavior fuel model descriptions found in Pitkin County

FBFM	Description
NB 1, 2, 3, 8 & 9	**Non-burnable, including urban areas, snow & ice, agricultural lands, open water, and bare ground**
GR2	**Primarily grass with some small amounts of fine, dead fuel, and shrubs which do not affect fire behavior**. Low flame length and rate of spread. Found locally in meadows.
GS1	**Low load shrubs with low grass cover. The spread rate is moderate and flame length is low.**
GS2	**Moderate Load, Dry Climate Grass-Shrub:** The primary carrier of fire in GS2 is grass and shrubs combined. Shrubs are 1 to 3 feet high, grass load is moderate. Spread rate is high; flame length moderate. Found locally in meadows and clearcuts.
SH1	Woody shrubs and shrub litter, fuelbed depth is about 1 foot, may be some grass, but the spread rate and flame lengths are low. Sagebrush types in the County fall into this fuel model.
SH2	Woody shrubs and shrub litter, the fulebed depth is about 1 foot, but with no grass. The spread rate and flame lengths are low. Tall sagebrush, and shorter mixed-mountain shrublands (i.e. serviceberry & snowberry) fall into this fuel model
SH7	Woody shrubs and shrub litter, with a very heavy load. The fuelbed depths are 4 to 6 feet, with a moderate spread rate but very high flame length. Pinyon/juniper and Gambel's oak woodlands fall into this fuel model.
TL8	**Moderate load long needle pine litter. This model fitted best in Pitkin County for describing ponderosa pine stands, and occupies a very minor component in the County**
TU1	Low Load Dry Climate Timber-Grass-Shrub: The primary carrier of fire in TU1 is low load of grass and/or shrub with litter. Spread rate is low; flame length low. This model described about half of the timber fuel type in the County.
TU5	**Very High Load, Dry Climate Timber-Shrub:** The primary carrier of fire in TU5 is heavy forest litter with a shrub or small tree understory. Spread rate is moderate; flame length moderate. This model described about half of the timber fuel type in the County.

From Scott and Burgan 2005

The following fuel types are identified within Pitkin County, and may be susceptible to MPB and other forest pathogen-induced mortality. Predicted post-MPB attack fuel characteristics and fire behavior is presented.

TU1: Low Load Timber Understory

TU1 is identified as one of the predominant fuel models in the County, occupying 28% of the area based on Landfire data. Landfire primarily includes aspen and lodgepole pine in this fuel model. Fire is carried in the low loads of conifer litter and light load of course fuels. Surface fire in this fuel model is characterized by low flame lengths and rates of spread (Scott and Burgan 2005). The canopy base height was set to reflect a severe case scenario of 5 ft. Canopy bulk density was set to 0.0086 lbs/ft^3.

TU5: Heavy Load, Dry Climate Timber-Shrub

Landfire analysis identifies TU5 as the one of the predominant fuel models in the County, occupying 20% of the area. This fuel model is consistent with spruce-fir forest and lodgepole pine with emerging spruce, fir, or pine regeneration. In TU5 the fire spread rate and flame length are moderate. Surface fire is carried by heavy forest litter with a shrub or small tree understory (Scott and Burgan 2005). Canopy characteristics were determined using Landfire data, field observations, and comparison to stereo photo samples (Scott and Reinhardt 2005). For fire behavior modeling, crown bulk density was set at relatively dense 0.015 lbs/ft^3 while fire behavior was modeled for canopy base heights (cbh) of 2.5 feet and 5 feet to reflect field observations.

2.3.2.2. Table 4: Models in the Landfire Dataset for Pitkin County

Fire Behavior Fuel Model	FBFM Abbreviation	Vegetation Communities	Percent of Cover
Moderate Load Long Leaf Pine Litter	TL8	Ponderosa Pine	0.31%
Very High Load, Timber and Shrubs	TU5	spruce-fir, lodgepole with regeneration	20%
Low Load Timber Understory	TU1	aspen, lodgepole pine, some spruce/fir	28%
Very High Load Shrub	SH7	Pinyon/juniper, Gambel's oak- *likely underrepresented in County*	<.01%
Moderate Load Shrub	SH2	Sagebrush, pinyon/juniper and Gambel's Oak	5.27%
Low Load Shrub	SH1	Sagebrush, snowberry	0.13%
Moderate Load Grass and Shrubs	GS2	Meadows w/ sagebrush, snowberry	22%
Short, Sparse Grass	GS1	Shrubby meadows, sparse sagebrush	0.04%
Short Grass	GR2	Meadows, alpine tundra	2.34%
Bare Ground and Rock (not burnable)	NB9	--	17.8%
Open Water (not burnable)	NB8	--	0.42%
Agricultural (not burnable)	NB3	Agricultural meadows, some wet meadows along montane streams- *may burn during spring season*	2.07%
Snow/Ice (not burnable)	NB2	--	0.33%
Urban	NB1	Includes some subdivisions in the WUI- which are definitely burnable	1.22%

2.3.3. Fire Behavior Analysis

Fire behavior is defined as the manner in which a fire reacts to the influences of fuel, weather, and topography. Two key measures of this behavior are the rate of spread and the intensity. These indicators are modeled for surface fire behavior at the flaming front and do not represent crown fire behavior or spread by spot fires. These predictions are used to illustrate the current and projected degree of hazard around the WUI focus areas where MPB may impact fuel conditions.

Rate of spread is often expressed in chains (1 chain = 66 feet) per hour which is equal to 1.1 feet per minute. Fireline intensity is reflected by flame length at the flaming front; it does not account for continued burning of fuels once the main fire front has passed.

Fire behavior simulations were conducted for average (50th percentile) and severe (90th percentile) conditions for the critical months of the fire season, June through September, as determined from the RAWS data (**Table 5**). Slope steepness was set to 20 percent.

BehavePlus 3.0.1 (Andrews 2000) software was used to illustrate the potential surface fire behavior given the prevailing fuel types, local topography, and local weather conditions. Runs were made for the two most prevalent timber fuel models, TU1 and TU5. TU5 was modeled with two canopy base heights to reflect the diversity of observed conditions.

2.3.3.1. Table 5: BehavePlus Predictions of Fire Behavior on 20 Percent Slope for Average and Severe Climatic Conditions for pre-epidemic conditions.

Fire Behavior Fuel Model	Description	Rate of Spread (chains/hr)		Flame Length (feet)		Torching		Able to Support Active Crown Fire	
		Avg	Severe	Avg	Severe	Avg	Severe	Avg	Severe
TU1	Low Load Timber Understory: aspen stand, and less dense conifer stands	1.8	4.5	1.1	2.5	No	No	No	Yes
TU5 2.5 ft. cbh	Very High Load Timber-Shrub: denser conifer stands with low cbh	5.4	20.1	5.8	11.2	Yes	Yes	No	Yes
TU5 5 ft. cbh	Very High Load Timber-Shrub: denser conifer stands with higher cbh	5.4	20.1	5.8	11.2	Yes	Yes	No	Yes

-Average conditions based on 50th percentile weather and 9 mph 20 ft windspeed
- Severe conditions based on 90th percentile weather and 25 mph 20 ft windspeed

Modeled results for forests prior to the full impact of the MPB epidemic illustrate several important points:

- TU1, typical of lodgepole pine forests with low or moderate understory fuels, generally lacks the ladder fuels necessary to initiate crown fire and requires severe conditions to propagate fire through the forest canopy.
- TU5, typical of mixed conifer or lodgepole with an emerging understory, generally has sufficient ladder fuels even with a 5 ft. cbh to support torching. Crown fire will actively spread through the forest canopy under severe conditions.

2.3.4. Ecology of Mountain Pine Beetle

Mountain Pine Beetle, Colorado
http://csfs.colostate.edu/pages/mountain-pine-beetle.html

Aerial surveys of Pitkin County indicate the size of the MPB infestation increased 740% from 1999 to 2005, from 14,021 acres to 104,293 acres. Within the County, lodgepole pine stands occur in relatively isolated areas, and are often co-dominated by other tress including Douglas-fir (*Pseudotsuga menzeisii*), Engelmann spruce (*Picea engelmannii*), aspen (*Populus tremuloides*) and subalpine fir (*Abies bicolor*). Because of this, mountain pine beetle activity can be locally detrimental to lodgepole pine and ponderosa pine, but the widespread stand mortality seen in other areas of Colorado is tempered by the fact that other trees species occur within the forest stands in Pitkin County. J. Burke (USFS pers. comm. 7/15/2009) hypothesizes that MPB in Colorado can be broken down into roughly two infestation types- "source" stands and "sink" stands (or "victim" stands). Large contiguous stands of lodgepole pine can produce an overabundance of MPB, which have formed the huge epidemic populations seen in Grand, Summit and eastern Eagle County. This large population of beetles will then infest small and less suitable stands where the beetles will infest and kill suitable host trees, but as the "sink" stands do not have a propensity of suitable host trees, the MPB infestation will not produce an overabundance of beetles. Within Pitkin County, most of the forest stands could be considered to be "sink" stands, however, the unfortunate effects are the same- all or most suitable host trees will succumb to MPB. At the time of this report update, all lodgepole pine stands in Pitkin County are considered to be infested with MPB, and most suitable lodgepole pine trees will be dead within the next 2 to 3 years. Suitable ponderosa pine trees in the county will also likely succumb to MPB within the next few years.

In the Pitkin County the impacts of the epidemic are still variable. Many of the lodgepole pine stands east of Aspen, in Woody Creek and on Mount Sopris are taking on the noticeably red hue of mortality, but as other trees species are co-mingled with the lodgepole pine the effects are somewhat tempered.

2.3.5. Effects of MPB on Fuels

During the first year of a MPB attack, pine needles remain green. In year two, the needles turn yellow or red, eventually dropping off entirely in year three or four. Beginning about five years post mortem, the dead stems become increasingly susceptible to rot and blow-down. The post epidemic fuel profile will depend on a number of variables including the number of years post mortem, the composition of the forest

understory, and subsequent disturbances. The further out from the initial epidemic, the more difficult it becomes to predict the fuel model as more variables are introduced.

Surface Fire Behavior Fuel Models (FBFM) are projected for the relatively short time frame of 10 to 20 years to help provide an understanding of the post epidemic fuel hazard. There is no doubt that the MPB epidemic will greatly increase the amount of dead biomass in lodgepole forests, but predictions that this translates into an immediately drastic increase in the fire hazard is an oversimplification. The cycle is nuanced and complex, and a variety of fuel profiles and fire concerns will emerge.

The expected changes in fuels are discussed here in terms of the standard generalized fuel models. In general terms, TU1 (low load timber understory) can be expected to transition into TL5 (high load conifer litter) as dead fall begins to accumulate approximately 10 years post mortem. The fine and course fuel loads increase, but regeneration is slow in establishing itself.

Development of understory fuel loading (TL5) in lodgepole pine stands

TU5 (very high load, timber and shrub) will experience a release of the existing understory, increase regeneration, and increased dead fuel loads. This may continue to be modeled as TU5 (Green 2007), though it may be more instructive to increase the dead fuel loads to levels similar to those found in SB2 (moderate load activity fuel or low load blowdown). To illustrate this condition, fire behavior runs were made with a TU5 "heavy load" with dead fuel loads increased by 0.25, 0.5, and 1 ton per acre for 1 hour, 10 hour, and 100 hour fuel size classes respectively. As the volume of large down logs increases over time, there may be areas better represented by TL7 (large down logs).

A beetle-killed overstory with a TU5 fuel load comprised of pine and spruce regeneration

Page and Jenkins (2007) developed custom fuel models from field measurements in several Utah stands. When comparing fire behavior predictions between standard models and their own, they found that TL5 generally approximated recently impacted stands while stands were well represented by TL7 approximately 20 years after mortality. Some areas can

also be expected to move through a period where grass, seedlings, and shrubs are the dominant surface fuels. This may be especially true in project areas where logs are removed.

2.3.5.1. Table 6: Projected post-epidemic FBFMs.

Forest Type	Pre-Epidemic Fuel Model	Potential Fuel Models Approximately 10 to 20 Years Post Mortem
Lodgepole Pine with grass/low shrub understory	TU1- Low Load Timber Understory	TL5- High Load Conifer Litter TL7- Large Down Logs
Lodgepole Pine with Mixed Conifer or Heavy Understory Load	TU5- Very High Load, Timber and Shrubs	TU5- Very High Load, Timber and Shrubs or heavier

2.3.6. Effects of MPB on Potential Fire Behavior

There have been many public statements about the expected impacts of the MPB epidemic on fire behavior, but foresters and fire scientists are still trying to develop an understanding of the situation (Page and Jenkins 2007). There are many variables to consider in these diverse and constantly changing stands. It is generally understood that the amount of dead fuels is going to dramatically increase over the next 10 to 20 years and that new vegetation will grow up where the lodgepole pine stands once were.

Crown bulk density and wind adjustment factors were set to reflect canopy mortality and diminished sheltering as dead trees fall. While foliar moisture content is typically held constant at 100% for modeling purposes, the runs for MPB impacted TU1 and TU5 were made with a foliar moisture content of 30% to reflect tree crowns with dead needles (Page and Jenkins 2007).

2.3.6.1. Table 7: BehavePlus Predictions of Fire Behavior

The following table shows results from BehavePlus modeling of fire behavior on 20 Percent Slope for Average and Severe Climatic Conditions in Post-Epidemic Stands. Fire behavior outputs for post MPB epidemic stands with "red needles" are shown in orange cells for comparison. After MPB have killed off the lodgepole pine components of TU1 and TU5, and these stands begin to establish understory coniferous seedlings and saplings (within 10 years or so), these stands will transition to the post-epidemic TL5 and TU5 "heavy load" models respectively (shown in green cells). After 20 years post-MPB epidemic, we used the TL7 model to illustrate fire behavior with significant deadfall components in the fuels profile.

Fire Behavior Fuel Model	Description	Surface Fire Intensity Required for Torching Btu/ft/sec	Rate of Spread (chains/hr)		Flame Length (feet)		Torching		Able to Support Active Crown Fire	
			Avg	Severe	Avg	Severe	Avg	Severe	Avg	Severe
TU1	Low Load Timber Understory	23	1.8	4.5	1.1	2.5	No	No	No	Yes

TU1 red needles	Moderate Load Conifer Litter: red needled	6	1.8	4.5	1.1	2.5	No	No	No	Yes
TU5 2.5 ft. cbh	Very High Load Timber-Shrub	32	5.4	20.1	5.8	11.2	Yes	Yes	No	Yes
TU5 red needles	Very High Load Timber-Shrub: red needled	8	5.4	20.1	5.8	11.2	Yes	Yes	No	Yes
TU5 green needles	Very High Load Timber-Shrub: heavy load	23	6.4	24.6	6.2	12.2	Yes	Yes	No	Yes
TL5	High Load Conifer Litter	23	3.6	15.4	1.9	4.0	Yes	Yes	No	No
TL7	Large Downed Logs	23	2.9	10.3	2.0	3.9	Yes	Yes	No	No

- Average conditions based on 50th percentile weather and 9 mph 20 ft windspeed
- Severe conditions based on 90th percentile weather and 25 mph 20 ft windspeed

The fire behavior predictions illustrate several important points about the impacts of the MPB epidemic. Torching is dependent upon the proximity of flames to low branches (i.e. fireline intensity vs. cbh). While lowering foliar fuel moisture to simulate dead needles does lower the fire intensity required to ignite tree crowns, there does not appear to be an increase in crown fire activity given the environmental parameters modeled for TU1 and TU5. After MPB killed stands grow seedlings and saplings in the understory (about 10-years post-mortem), flame lengths and rates of spread increase expectedly. Due to the low crown heights in young trees, the potential for torching of the emerging post-epidemic trees is high, but the absence of a contiguous overstory diminishes the threat of active crown fire. As the stands reach maturity over the period of several decades, the crown fire hazard will reemerge with the new overstory.

The modeled fire behavior illustrates the following expectations:

- These runs did not capture an increase in predicted crown fire behavior as a result of dead needles; however the surface fire intensity required for transition to crown fire under red needle conditions is significantly lower.
- Increased dead fuel loads and the release of understory vegetation will support higher rates of spread and higher flame lengths than pre-epidemic conditions.
- Needle loss and tree mortality eventually eliminate canopy continuity, resulting in reduced crown fire activity until a new forest is established.
- The MPB epidemic will produce a pronounced cycle of change in the fuel bed over the next several decades, which will be reflected in the nuanced and shifting nature of the fire hazard.

The drier canopy conditions produced by dead crowns require less fire intensity to propagate combustion. Situations where a low surface fuel load and high canopy base height prevent torching of a live canopy may not be dramatically changed by the presence of a dead canopy. Likewise, where a live canopy was not dense or contiguous enough to support crown fire, the death of the canopy may not significantly alter fire behavior. But, as previously noted, these modeled conditions represent points along a spectrum of

conditions. It can be expected that a dead canopy will drive the threshold for crown fire activity down in most situations.

In summary, red needled canopies are more prone to crown fire, though crown fire will not be supported in all situations. The change in potential fire behavior precipitated by the MPB epidemic will be more nuanced than simply a dramatic increase in fire hazard. Because many of the lodgepole pine stands in Pitkin County are codominants with spruce/fir trees, support or enhancement of crown fire activity may occur under normal or dry times of the year, but during wetter periods of the year, or during wet years (when live fuel moistures are elevated), the presence of the dead lodgepole pine canopy intertwined with live spruce/fir canopies may support more torching or pockets of crown fire activity, but running crown fire behavior would not likely be supported. Once dead needles fall to the forest floor, the aerial fuels required to carry running crown fires will be significantly reduced and in some cases eliminated, even with the comingled spruce/fir canopies. This will be accompanied by an increase in dead surface fuels as needles and branches accumulate on the ground. The open canopy conditions will subsequently allow the release of brush, grass, and seedlings, creating potential for more intense and severe surface fire under dry conditions. As snags fall to the ground, surface fires will become more severe (longer production of higher heat), though these heavy fuels may not dramatically increase rate of spread or flame length. Higher fuel loading on the surface and the presence of larger fuels (downed logs) will make suppression and fire control more difficult and time consuming. The ability for fire crews to rapidly contain and control surface fires will be reduced, and increased snags and subsequent torching of snags will make suppression and initial attack efforts very time consuming, difficult and dangerous. Spotting distances will also likely increase due to the presence of receptive fuels (including increased grass and forb cover as well as snags and downed logs).

