



Bear Mountain AutoCamp Wildfire Risk Review



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Client: Keep Sedona Beautiful

Executive Summary

The Yavapai County Planning and Zoning department and county supervisors are soliciting public input about a proposed zoning change that would allow for the development of a 100-site luxury campground featuring open outdoor fire pits on an 18.73-acre parcel northwest of Sedona, AZ. This review, prepared for Keep Sedona Beautiful, examines the wildland fire hazards and risks associated with the introduction of a potentially significant new wildfire ignition source.

This 64,491-acre analysis found that the fuels, weather, and topography typical of the area are very conducive to the rapid spread of hot-burning wildfires during peak fire season. The predicted fire behavior would likely be very difficult to suppress by local firefighting response agencies without the use of aviation and other outside ground-based fire resources. The limited road network would present challenges to both safe firefighting operations and the evacuation of local residents. The numerous residences, commercial properties, and natural and archeological resources within 3.5 miles could likely be adversely impacted by a wildfire originating from the site.

Fire Behavior Findings:

- A probability analysis showed a very high likelihood of a wildfire originating from the proposed campground impacting the natural resource and recreational values within the Red Rock/Secret Mountain Wilderness.
- Over 50 percent of wildfires simulated during the core fire season (mid-May through mid-July) reached the Bear Mountain Road residences, the Enchantment Resort, and the Palatki Heritage Site, in the absence of effective suppression.



- Rates of spread modeled during peak fire season conditions ranged from one-half to nearly 2 mph, which would require a very fast response time from local firefighting agencies in order to suppress a wildfire quickly.
- The ability to keep a wildfire small would be further hampered by the limited area road network, a general lack of safety zones for firefighters, and the likely longer mutual aid response times from neighboring agencies.
- High spread rates coupled with the road network would also make the quick and safe evacuation of local residents difficult.
- Flame lengths of 8 to 25 feet that would require the use of fixed-wing retardant and/or rotor-wing water-dropping aircraft to suppress, were found to be widespread across the study area.
- A spatial analysis showed that the Red Rock/Secret Mountain Wilderness would be immediately impacted by a wildfire originating from the proposed campground in peak fire season, followed by the Bear Mountain Road residences, the Enchantment Resort, and the Palatki Heritage Site on the second afternoon, in the absence of effective suppression.

This is a circumstance where the threat of wildfire damage would come from within an area rather than from without. The introduction of a large, busy campground with open fire pits into a very dry, flammable wildland fire environment creates hazard and risk to residents, firefighters, and surrounding values at risk. The hazard is presented by campfires, up to 100 per day, ignited by campground users unfamiliar with safe fire practices. These same users would increase foot traffic in the area; one carelessly discarded, smoldering cigarette could ignite a problematic wildfire. The risk is presented by the high likelihood of an ignited wildfire reaching and adversely impacting local residences, commercial properties, and natural and archeological resources. The risk posed to residents and firefighters would be substantial.



Introduction

AutoCamp Sedona LLC (DBA AutoCamp) is under contract to purchase an 18.73-acre parcel northwest of Sedona, Yavapai County, AZ (Figure 1.), and wishes to develop a 100-site luxury campground consisting largely of Airstream trailers. The company has petitioned Yavapai County Development Services for a Zoning Change/Zone Map Modification and site plan approval for the parcel from Residential 2-acre minimum RCA-2A to Planned Area Development (PAD) (AC Letter of Intent). Keep Sedona Beautiful (KSB), a local 501(3)(c) environmental stewardship organization, has raised concerns about the proposal to local citizens. A chief concern is the potential for campground users to spark wildfires from the open outdoor firepits located at each of the 100 campsites, along with other anthropogenic ignition sources. This analysis will examine wildfire hazard and risk from the perspective of informing KSB input to Yavapai County Planning and Zoning and county supervisors as part of the public external scoping process.

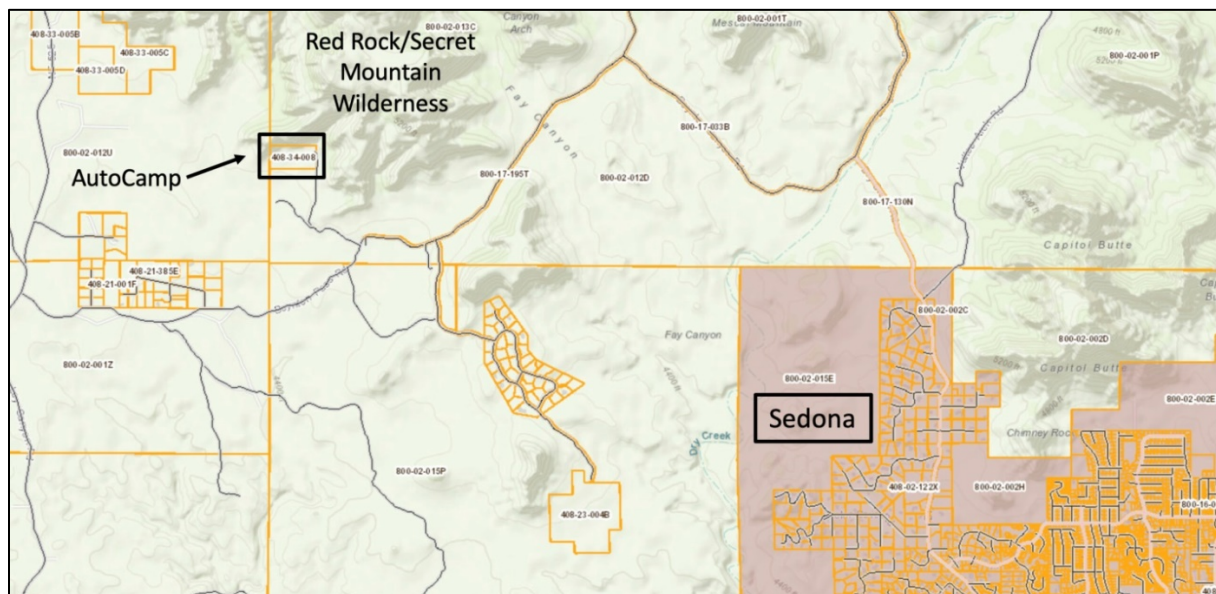


Figure 1. Proposed AutoCamp development vicinity map (KSB mailing 10/8/2020).

Analysis Area

The project parcel (APN 408-34-008) is an 18.73-acre inholding located within Coconino National Forest (Sedona Ranger District) lands and immediately adjacent to the Red Rock/Secret Mountain (RR/SM) Wilderness (Figure 2.). The analysis area was expanded in an approximate 5-mile radius around the project site and encompasses 64,491 acres. The hazards within the area's wildland fire environment, defined as conditions and situations capable of causing harm, will be described below.