2.3.7. Verbenone Treatments

Mountain Pine Beetle, Colorado
http://csfs.colostate.edu/pages/mountain-pine-beetle.html

3. Pitkin County Wildland Fire Hazard Identification

Pitkin County has adopted the format of the Colorado State Forest Service's state-wide Wildfire Hazard Map and the tools used in its development (Geographical Information System based analysis), but has updated this process for this 2009 revision to incorporate new data, information, and GIS tools, and the impacts of mountain pine beetle. These maps take into consideration slope, aspect, fuel types, potential ignition sources, housing density, road density, and lighting strikes. At the County scale, this map is very accurate. At tighter scales these maps are not entirely accurate, and thus Pitkin County supports and is in the process of developing sub-County level CWPPs.

As part of the analysis process in determining wildland fire risk and hazards, we utilized the Colorado State Forest Service's model, but further enhanced the accuracy of the assessment by utilizing the more accurate Pitkin County GIS vegetation data layer. In

comparing ReGAP vegetation data, USFS data, and Pitkin County GIS vegetation data, we found that Pitkin County's vegetation data was the most accurate of these three GIS data themes, but even still the Pitkin County GIS data had some observed inaccuracies. We ground-truthed and used aerial photo interpretation to further enhance the Pitkin County vegetation data resources to key in on lodgepole pine stands due to mountain pine beetle induced mortality. From these data we produced the Wildland Fire Hazard Maps.

We then produced additional maps using the Pitkin County vegetation data layers, and incorporated Pitkin County assessor data as well as lightning strike and road data to produce overall Wildland Fire Hazard (Risk + Hazards + Values) Maps.

For all new construction or redevelopment applications in the County, the land owner/applicant must complete a Wildfire Hazard Analysis. This analysis includes a wildfire hazard assessment for the homesite. Based on fuels, slope, aspect and access, construction sites are rated as a Low, Medium or High Hazard areas. All new or additional permitted construction is required to have supplemental fuels mitigation (thinning) as defined by a qualified wildfire professional for Low, Medium and High Hazard sites. Homes within a High Hazard area have more stringent building materials and construction requirements that must be incorporated into the building design prior to permit approval. At this time, older and existing homes that have not gone through a hazard review are not being inspected under the Land Use Code guidance, but may be inspected by local Fire Marshals, the Colorado State Forest Service, local Fire Departments, or County approved fire experts by owner request, or the Fire Marshals discretion. The Wildfire Hazards guidance from the Pitkin County Land Use Code can be found in:

Pitkin County Land Use Code - Wildfire
http://www.aspenpitkin.com/Portals/0/docs/county/countycode/bocc-ord-010-03.pdf

3.1. Mapping

The templates for developing the maps in the 2009 Pitkin County Wildfire Protection Plan were developed in ArcGIS 9.2 and data was provided by the following services and agencies:

- Aspen/Pitkin County GIS Department
- Colorado State Forest Service
- Colorado Department of Transportation
- United States Forest Service
- United States Geological Service
- Bureau of Land Management

The Colorado State Forest Service (CSFS) Wildland-Urban Interface data on fire risk, hazard, and life and property "value", was utilized as a template for customizing the maps for this plan. The GIS analyst for map production and data analyses was:

Zach Perdue
Elev8, Inc.
PO Box 635
Avon, CO 81620
zperdue@elev8-inc.com
970-409-9012

Data, Projects, and Digital Maps are contained on a Compact Disk. Data is in ESRI "shapefile" and "grid" formats. Projects (.mxd) were created using ArcMap 9.2. Digital maps in ArcMap 9.2 were exported to Adobe Illustrator CS2, and finally into Adobe Acrobat (.pdf) files, as well as .jpeg image format. Map descriptions and data directory locations are listed below:

Data

Sources for base data include:

- Aspen/Pitkin County GIS Department: *parcels and structures shapefiles for value assessment, road and railroad shapefiles for risk assessment, vegetation shapefile for hazard assessment.*
- Colorado Department of Transportation: *streams and lakes shapefiles for hazard assessment, cities shapefile for display.*
- United State Forest Service: *historical fire occurrences shapefile, historical insect damage shapefiles for hazard assessment, historical lightning strike data for risk assessment.*
- United States Geological Service: *10-meter NED(National Elevation Dataset) Level 2 digital elevation model for hazard assessment.*
- Bureau of Land Management: *historical fire occurrences, land ownership for display.*

Source for all fire hazard, risk, value and final risk indices was the Colorado State Forest Service. Model weights and values and analyses methodology adopted from *Appendix A* of the *Colorado Wildland Urban Interface Hazard Assessment Methodology*

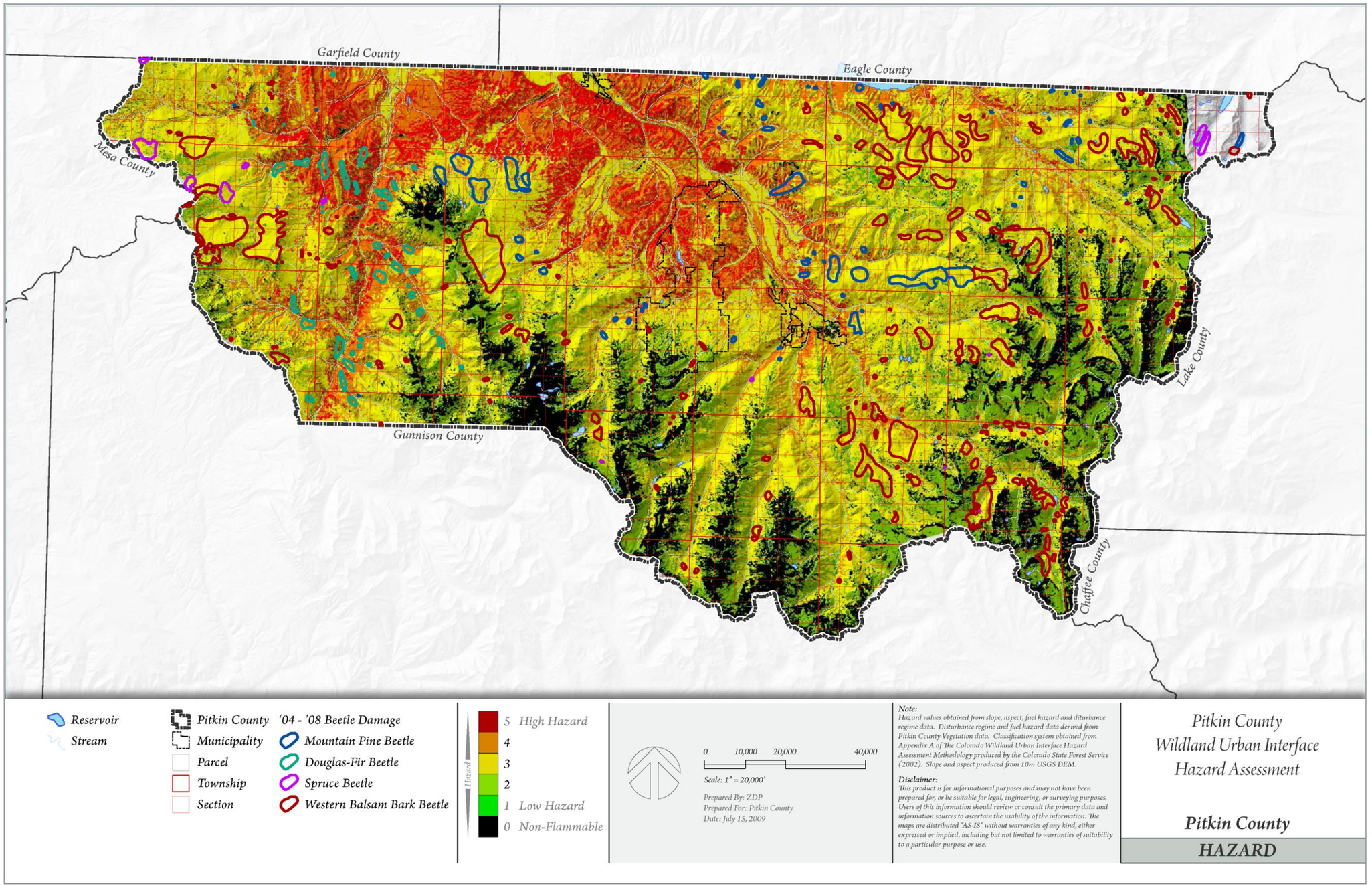
Projects

- One map project (.mxd) exists as template. Individual map extents have been bookmarked within the template file.
- 26 Adobe Illustrator projects (.ai) exist as final figures.
- Directory location for .mxd: L:\Pitkin_Fire\Projects
- Directory location for .ai: L:\Pitkin_Fire\Projects\AI

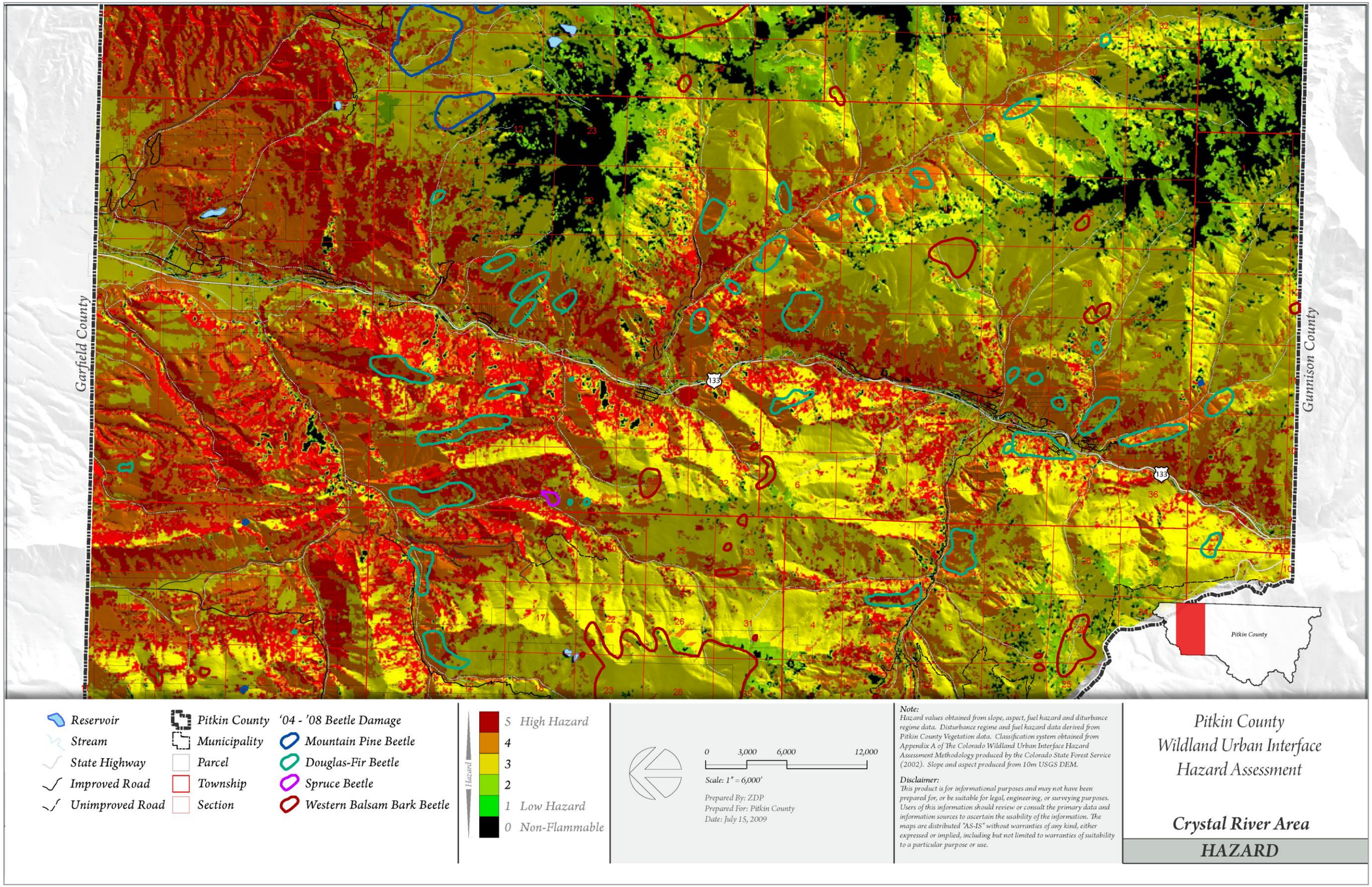
Maps

- **Land Status**, map of land ownership and topography in and surrounding Pitkin County. Land owner data acquired from the Bureau of Land Management.
- **Pitkin County Wildfire Hazard,** maps showing hazard values obtained from slope, aspect, fuel hazard and disturbance regime data. Disturbance regime and fuel hazard data derived from Pitkin County Vegetation data. Classification system for fuel hazards and disturbance regime obtained from *Appendix A* of the *Colorado Wildland Urban Interface Hazard Assessment Methodology* produced by the Colorado State Forest Service (2002). Slope and aspect produced from 10m USGS DEM.
- **Pitkin County Value,** map showing representative values extrapolated from Pitkin County 'Parcel' and 'Structure' spatial data. Values expressed as a classification of density units per acre. Density classification derived from *Appendix A* of the *Colorado Wildland Urban Interface Hazard Assessment Methodology* produced by the Colorado State Forest Service (2002).
- **Pitkin County Wildfire Risk,** maps showing wildfire risk values obtained from lightning strike data and proximity to existing roads and railroads. Values expressed on a relative equal-interval scale of 1-4 derived from *Appendix A* of the *Colorado Wildland Urban Interface Hazard Assessment Methodology* produced by the Colorado State Forest Service (2002).
- **Pitkin County R+H+V (Risk + Hazard + Value),** maps showing resulting combination of risk, hazard and value data for assessed risk of wildland fire within Pitkin County. Values expressed on a relative equal-interval scale of 0-14 derived from *Appendix A* of the *Colorado Wildland Urban Interface Hazard Assessment Methodology* produced by the Colorado State Forest Service (2002).
- **Pitkin County Historical Wildland Fire Occurrences,** map showing historical wildland fires for years 1984 – 2006 within Pitkin County. Data obtained from the Bureau of Land Management.

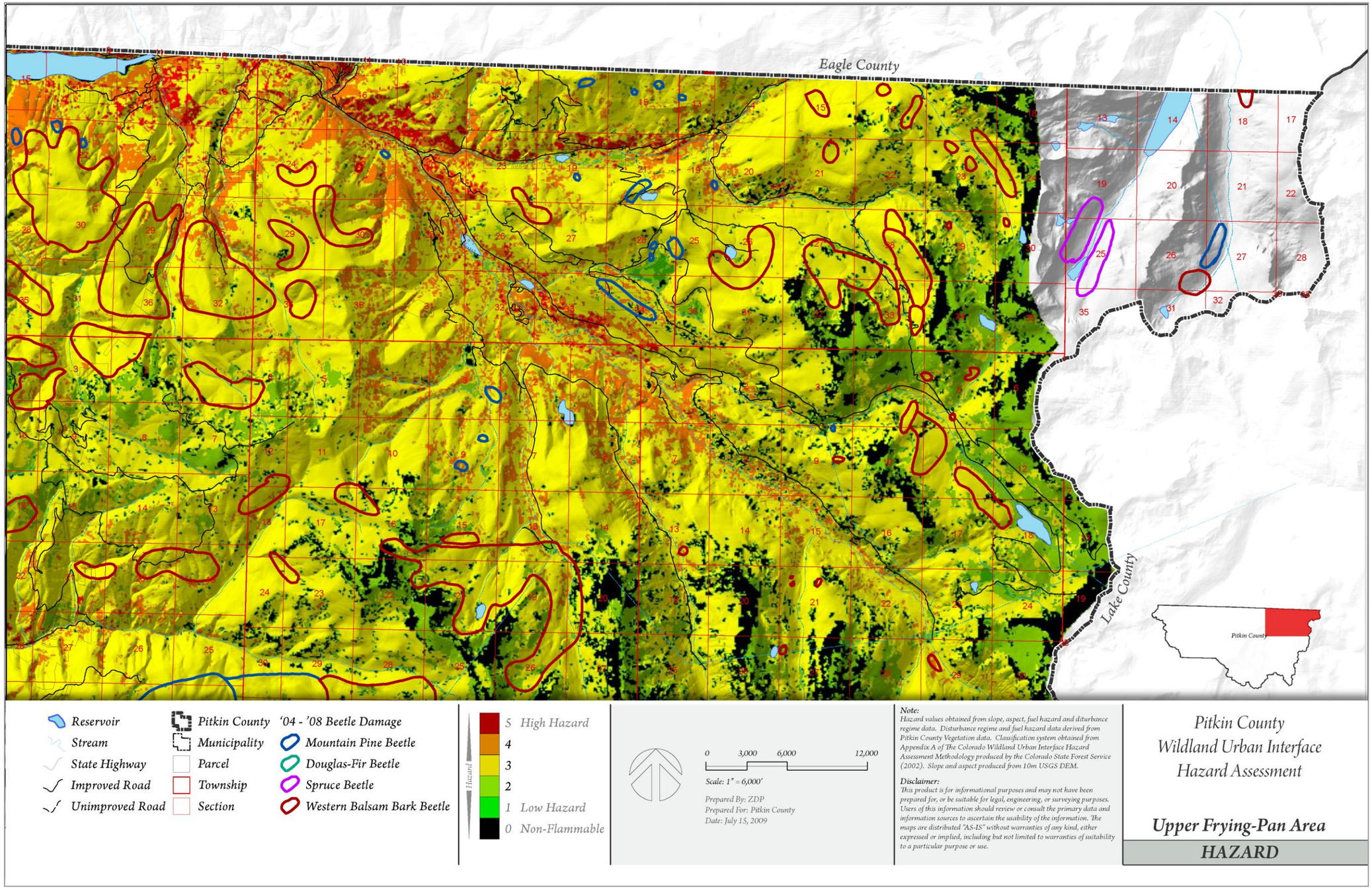
3.1.1. Pitkin County Wildfire Hazards Map



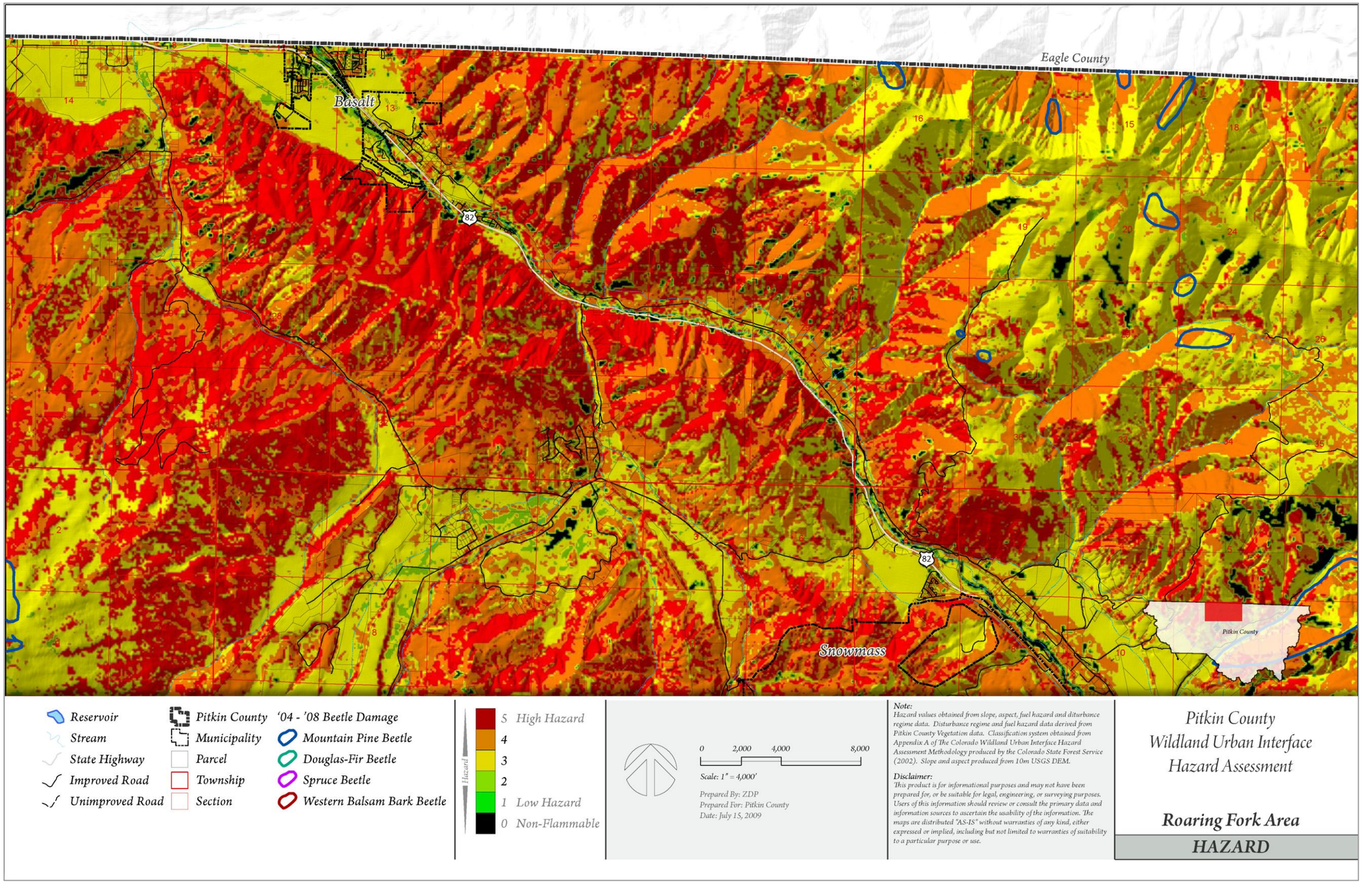
3.1.1.1. Wildfire Hazards in the Crystal Valley



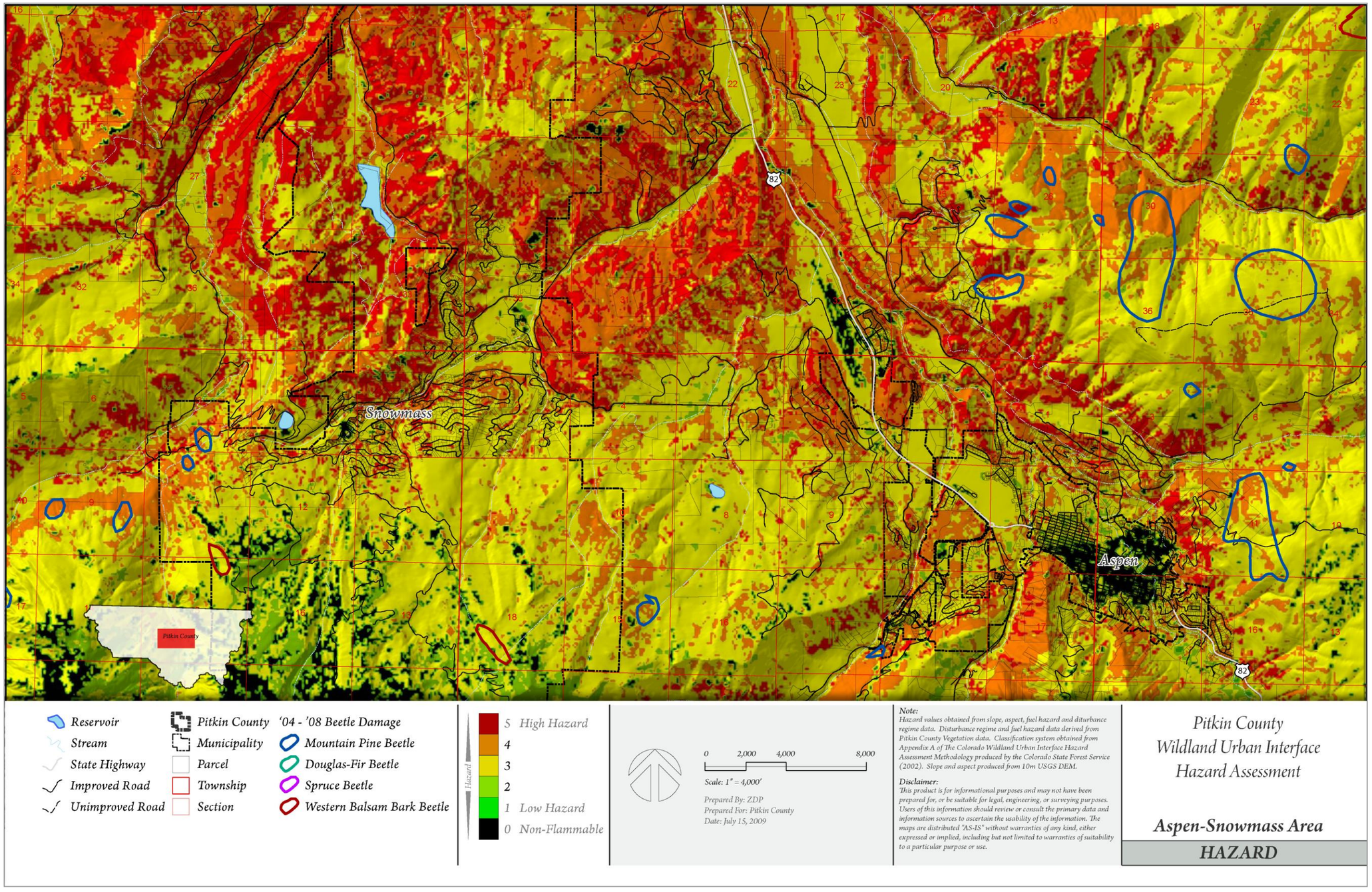
3.1.1.2. Wildfire Hazards in the Upper Frying Pan Valley



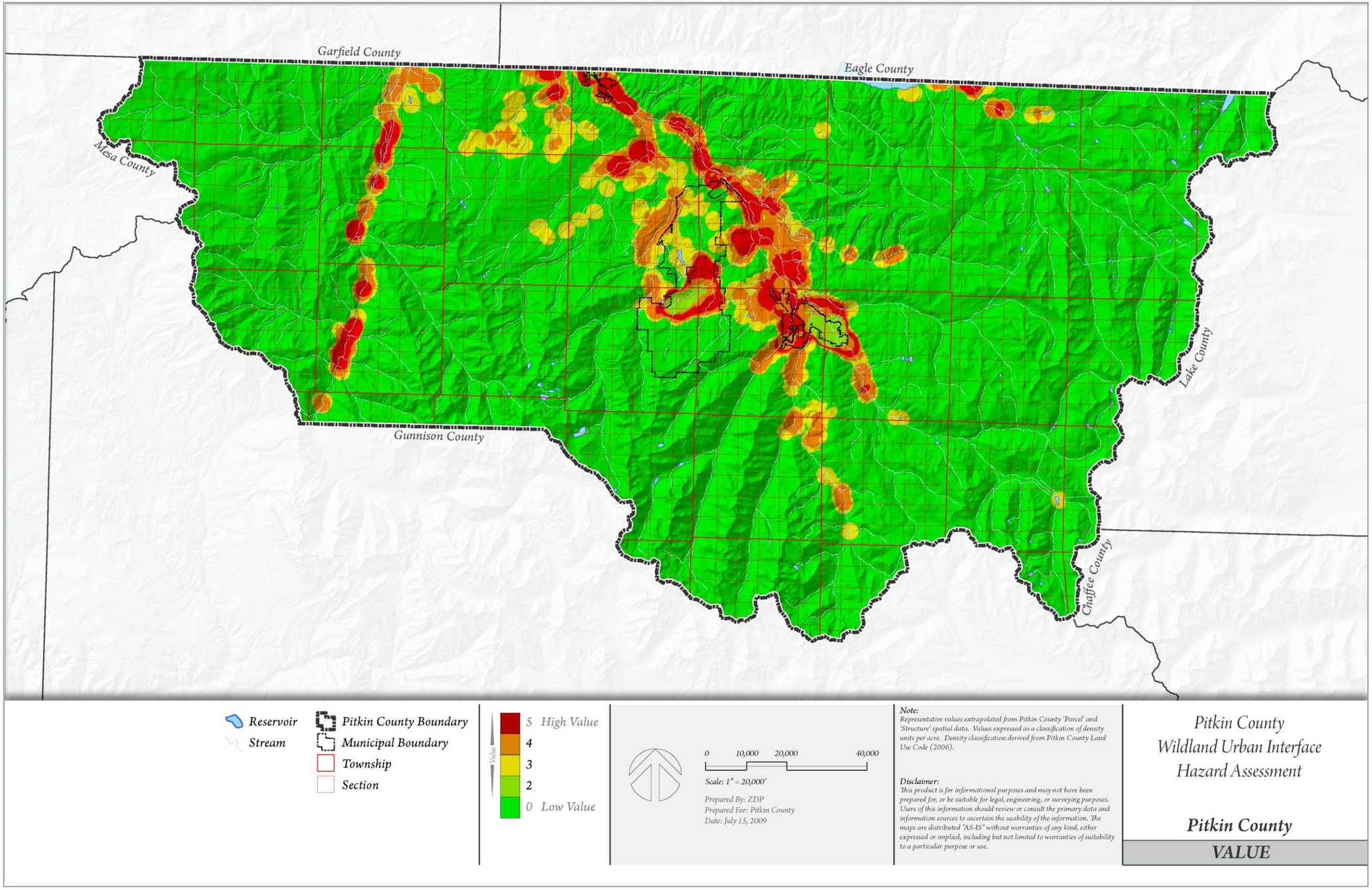
3.1.1.3. Wildfire Hazards in Roaring Fork Valley



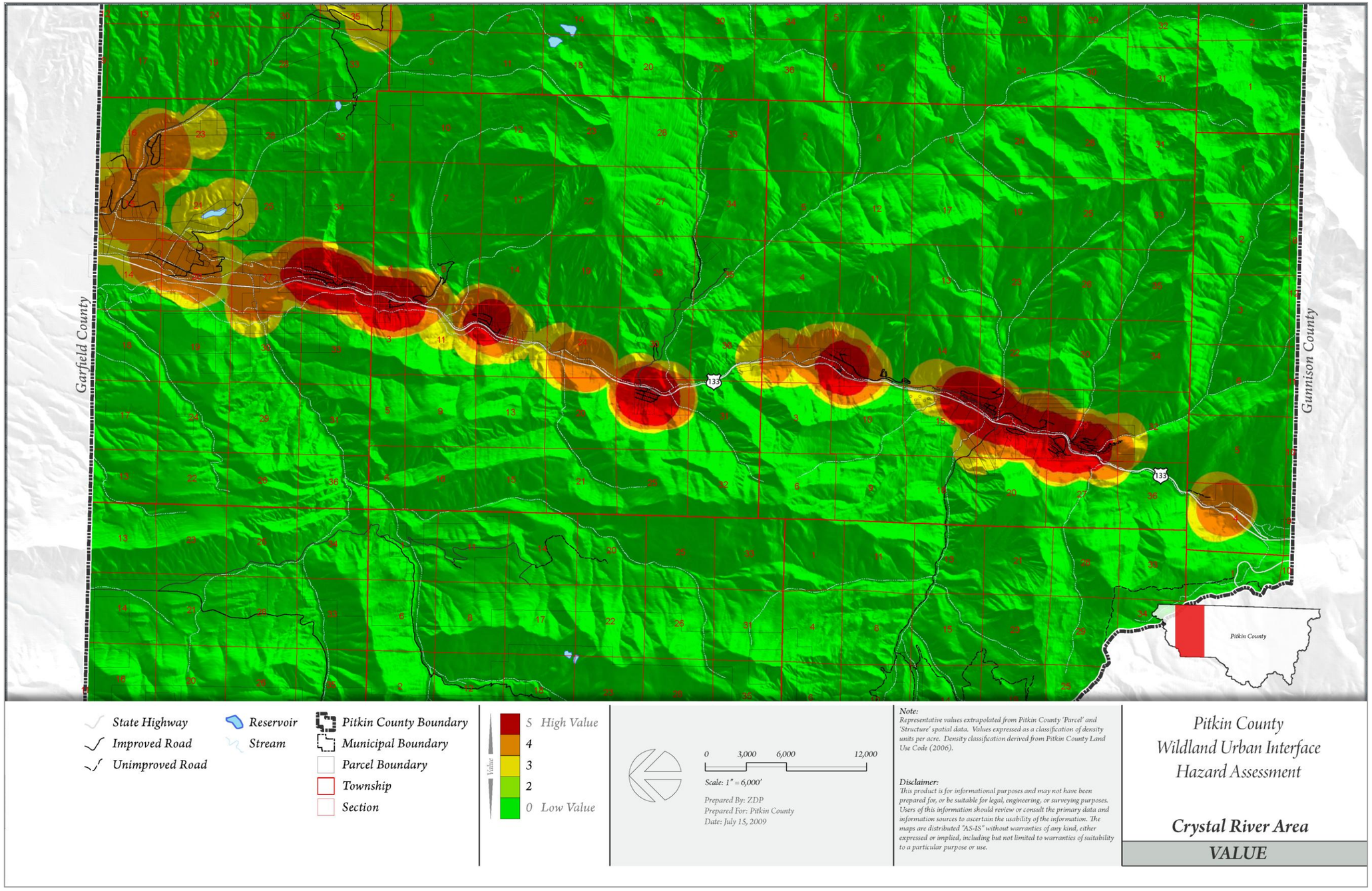
3.1.1.4. Wildfire Hazard in Snowmass/Aspen Area



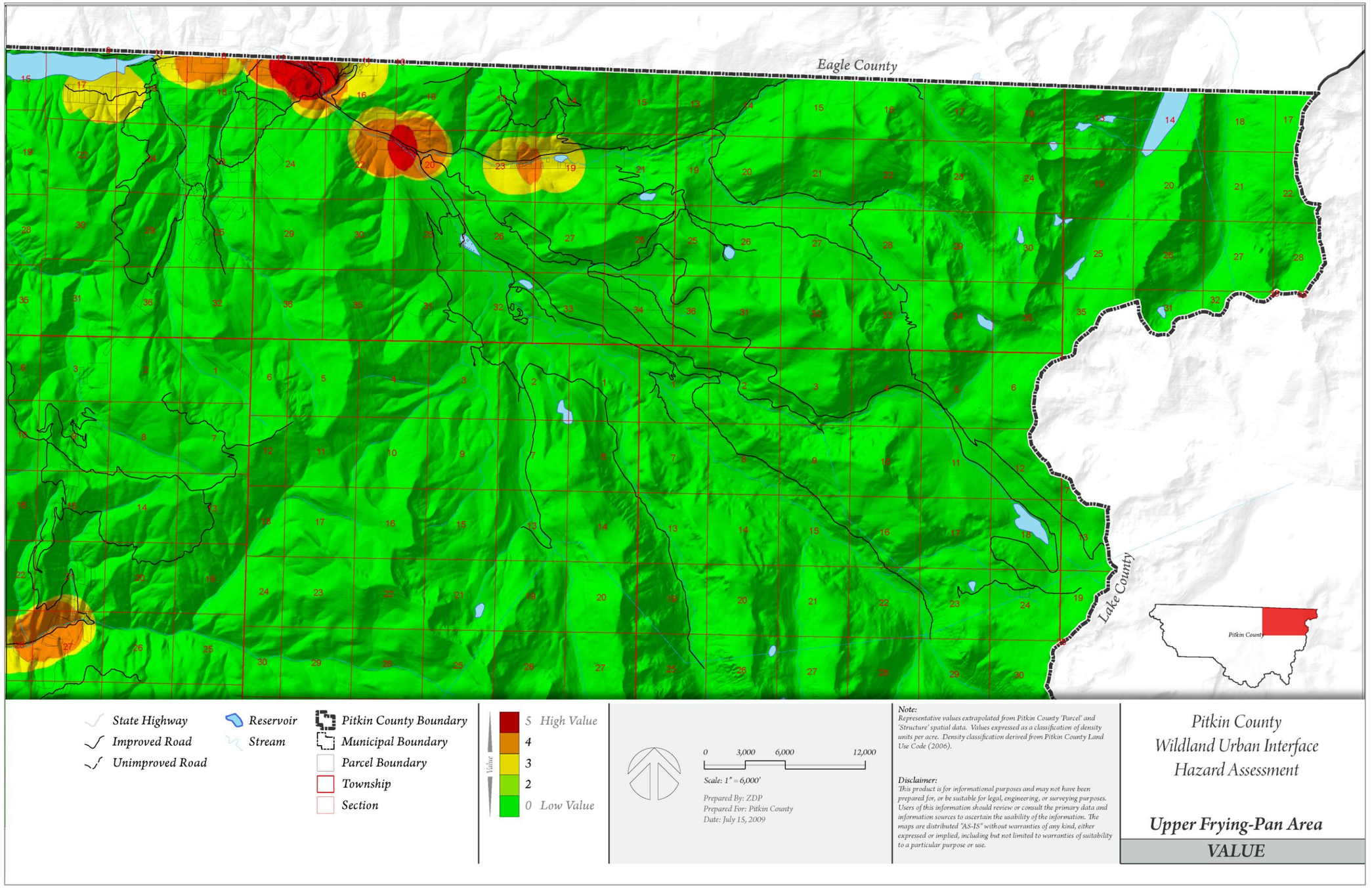
3.1.2. Pitkin County Values at Risk



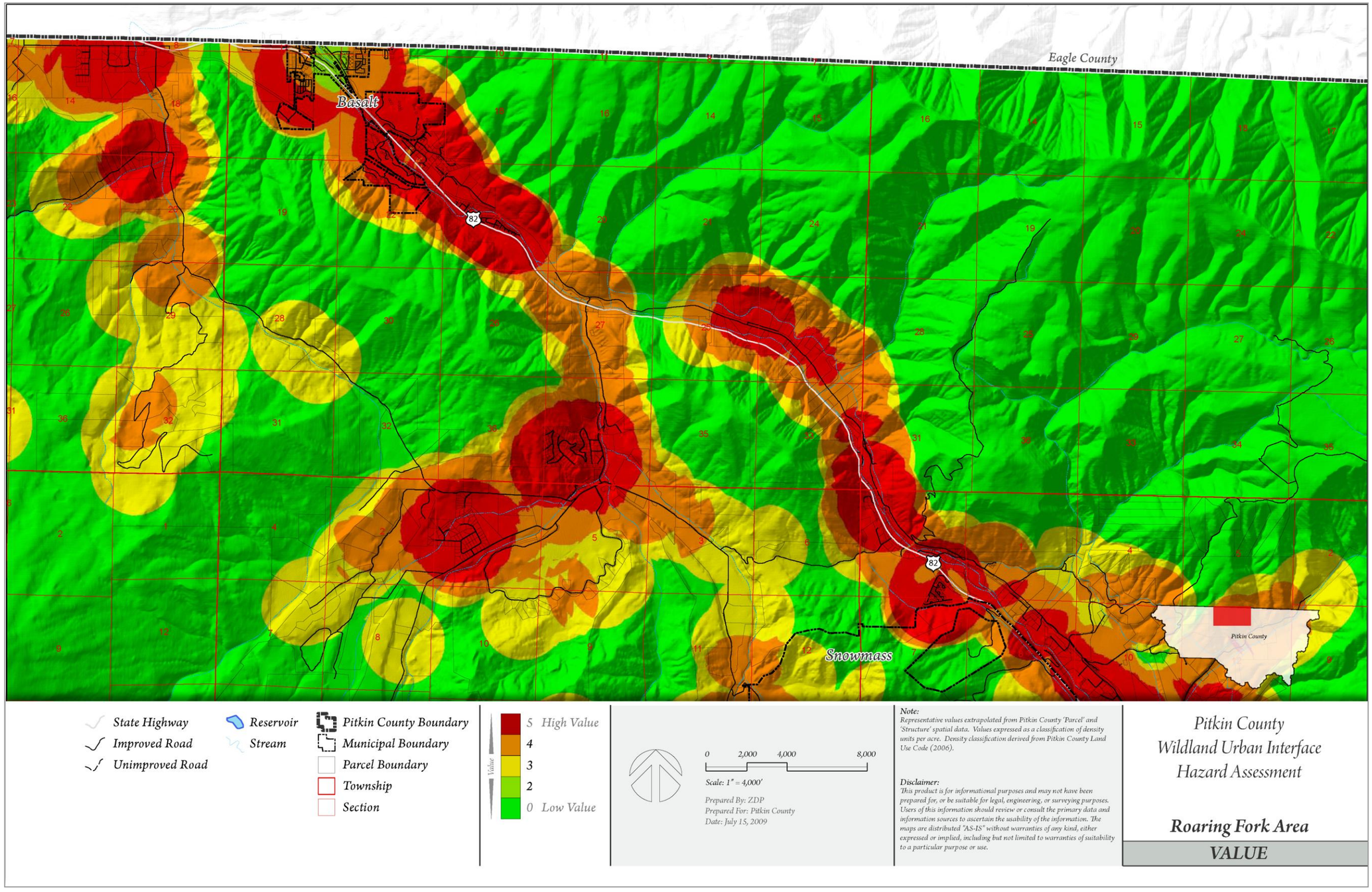
3.1.2.1. Crystal River Valley Values at Risk



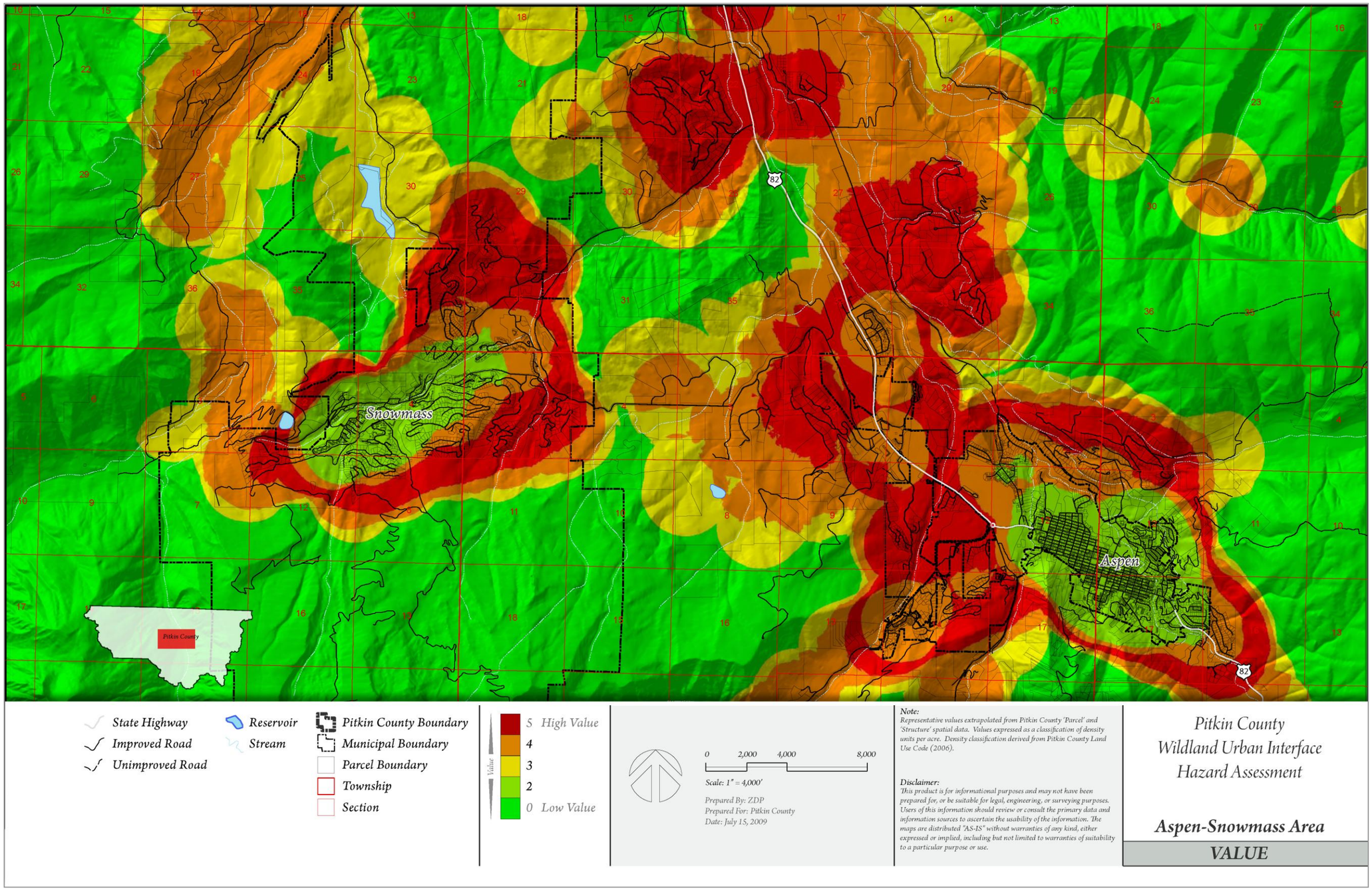
3.1.2.2. Upper Fryingpan Values at Risk



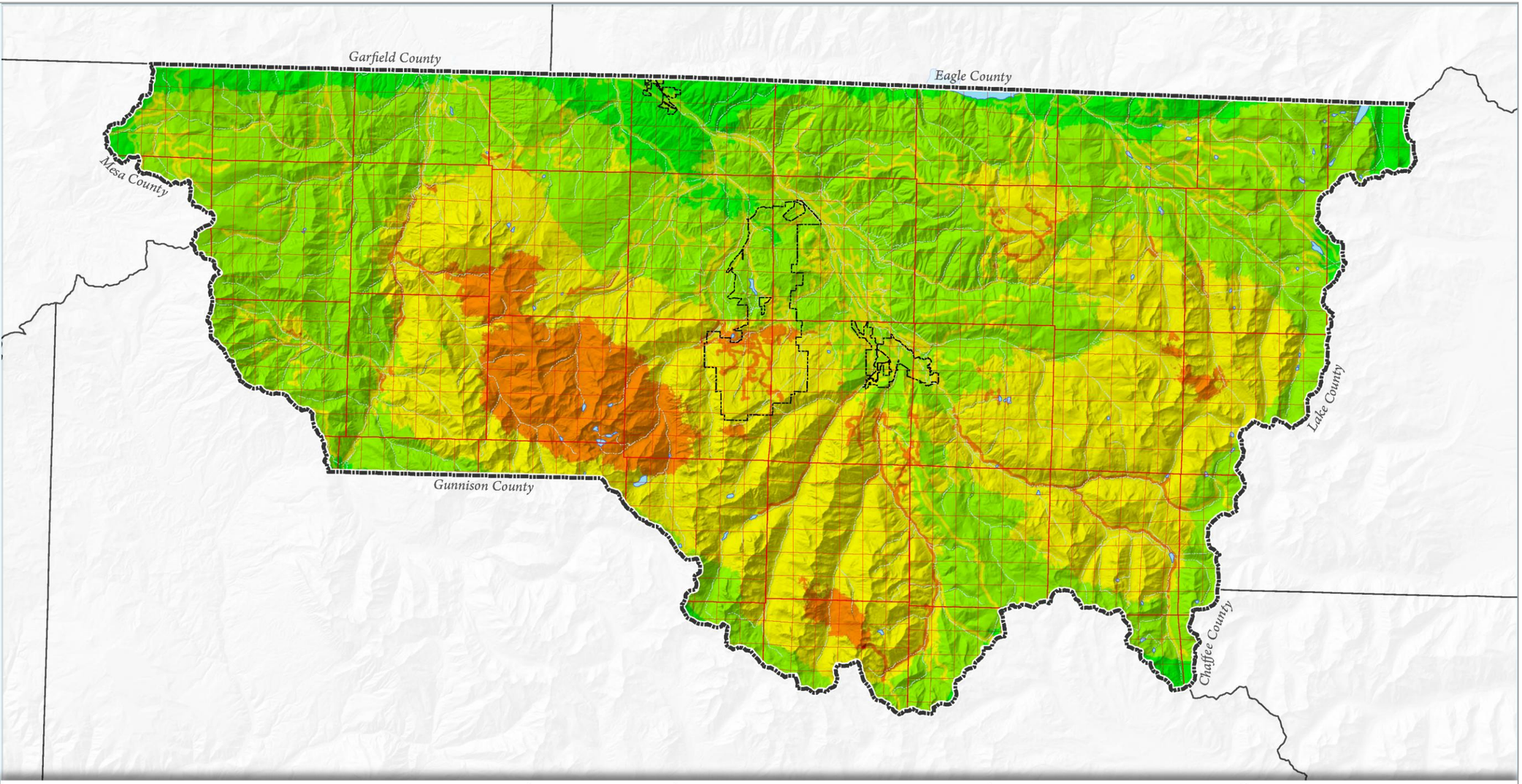
3.1.2.3. Roaring Fork Valley Values at Risk



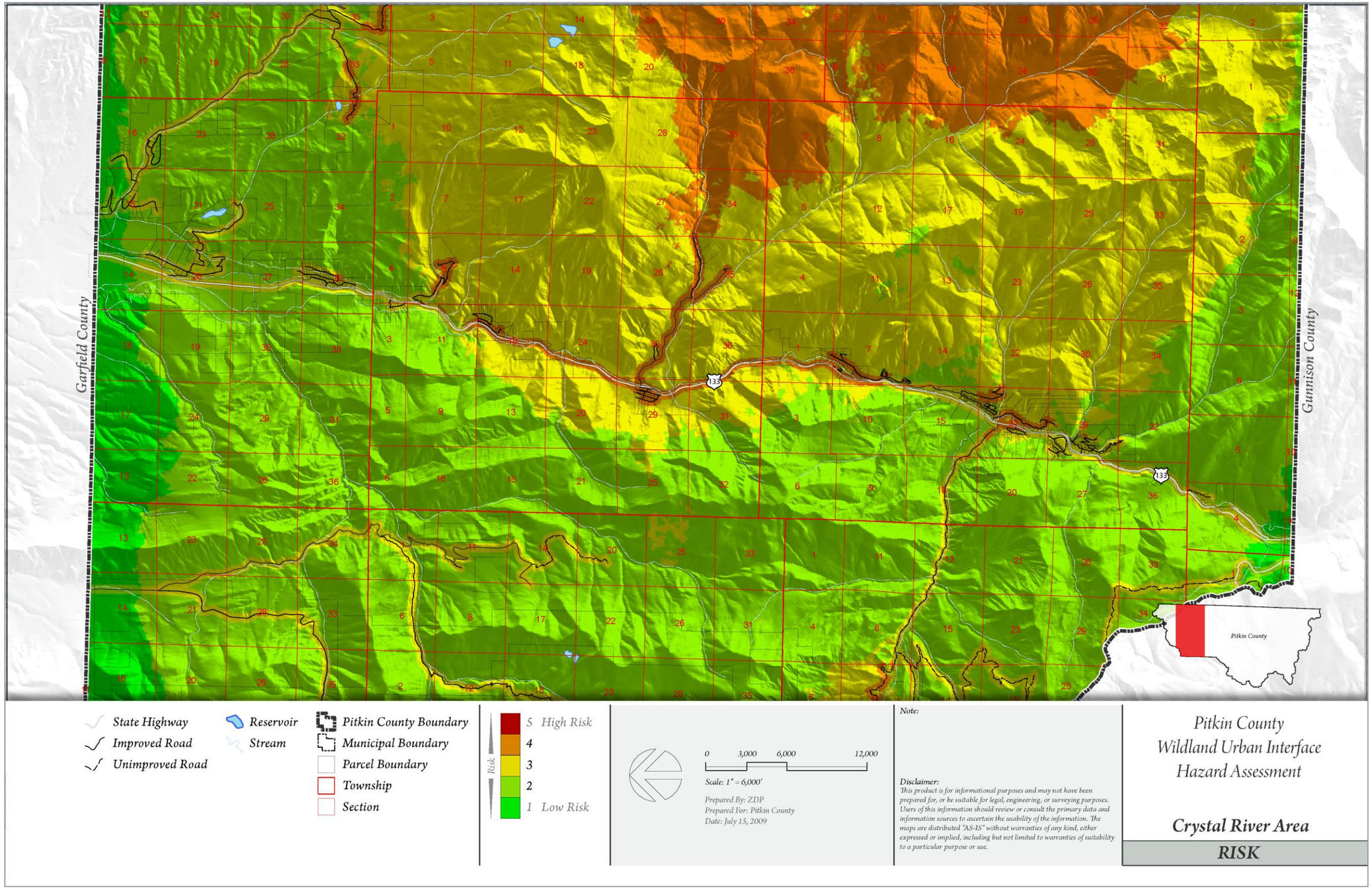
3.1.2.4. Snowmass/Aspen Area Values at Risk



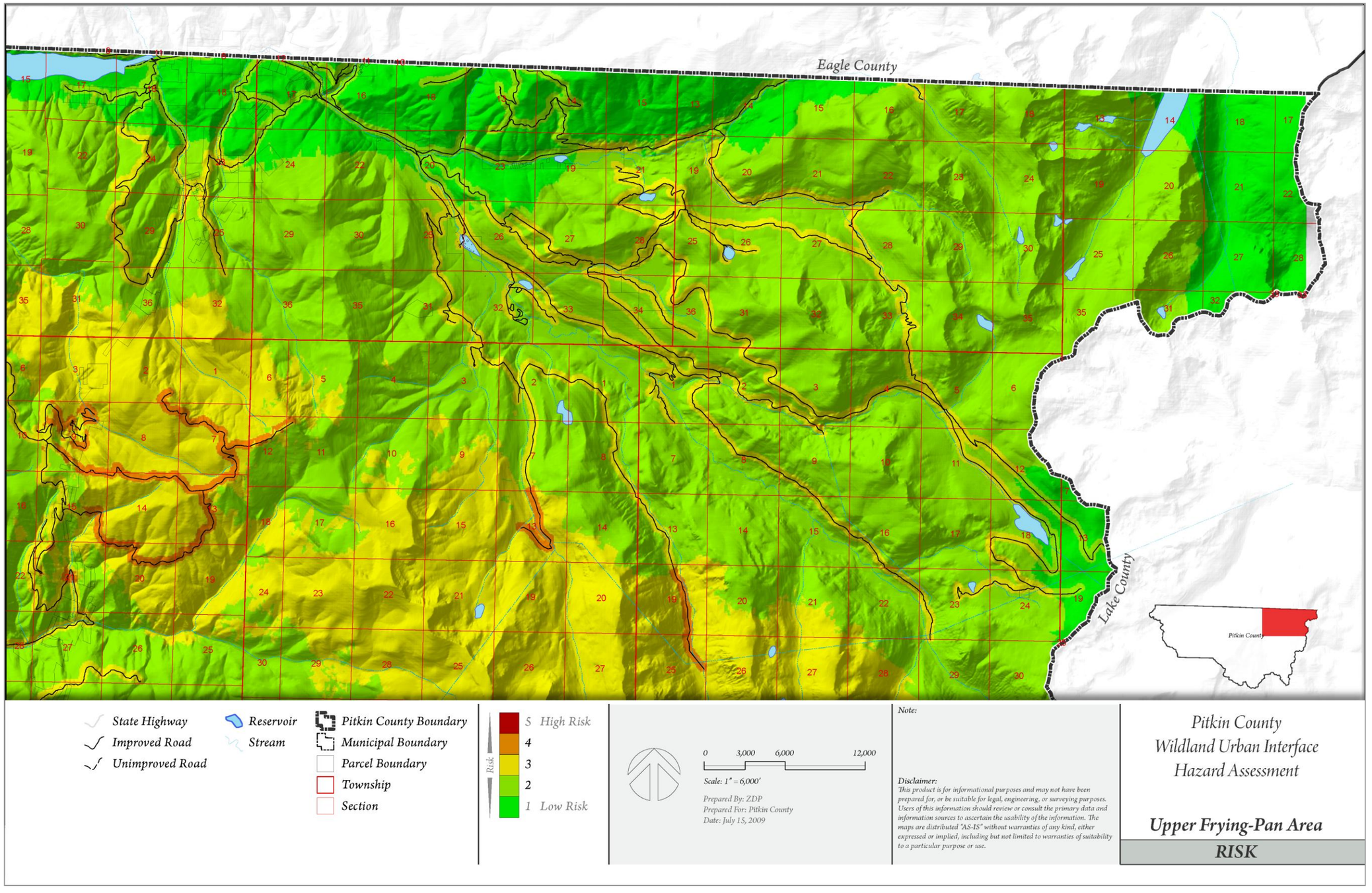
3.1.3. Pitkin County Wildfire Risk



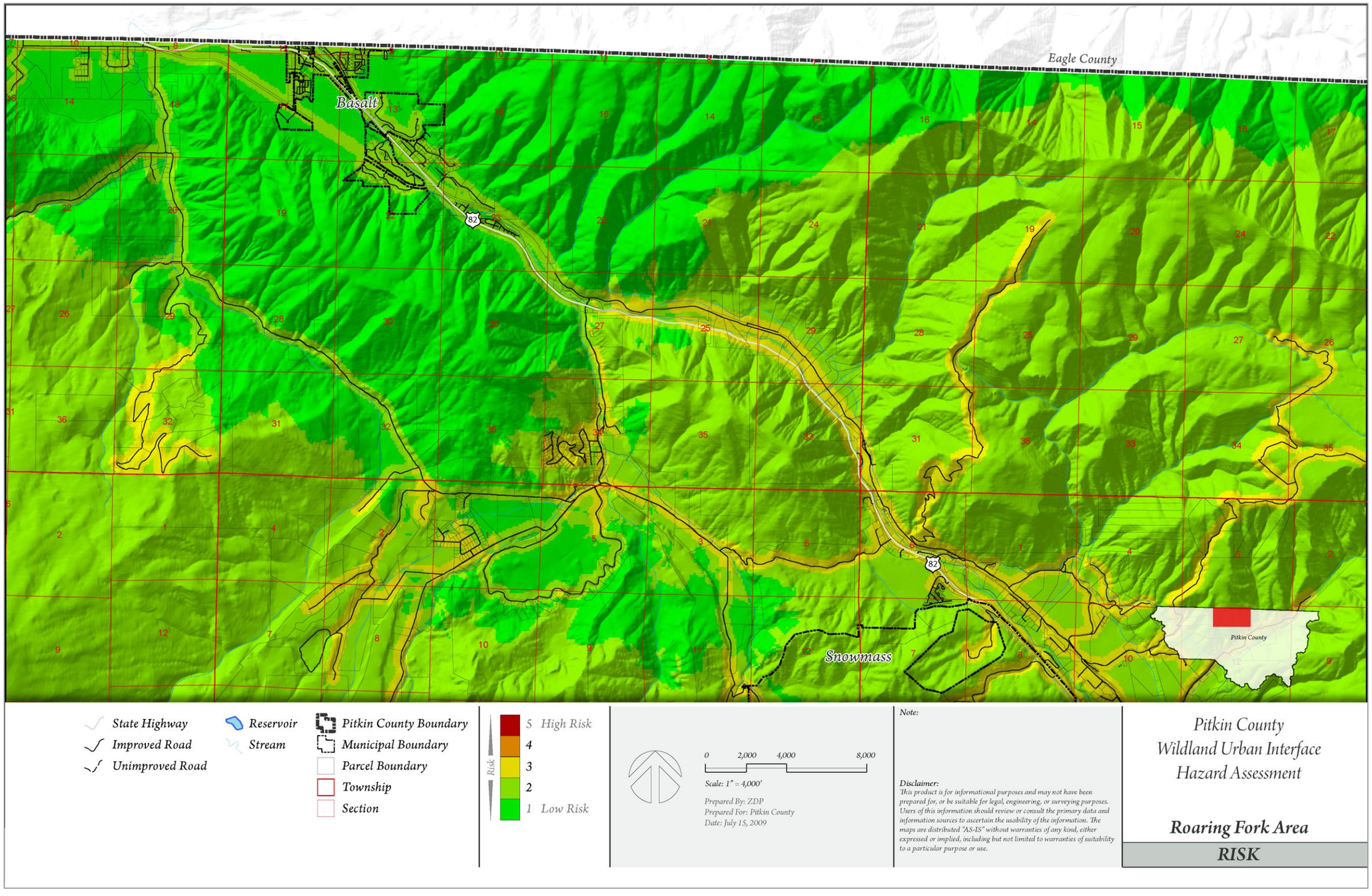
3.1.3.1. Crystal River Valley Wildfire Risk



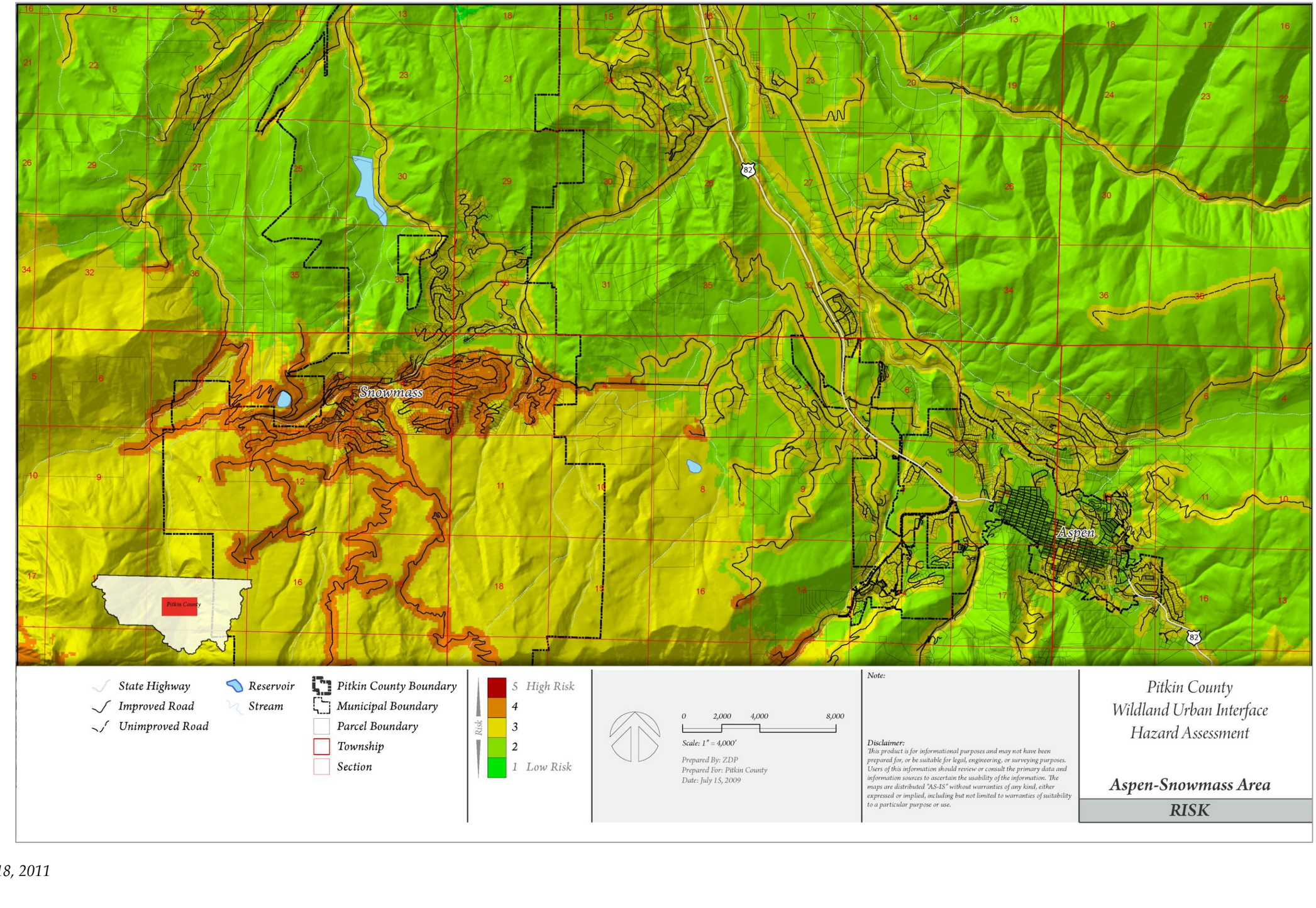
3.1.3.2. Upper Fryingpan Wildfire Risk



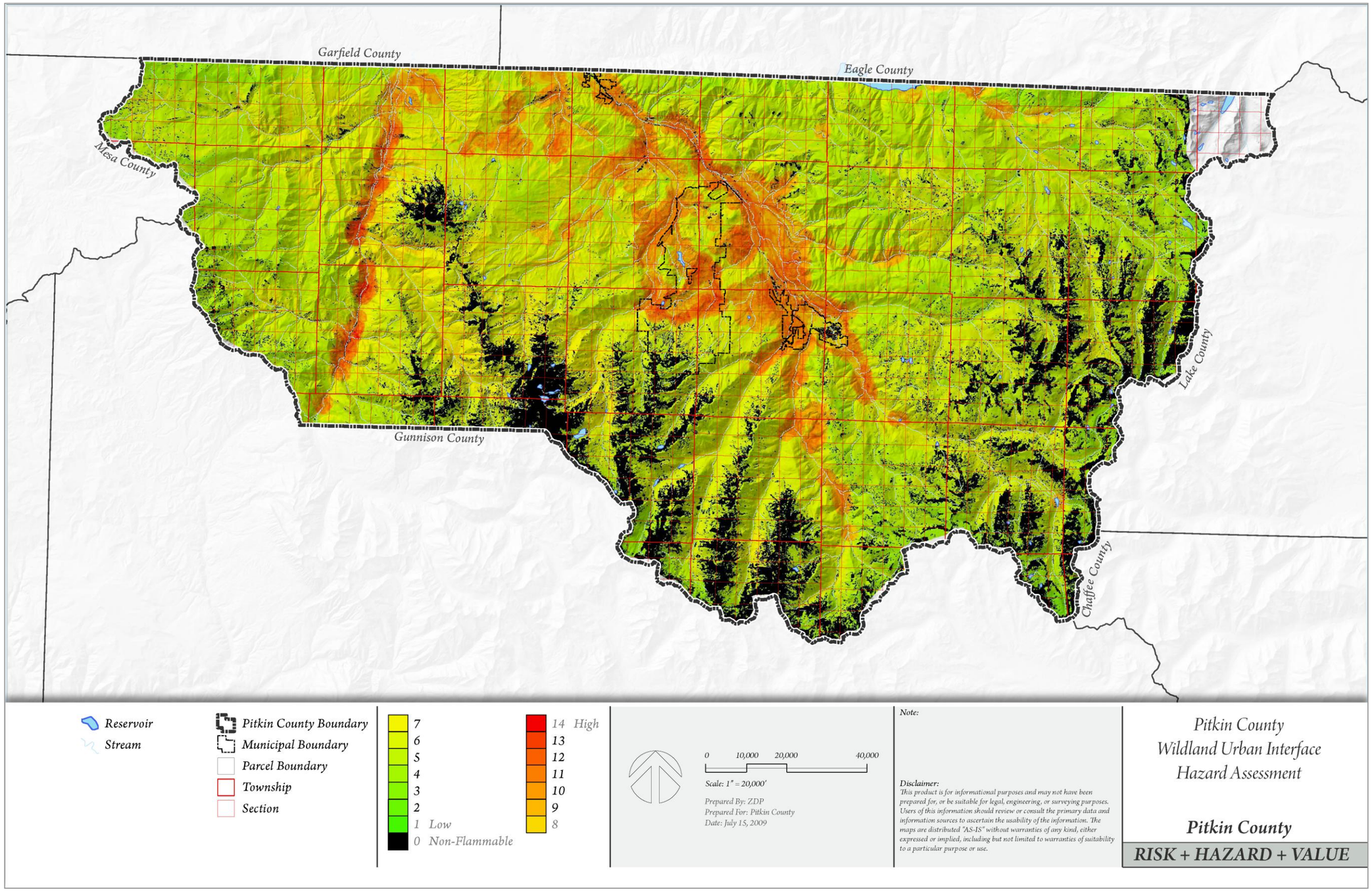
3.1.3.3. Roaring Fork Valley Wildfire Risk



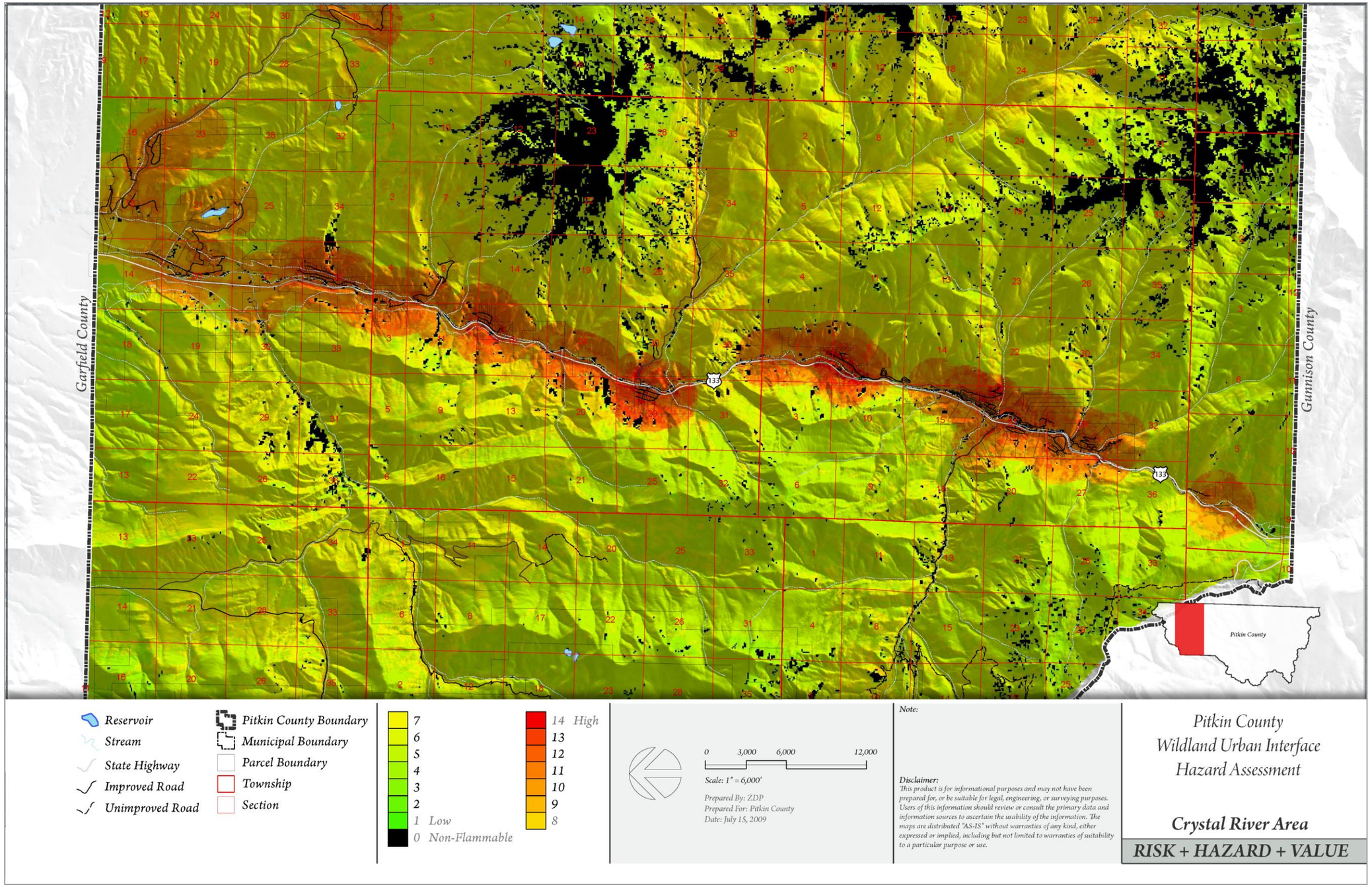
3.1.3.4. Snowmass/Aspen Area Wildfire Risk



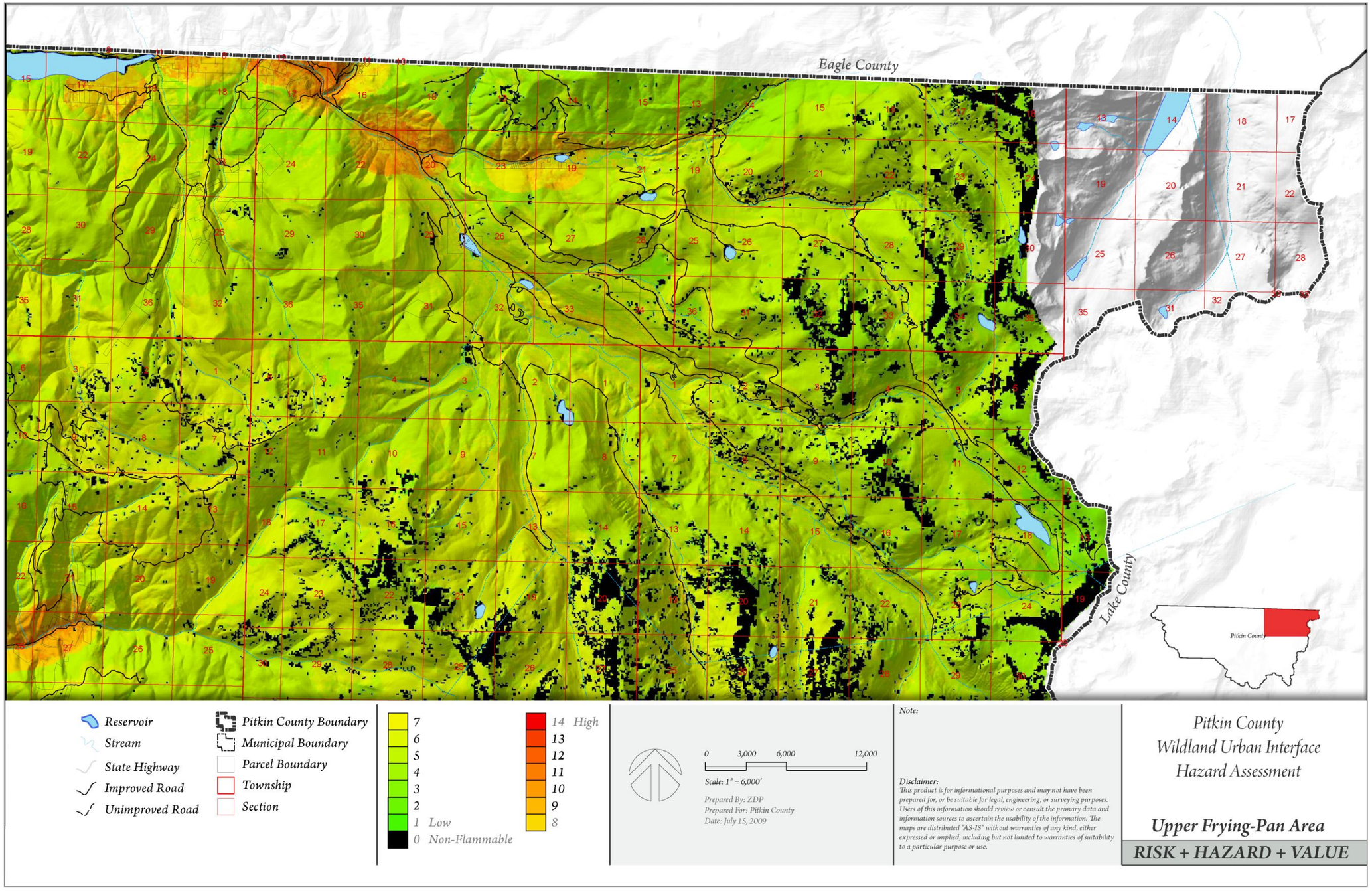
3.1.4. Pitkin County Wildfire Risk + Hazard + Value Mapping



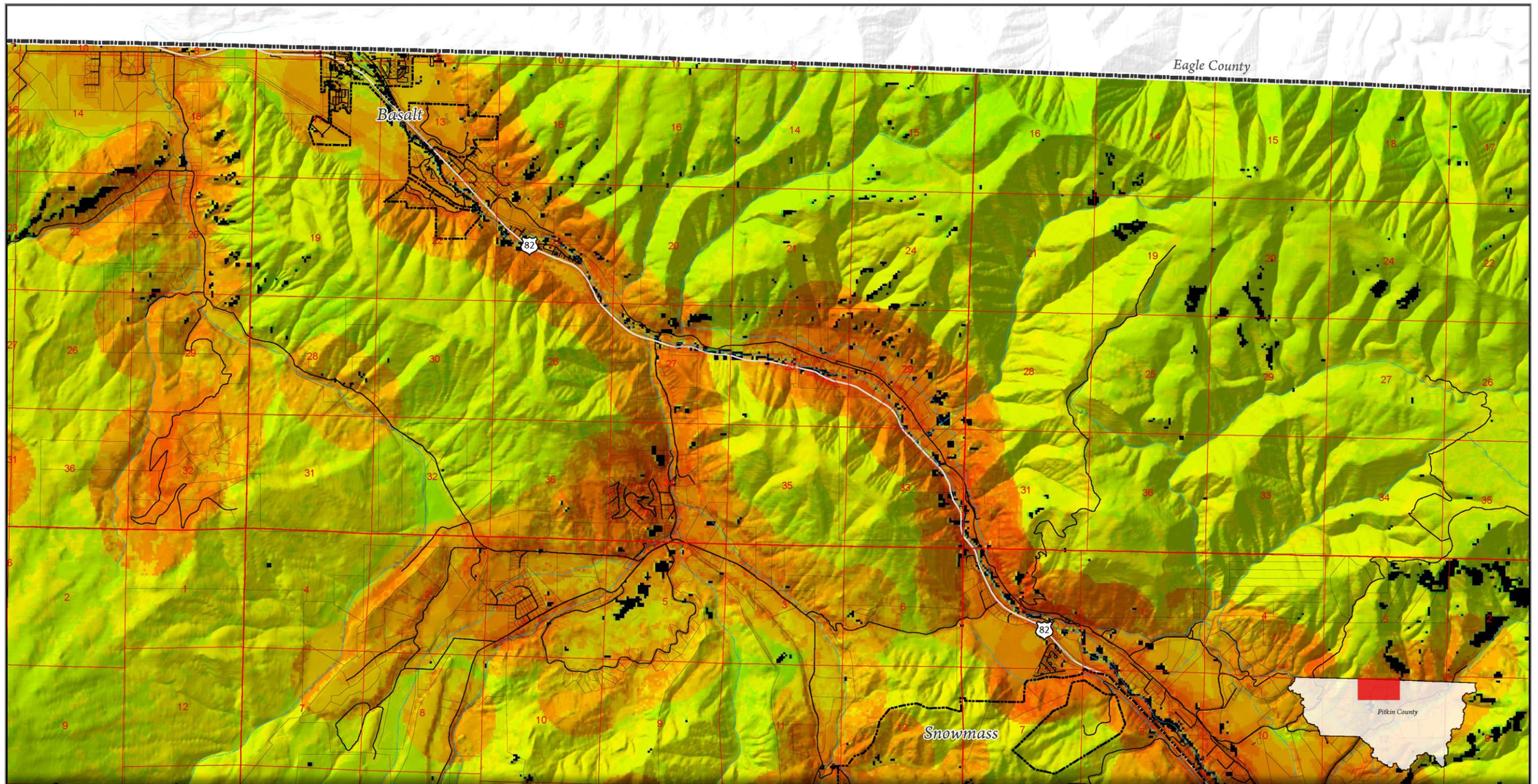
3.1.4.1. Crystal River Valley Risk + Hazard + Value Mapping



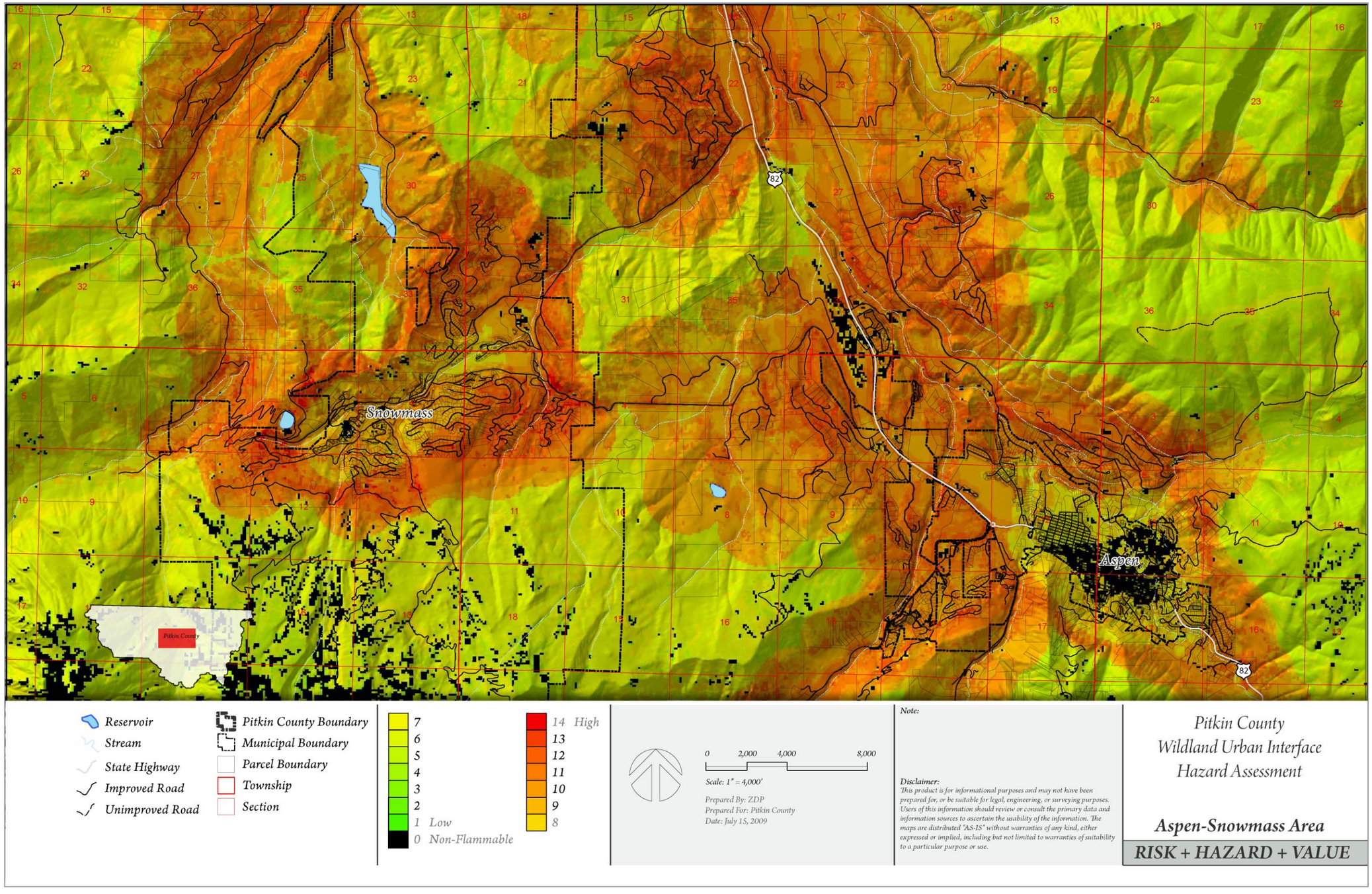
3.1.4.2. Upper Fryingpan Valley Wildfire Risk + Value + Hazard Mapping



3.1.4.3. Roaring Fork Valley Wildfire Risk + Value + Hazard Mapping



3.1.4.4. Snowmass/Aspen Area Wildfire Risk + Value + Hazard Mapping



4. Interagency Cooperation

Since Pitkin County encompasses a mosaic of land ownership and jurisdictional boundaries, interagency cooperation is essential not only for wildland fire suppression but also for prevention, preparedness, mitigation, reclamation / rehabilitation, and fiscal issues to provide efficient and effective wildland fire programs. Currently, all fire agencies within Pitkin County are working aggressively to provide a consistent and unified approach to most fire programs regardless of ownership. However, differences do exist between agencies due to internal policies and procedures as well as land base and jurisdictional boundaries.

4.1. USFS & BLM Coordination

(*Taken from BLM/USFS internal documents*) The Upper Colorado River Interagency Fire Management Unit is a fully integrated fire management program with the BLM Western Slope Center, the Grand Junction BLM Field Office, the Glenwood Springs BLM Field Office, the White River National Forest, and the Grand Valley Ranger District of the Grand Mesa, Uncompahgre and Gunnison National Forests. The Upper Colorado River Interagency Fire Management Unit (UCR) provides preparedness, suppression, prevention and fuels management services to the above units.

Each agency maintains discrete budgeting, staffing and support services which are combined where appropriate to increase program effectiveness and efficiency to participating units. The following discussion is limited to the Bureau of Land Management's portion of the program with references to the interagency staff unit where appropriate.

Fiscal Year Budget and the Ability to Support Planned and Unplanned Actions

Program Leadership – The BLM portion of the interagency fire management program consists of a Unit Fire Management Officer and an Assistant Fire Management Officer for Operations. The Forest Service contributes an Assistant Fire Management Officer for Fuels and Aviation. Both The BLM and the Forest Service contribute to funding a Zone Fire Management Officer and Assistant Fire Management Officer to manage each of the three Zones that make up the Unit.

Preparedness –The UCR budget allocation includes funding for fire management activities on the Grand Junction and Glenwood Springs Field Offices and the White River National Forest. The BLM funds and staffs the following fire management resources:

- Type 4 engines
- Type 6 engines
- Type 3 Helicopter with 5 crewmembers
- Interagency Dispatch Center

- Type 1 Air Tanker Base

The FS funds and staffs the following fire management resources:

- Type 4 engine
- Type 6 engines
- Initial Attack Squads
- Helicopter crewmembers

Interagency Dispatch – The interagency dispatch center is located at the Grand Junction Air Center at Walker Field, Grand Junction, Colorado. The BLM is responsible for the facilities management, utilities, and fees associated with the air center. The BLM staffs the following non-seasonal positions:

- Air Center Manager (GS-455-11)
- Assistant Air Center Manager, Ramp and Facilities (GS-455-09)
- Lead Initial Attack Dispatcher (GS-455-07)
- Lead Aircraft Dispatcher (GS-455-07)
- Air Tanker Base Manager (GS-455-07)

The FS staffs the following non-seasonal positions:

- Assistant Air Center Manager, Dispatch (GS-455-09)
- Initial Attack Dispatcher (GS-455-06)
- Aircraft Dispatcher (GS-455-06)

Fuels Management – The fuels management program is the responsibility of the fire ecology section of the fire management staff. Prescribed fire is conducted with the support of the operations staff. The BLM also hosts a fire use module for prescribed fire and wildland fire use events. The BLM funds and staffs the following fuels positions:

- Fire Ecologist
- Fuels Specialist
- Fuels Planners

The FS funds and staffs the following fuels positions:

- Fire Ecologist
- Fuels Planner
- Fuels Specialists

New to 2009, the Forest Service has tasked an Incident Commander position to facilitate mitigation of mountain pine beetle impacts to forests on the White River National Forest. This position is based out of the Eagle Ranger District.

Cooperative Agreements and Interagency Contacts
The BLM conducts the fire management program with Federal and State partners under the terms of the following agreement:

Colorado Interagency Cooperative Fire Management Agreement – between the USDI, Bureau of Land Management, Colorado; USDA Forest Service, Region 2; USDI National Park Service, Intermountain Region; USDI Fish and Wildlife Service, Mountain and Prairie Region; USDI Bureau of Indian Affairs, Southwest Region and Colorado State Forest Service.

This agreement establishes statewide authority for interagency fire protection assistance and cooperation between the above agencies for mutual cooperation in fire training, prescribed fire, prevention, preparedness and suppression activities.

At the Unit level, the Bureau of Land Management and White River National Forest have a Memorandum of Agreement that provides the basis for interagency fire management activities and the exchange of funds via reimbursable agreements to support the interagency staff unit.

Both the BLM and Forest Service are signatories to co-op fire plans for each county within the affected jurisdictions that are executed on an annual basis to provide for cooperative fire management activities between affected Federal and local jurisdictions.

Copies of these plans are available on CD from agency fire management staff and or Colorado State District Foresters.

4.2. Agency Responsibilities

4.2.1. Prevention

With the exception of enforcement, wildland fire prevention is a shared responsibility of all agencies. Education and information associated with wildland fire is not jurisdictional and relates to all land ownership. Education and awareness materials are available through all partnering agencies. The USFS and BLM responsibility for enforcement of wildland fire prevention is tied to primary Federal lands respectively. The Fire Protection Districts enforce wildland fire prevention on private lands, with support from the Colorado State Forest Service and the Pitkin County Sherriff. All agencies cooperate to establish restrictions and closures when wildland fire conditions meet pre-established criteria outlined in the Pitkin County Annual Operating Plan (AOP).

4.2.2. Preparedness

USFS/BLM responsibility is primarily tied to Federal lands within the County. The CSFS and Fire Protection Districts (FPD) assist all agencies, communities and associations with fire planning, readiness and wildland fire hazard identification. All agencies share responsibility to coordinate and cooperate in mitigation planning, pre-attack planning and communication with the public and the news media. When high fire hazard conditions exist (i.e. high fire danger ratings) then FPDs and Federal agencies coordinate through monthly meetings while these elevated fire danger conditions persist.

4.2.3. Mitigation

USFS/BLM fuels reduction implementation is tied primarily to Federal lands. The CSFS has coordinated, assisted and often provides additional funding for fuel reduction projects on state and private lands. Agreements allow for cross-jurisdictional fuel reduction project planning and implementation. Pitkin County's Hazard Assessments was established to provide mandatory building and land use codes to reduce wildfire hazards, and to require individual wildland fire hazard site inspections and assessments in order to minimize and mitigate fuels hazards and unsafe building materials. These regulations were adopted to reduce the hazards to homeowners as well as firefighters and first responders.

4.2.4. Suppression

4.2.4.1. Fire Protection Districts

The Fire Protection Districts are responsible for all wildland fire suppression activities on private and State lands within their fire districts. However, by state statute the Pitkin County Sheriff has ultimate authority over all fires on state and private lands in the County. FPD's typically handle routine wildfire suppression within their districts and rely on the Sheriff to summon additional assistance as needed. Initial control actions can and usually are taken by fire protection districts or Federal firefighters dispatched by the Grand Junction Interagency Dispatch Center (GJC), or Aspen-Pitkin County Communications Center (APCCC).

4.2.4.2. Colorado State Forest Service

The Colorado State Forest Service will, upon request, assist all agencies on wildland fires within Pitkin County. The CSFS will assume duties as specified under provisions of the Emergency Fire Fund when a forest fire exceeds the County's resources, upon agreement of the Pitkin County Sheriff or designated representative and the State Forester or designated representative.

4.2.4.3. United States Forest Service/Bureau of Land Management

The USFS/BLM is responsible for all fire management activities on Federal lands. The GJC will notify local FPDs of fires on federal lands through the APCCC due to the close proximity of many FPDs to federal lands.

4.2.5. Reclamation/Rehabilitation

The US Forest Service and Bureau of Land Management are responsible for burn area emergency rehabilitation (BAER) on affected National Forest lands and BLM lands. Close coordination and cooperation with other agencies is necessary to determine values at risk that may be affected by BAER activities on adjacent lands. CSFS provides technical assistance to property owners, with consulting and financial support of the Natural Resources Conservation Service. Pitkin County can coordinate with other County departments, state and federal agencies and qualified contractors to assist private landowners affected by wildland fire occurrence.

4.2.6. Fiscal

Funding for prevention, preparedness, mitigation and burn area rehabilitation by USFS/BLM personnel is tied to Federal lands. The Colorado State Forester administers the Emergency Fire Fund (EFF) for those Colorado counties that contribute to the fund. Pitkin County contributes annually to this fund. At the Pitkin County Sheriff's request, the CSFS District may request EFF designation from the State Forester. If approved, EFF will reimburse county suppression costs according to the current Annual Operating Plan (AOP), the master EFF agreement, and as agreed to for the specific incident. The CSFS will request Federal Emergency Management Agency reimbursement for qualified suppression costs according to the most current agreements. CSFS administers various grants to assist local fire departments and property owners as funds are available for suppression, training and other projects.

NWCG Grant Listing
http://www.nwcg.gov/grants/wf-grants.pdf

5. Prescribed Fire—Agency Roles and Responsibilities

Definition: Any fire ignited by management actions under certain predetermined conditions to meet specific resource management objectives. A written, approved prescribed fire plan must exist, and agency requirements must be met prior to ignition.

5.1. USFS/BLM

USFS/BLM objectives are: to use fire from management ignitions in a safe, carefully planned, and cost effective manner to benefit, protect, maintain, and enhance natural resources; to reduce future fire suppression costs; and, to the extent possible, to restore natural ecological processes. Prescribed fire refers to the planning and implementation of management-ignited wildland fires to accomplish specific, pre-stated resource management objectives as defined through the National Environmental Policy Act (NEPA) process and accomplished through the interdisciplinary team process. At least once a year, district staff should meet with local cooperators to discuss future and current fuels projects. Typically, the meetings should include the local FPD's staff and local representatives of the Colorado State Forest Service. Discussions should revolve around where to initiate new projects in the urban-wildland intermix.

Prior to implementation, the following requirements are fulfilled:

- Prepare and approve burn plan
- Obtain smoke permit
- Prepare communications plan
- Prepare monitoring plan
- Provide advance notification to State smoke regulators and (through the Dispatch Center) to area cooperators
- Provide advance notification to news media, elected officials and neighbors as described in the communications plan
- Complete a project file including the components required in the burn plan

5.2. Colorado State Forest Service

CSFS will assist agencies and individuals with the planning and implementation of prescribed fire to accomplish specific resource management objectives. Costs to individuals and agencies of projects are determined according to current CSFS policy.

5.3. Pitkin County

Currently, Pitkin County allows only slash burning and agricultural burning, and at this time does not have guidance regarding prescribed fire for forest health or fuels reduction on private lands. Given the fuels and the size of most private parcels, it is unlikely that private property owners would conduct prescribed fires, however if they

did, Pitkin County could likely grant them a "one-time" permit. Pitkin County requires a smoke permit for any open burning.

5.4. Colorado Department of Public Health and Environment

Colorado Department of Public Health and Environment (CDPHE) requires air quality permits for burns grassland or forest management, including vegetative, habitat, or fuel management and includes only clean, unprocessed wildland fuels. Fire use requires a smoke permit from CDPHE. Agricultural burning does not require a smoke permit from CDPHE at this time.

6. County Fire Plan—Detailed Layout

The County Fire Plan identifies six management objectives essential to achieve this plan's mission statement. These management objectives include:

- Prevention
- Preparedness
- Mitigation
- Suppression
- Reclamation / Rehabilitation
- Fiscal

For each of the management objectives, contact positions and phone numbers are listed for each agency. Additionally, any agreement that refers to a particular management objective is also listed. A reference appendix will be created that will contain a copy of each agreement. Each management objective lists a statement that summarizes the goal and objective, plus activities that need to be accomplished to meet the objectives and the overall mission statement. For each activity listed, a brief background is provided, along with agencies involved, priority, status, estimated costs, funding sources and completion schedule. Pitkin County Emergency Management will serve as the primary agency for all listed activities.

6.1. Annual Review

An interagency group will review the Pitkin County Wildfire Protection Plan, management objectives and activities listed to ensure that objectives are being accomplished. Activities will likely be added to and removed from the plan due to completion of projects and changes in priorities. Pitkin County Emergency Management will serve as the lead agency and coordinate updates and annual reviews. Future activities can be submitted by any Pitkin County resident to the interagency group for review and addition to the year's County Fire Plan.

7. Management Objectives

Agency Contacts:

USFS	**Aspen & Sopris R.D. Fire Management Officer**	**970-963-2266**
BLM	**Glenwood Springs Field Office**	**970-945-2341**
CSFS	**Grand Junction District**	**970-248-7325**
Pitkin County Emergency Management	**Tom Grady, Emergency Management Coordinator**	**970-920-5234**
Aspen FPD	**Ed Van Walraven, Fire Marshal**	**970-925-5532**
Basalt & Rural FPD	**Jerry Peetz, Ops Dir.**	**970-704-0675**
Carbondale & Rural FPD	**Vern Holmes, EMC**	**970-963-2491**
Snowmass-Wildcat FPD	**John Mele, Deputy Fire Chief**	**970-923-2212**

7.1. Prevention

Reduce human caused wildfire ignitions through information, education and enforcement.

Activity (P1)	**Improve public awareness**
Background	The individual property owner/occupant has the primary responsibility to protect their property from a wildland fire event. Only limited numbers of citizens in the general public are aware of the wildland fire threat. Information is available, but a coordinated approach to educational outreach is needed.
Agencies	Pitkin County, CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Ongoing
Estimated Costs	Staff time
Funding Sources	Existing programs and supplemental funds/grants (CSFS?)
Schedule	As needed- at this time all fire departments have information and links on websites

Activity (P2)	**Develop ways to update news media and Pitkin County residents of the current wildfire danger**
Background	Utilize news media outlets and Public Information Officers to inform the citizens of current wildland fire danger. i.e. More Smokey Bear signs and use of CDOTs highway informational signs.
Agencies	USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Some programs in place
Estimated Costs	Staff time, some training costs, $2,000 per Smokey Bear sign.
Funding Sources	Supplemental funds/grants (CSFS?)
Schedule	Seasonally

7.2. Preparedness

Plan the most effective level of resources to protect human and natural resources

Activity (Pr1)	**Enforce/Improve road signs and posted address numbers in rural Pitkin County**
Background	The County's current road signage and site addressing system has many gaps where road signs are absent and home addresses conflict with official records. Although current road naming and site addressing is occurring through the Community Development and Building departments, many serious deficiencies exist in older platted subdivisions, on metes & bounds parcels, and in 35+ acre developments. Emergency service personnel and parcel delivery companies are often unable to locate properties quickly or at all, due to the lack of a road name and/or a site address. Due to inaccurate or inadequate information provided by property owners, many properties have received address numbers that are not accurate, further adding to the confusion. A major barrier to overcoming the many deficiencies of the current system is likely to be resistance by some property owners to naming their road, changing their address, or funding the posting of road signs in subdivisions.
Status	Complete 2011. GPS, GIS, CAD, Google Maps, etc.

Activity (Pr2)	**Develop local PIO, IMG and Type 3 teams for local incidents**
Background	A local Incident Management Group or Type 3 Incident Management Team needs to be developed for managing wildfire suppression incidents, working towards NWCG qualifications for all members.
Agencies	Pitkin County Emergency Management, CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Structure exists, but local involvement may be lacking.
Estimated Costs	Training costs
Funding Sources	Existing program funds and grants
Schedule	Ongoing

Activity (Pr3)	**Assist in development of CWPPs**
Background	Using the CSFS wildfire hazard maps and local knowledge, prioritize subdivisions in the county that should have Wildfire Protection Plans completed. Responsible Agencies will then need to work with subdivisions and/or homeowners associations to determine funding and cooperation
Agencies	Pitkin County Emergency Management, CSFS, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	
Estimated Costs	$10,000 to $15,000 per subdivision
Funding Sources	Grants and homeowners, CSFS, BLM/USFS
Schedule	TBD

Activity (Pr4)	**Coordination and dissemination of burn restriction information**
Background	Guidelines exist within the AOP for determining the need for fire restriction and/or fire closures. Information as well as implementing or lifting closures/restrictions shall be coordinated with all agencies. Agencies should also discuss agricultural burning policies.
Agencies	Pitkin County Emergency Management, CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Ongoing
Estimated Costs	Staff time
Funding Sources	Existing programs
Schedule	ASAP

Activity (Pr5)	**Strengthen and Ensure effective Multi-Agency Coordination and EOC/IMT interface capabilities. 2011**
Background	The County's current lack of an Emergency Operations Center program providing EOC/IMT interface and multi-agency coordination compatible with local, regional, state, and federal agencies and systems is deficient. The role of an Emergency Operations Center is to provide a central location from which government at any level can provide interagency coordination and executive decision making in support of incident(s) response and community-wide services and protection. This lack presents a major barrier to effective emergency services, public safety, and public service in the event of large or multiple wildfire incidents threatening or impacting our community. Barriers to overcoming the deficiencies of the current situation are likely to be identifying and equipping facilities to provide adequate infrastructure; the provision of broad-based training, mobilization planning; and securing funding.
Agencies	Pitkin County Sheriff Emergency Management
Priority	Very High
Status	Rudimentary County engagement and development support
Estimated Costs	TBD based on preliminary EOC program research and development
Funding Sources	Existing funding sources and grants (NWCCOG, FFAF, DHS).
Schedule	Define a program and submit grants

7.3. Mitigation

Plan and implement action to reduce potential negative impacts on human and natural values from wildland fire

Activity (M1)	**Pursue funding for more reverse 911 capacity**
Background	Reverse 911 is becoming more prevalent and widely used. Pitkin County Emergency Management, in cooperation with other service providers is expanding this service. Expansion of this service has been deemed a worthwhile pursuit.
Agencies	Pitkin County Emergency Management, local FPDs, Pitkin County Communications
Priority	High
Status	Complete Reverse 911 2011 **Pitkin Alert** http://www.pitkinalert.org/index.php?CCheck=1

Activity (M2)	**Prioritize needed Community Wildfire Protection Plans for subdivisions**
Background	Using the CSFS wildfire hazard maps and local knowledge, prioritize subdivisions in the county that should have Wildfire Plans completed. Agencies will then need to work with subdivisions and/or homeowners associations to determine funding and cooperation
Agencies	Pitkin County Emergency Management, CSFS, AFPD, SWFPD, BRFPD, CRFPD, contractors
Priority	High
Status	Conundrum, Snowmass/Wildcat, Starwood have CWPPs at this time.
Estimated Costs	$10,000 to $15,000 per subdivision
Funding Sources	Grants and homeowners
Schedule	Target subdivisions by fall 2009

Activity (M3)	**Continue to conduct required and voluntary wildfire hazard inspections and disseminate info to FPDs.**
Background	The Pitkin County Land Use Code mandates required inspections for new construction and any project that goes through a development review. Information on structures and subdivisions that are up to county code with regards to defensible space should be disseminated to local FPDs. Local Fire Marshalls also inspect development proposals.
Agencies	Pitkin County Community Development, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Ongoing
Estimated Costs	Staff time
Funding Sources	Existing programs
Schedule	Ongoing

Activity (M4)	**Identify cross-boundary fuel reduction projects**
Background	Under existing agreements CSFS, USFS/BLM are working together to identify cross-boundary fuel reduction projects within the wildland urban interface. Projects will focus on area where agencies have planned actions to address environment and watershed issues and where residents have expressed interest and support.
Agencies	CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	Ongoing
Estimated Costs	Staff time and project dependant
Funding Sources	Existing programs and grants
Schedule	Annual review

7.4. Suppression

Use appropriate strategies and tactics for safe and cost effective protection of human and natural resource values from wildland fire

Activity (S1)	**Pitkin County resource list**
Background	Building on the list of resources in the AOP, include NWCG qualified personnel and qualification levels to improve multi-agency resource use, and training opportunities. This could be a useful tool also on prescribed fires. Utilize the Individual Qualifications System (IQS) database for tracking.
Agencies	Pitkin County Emergency Management, CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	High
Status	??????
Estimated Costs	Staff time
Funding Sources	Existing programs
Schedule	Winter 2009

Activity (S2)	**Mutual aid agreements**
Background	Rapid mobilization of resources after initial reports of wildland fire is critical in keeping fires small and reducing the risk to lives and property. To insure maximum resource response, mutual aid agreements are maintained among the FPDs in Pitkin County. These agreements allow each agency to tap closest resources to assist them on wildland fires without consideration for reimbursement for costs for the first 12 hours on the incident.
Status	Complete including AOP annually updated

Activity (S3)	**Coordinated communications**
Background	Various radio systems and frequencies are in use throughout Pitkin County. The listing of these frequencies and use are detailed in the AOP. The Pitkin County Sheriffs Department should ensure that these lists are available to other fire fighting agencies in the area, and likewise the FPDs should have lists of Federal fire fighting radio frequencies, and possibly have some radios on-hand that are pre-programmed to federal frequencies..
Status	Completed 2011

7.5. Fiscal

Establish funding priorities and budget strategies for management objectives

Activity (F1)	**Identify, prioritize and develop cost estimates**
Background	Cooperators will identify, prioritize and develop cost estimates for common management objectives. Cooperators will be identified that can contribute an amount. Other cooperators will then be able to submit future budget requests. This process will be reviewed on an annual basis.
Agencies	Pitkin County Emergency Management, CSFS, USFS/BLM, AFPD, SWFPD, BRFPD, CRFPD
Priority	Medium
Status	To be done
Estimated Costs	Agency staff time
Funding Sources	Existing budgets **NWCG Grant Listing** http://www.nwcg.gov/grants/wf-grants.pdf
Schedule	December 2009

7.6. Work Plan

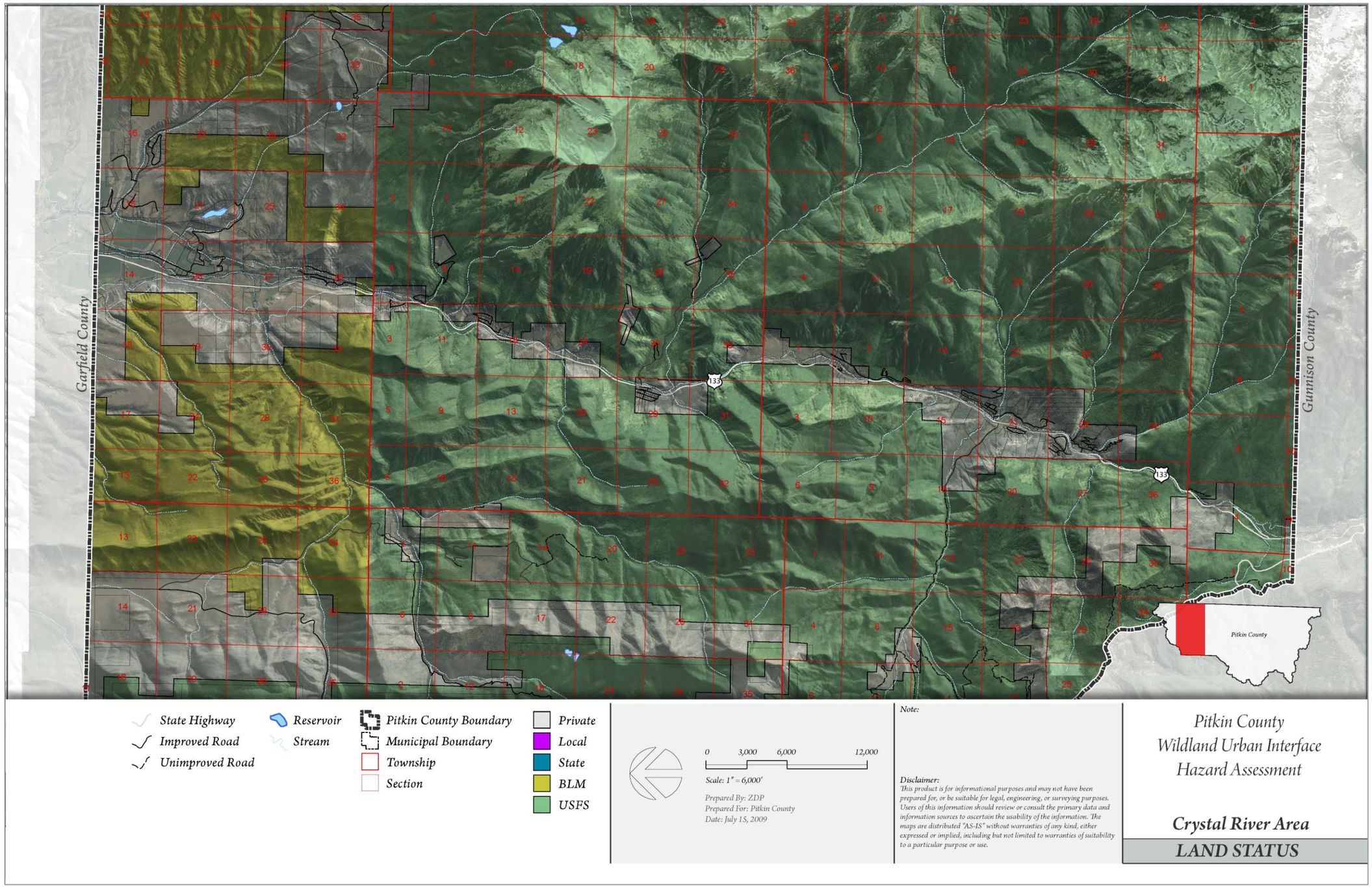
unty Fire Plan- Work Plan

2011					2012					2013		
April-June	July-Sept	Oct-Dec		Jan-March	April-June	July-Sept	Oct-Dec		Jan-March	April-June	July-Sept	Oct-Dec
		Does not exist										

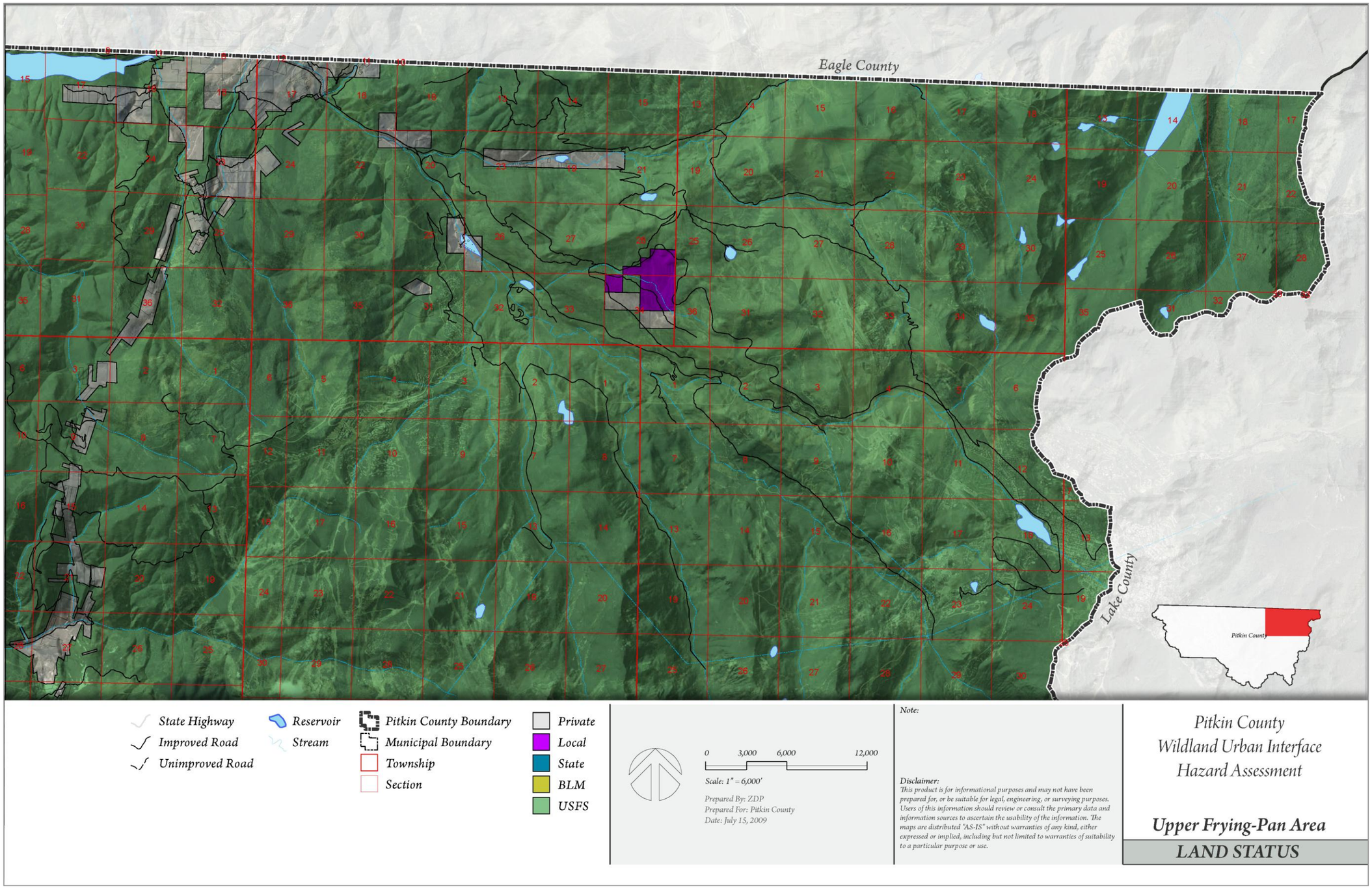
High=**RED** Medium=**YELLOW** Low=**GREEN**

8. Additional Mapping Follows

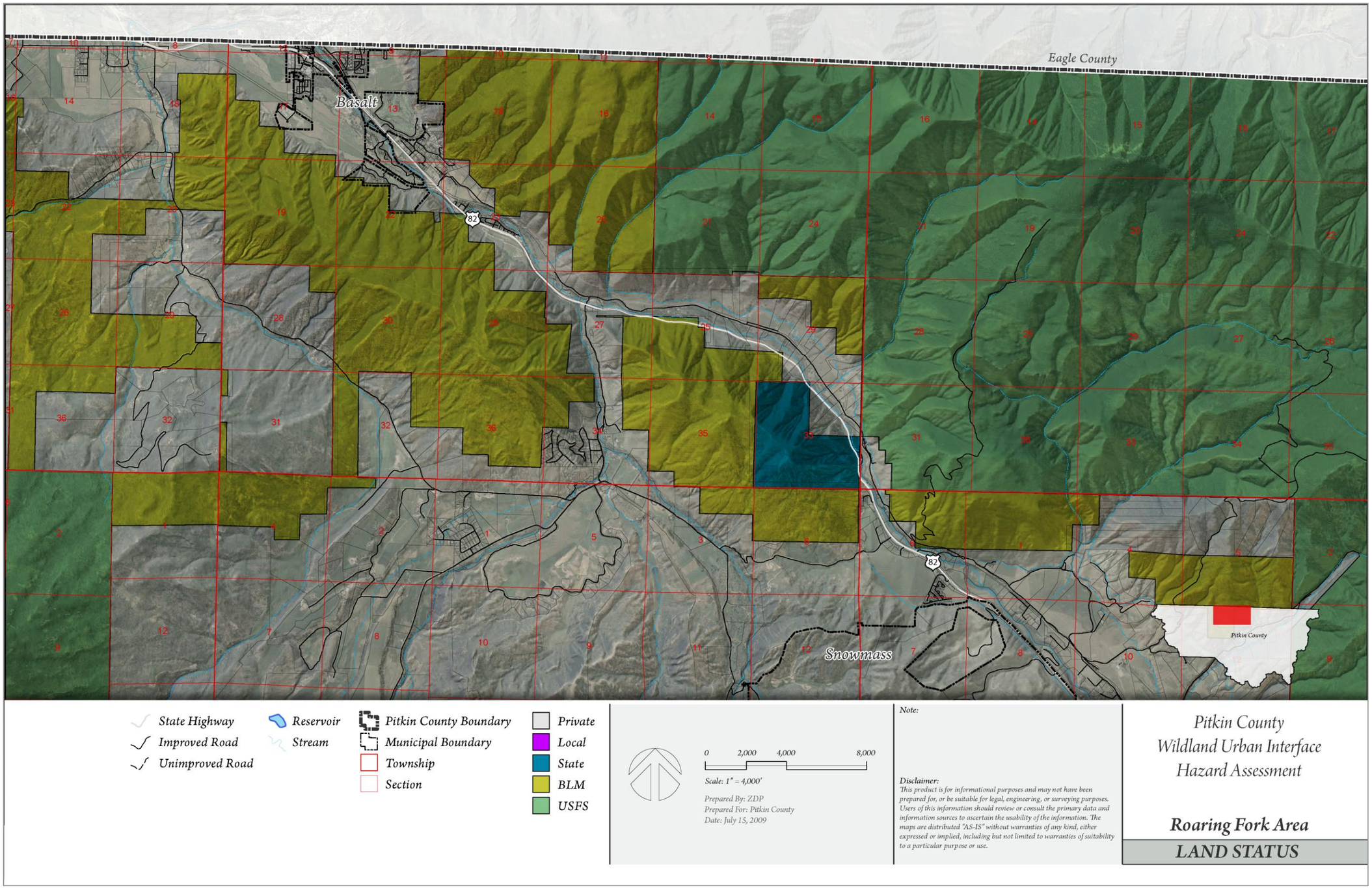
8.1. Crystal Valley Land Ownership & Parcel Map



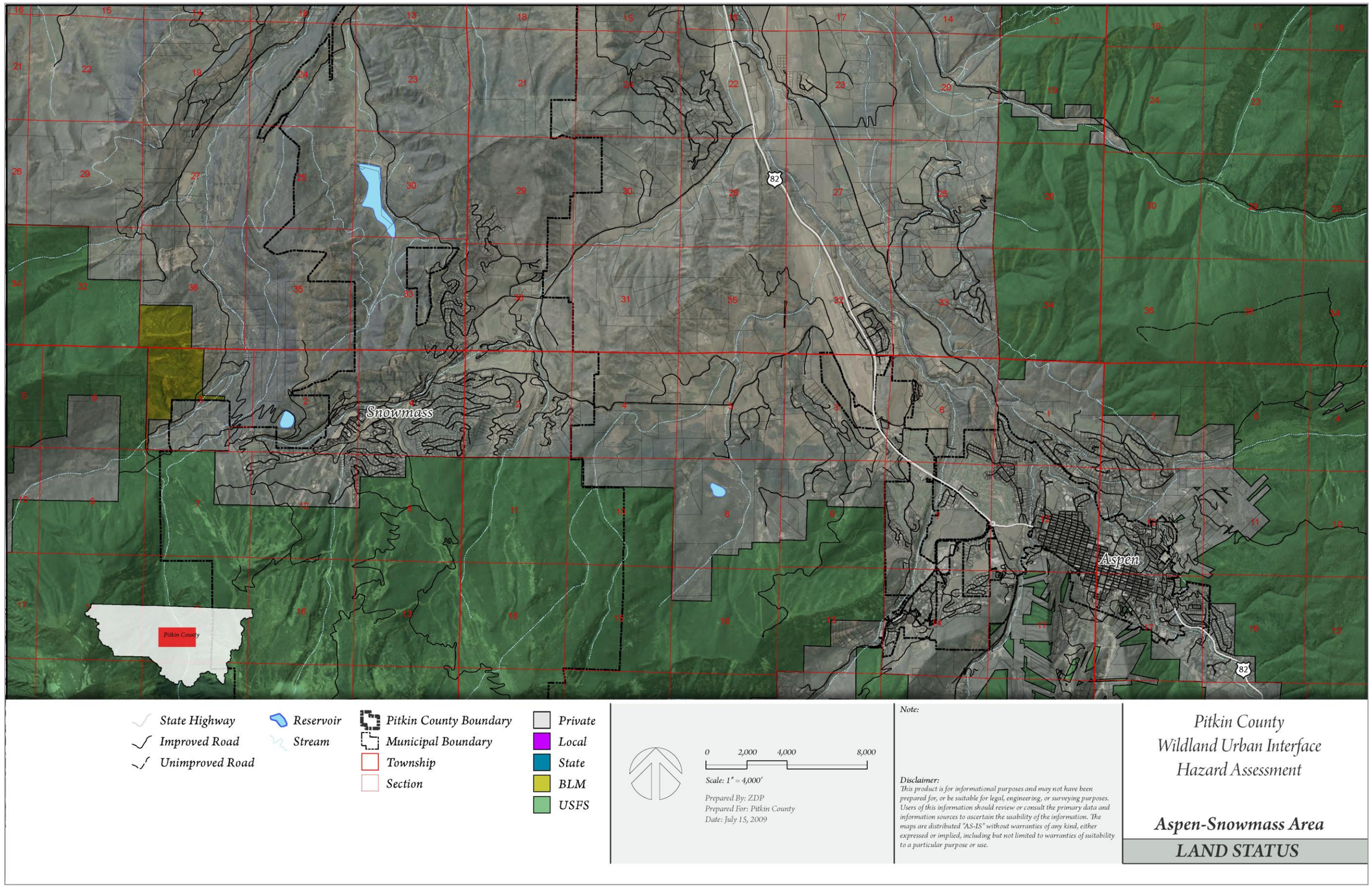
8.2. Fryingpan Valley Land Ownership and Parcel Map



8.3. Roaring Fork Valley Land Ownership and Parcel Map



8.4. Snowmass/Aspen Land Ownership and Parcel Map



9. Report Authors

Primary Author

The primary author of both the 2005 and 2009 update Pitkin County Wildfire Protection Plan is Eric Petterson of Rocky Mountain Ecological Services, Inc. Mr. Petterson holds a Masters of Science Degree in Rangeland Ecosystem Science (emphasis on fire ecology) and a Bachelors of Science Degree in Wildlife Biology from Colorado State University. Mr. Petterson has 19 years of natural resource planning and management experience. He has authored numerous Wildfire Hazard Reviews for Pitkin County, and has authored three Community Wildfire Protection Plans in the Roaring Fork Valley. Mr. Petterson has also conducted fuels inventories and management recommendation reports for 5 Colorado State Parks. As a contractor, Mr. Petterson has performed various assessments and planning tasks on the Cerro Grande, Missionary Ridge, Burn Canyon, Big Fish, Eldorado Canyon, and Hayman fires. Prior to being a consultant/contractor, Mr. Petterson was a Fuels Planner on the Canyon Lakes Ranger District on the Arapaho/Roosevelt National Forest. As a fuels planner, Mr. Petterson was the Project Manager for five prescribed fires, ranging in size from 300 acres to 7,000 acres, as well as combination mechanical treatment/prescribed fire projects. Mr. Petterson was with the USDA Forest Service for 10 years and has managed Rocky Mountain Ecological Services since 2000.

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2011 Update Consultant

Retired Aspen Fire Chief Darryl Grob was retained as a consultant by Pitkin County Emergency Management Coordinator Tom Grady in 2011. Mr Grob has 32 years in the Fire Service, with 16 years as career Fire Chief. His credentials include certification as a Colorado Division of Fire Safety Fire Officer III. He served on the Board of Directors of the Pitkin County 911 and Combined Communications Center for 15 years, the first fire service representative to do so. He served the Pitkin County Public Safety Council for 15 years, Chairperson for 5 of those years. He has served two terms on the Colorado Division of Fire Safety Firefighter Certification Advisory Board, appointed by the Governor to represent volunteer fire departments. His wildfire experience includes Command and Control assignments as a cooperator on Type-3 Incident Management Teams at all major wildfires in the North-West region of Colorado beginning with Storm King in 1996.

Darryl Grob, Consultant
Pitkin County Emergency Manager
Pitkin County Sheriff's Office
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970-379-1377

10. Appendices & Links

SB 09-001 CWPPs and County Governments
http://www.state.co.us/gov_dir/leg_dir/olls/sl2009a/sl_30.htm

SB 09-20 Wildfire Authorities and Responsibilities Summery
http://csfs.colostate.edu/pages/documents/Summary_Talking_points_SB-020_3.pdf

NWCG Grant Listing http://www.nwcg.gov/grants/wf-grants.pdf

Pitkin County Wildfire Protection Plan 2005
https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B20sbo6LXuR4NjY5ZmNkZGItOGRiZi00YmUwLWEyOGYtYTlmNDk0YjQ3NzQy&hl=en_US

Pitkin County Community Wildfire Protection Plan 2009 draft
https://docs.google.com/leaf?id=0B20sbo6LXuR4MGZhZjAzMzItODhjYS00MjI5LTgxMjktYzZhMzc2Yzg1YWJl&hl=en_US

2011Annual Operating Plan, Wildfire
https://docs.google.com/a/pitkinsheriff.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B20sbo6LXuR4OGY2MjkxYWUtYjNjNS00NzBiLTg5YzQtNGE0NzAyOGRjYzhm&hl=en_US

Roaring Fork Valley AOP Resource List
https://docs.google.com/a/pitkinsheriff.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B20sbo6LXuR4NWMzNWU0Y2QtMGYzOC00MWU0LWIzODQtZDk4Zjk3NzQwOGRh&hl=en_US&authkey=CK290ccK

Pitkin County Land Use Code - Wildfire
http://www.aspenpitkin.com/Portals/0/docs/county/countycode/bocc-ord-010-03.pdf

Mountain Pine Beetle http://csfs.colostate.edu/pages/mountain-pine-beetle.html

Conundrum Community Wildfire Protection Plan 2004
https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B20sbo6LXuR4ODMzZmIyYTYtYjdjNi00YTBjLTk0OTQtNzk1ODIzYzcxZTkz&hl=en_US

Snowmass Village Community Wildfire Protection Plan 2008
https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B20sbo6LXuR4ODRiZDc3ZTEtYzRjYy00YTM3LTgzNzctZjg1ZTBmNDhjNWZk&hl=en_US

Marble Community Wildfire Protection Plan 2011
https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0Bx6_iUW-7lkVZjFmZTljMjMtZWFmYi00YTk0LThmN2YtZDMyMjFiMjNhNTEx&hl=en_US

Firewise Guidelines
http://csfs.colostate.edu/pages/are-you-firewise-program.html

Pitkin Alert http://www.pitkinalert.org/index.php?CCheck=1

Preparing a Community Wildfire Protection Plan
http://www.stateforesters.org/files/cwpphandbook.pdf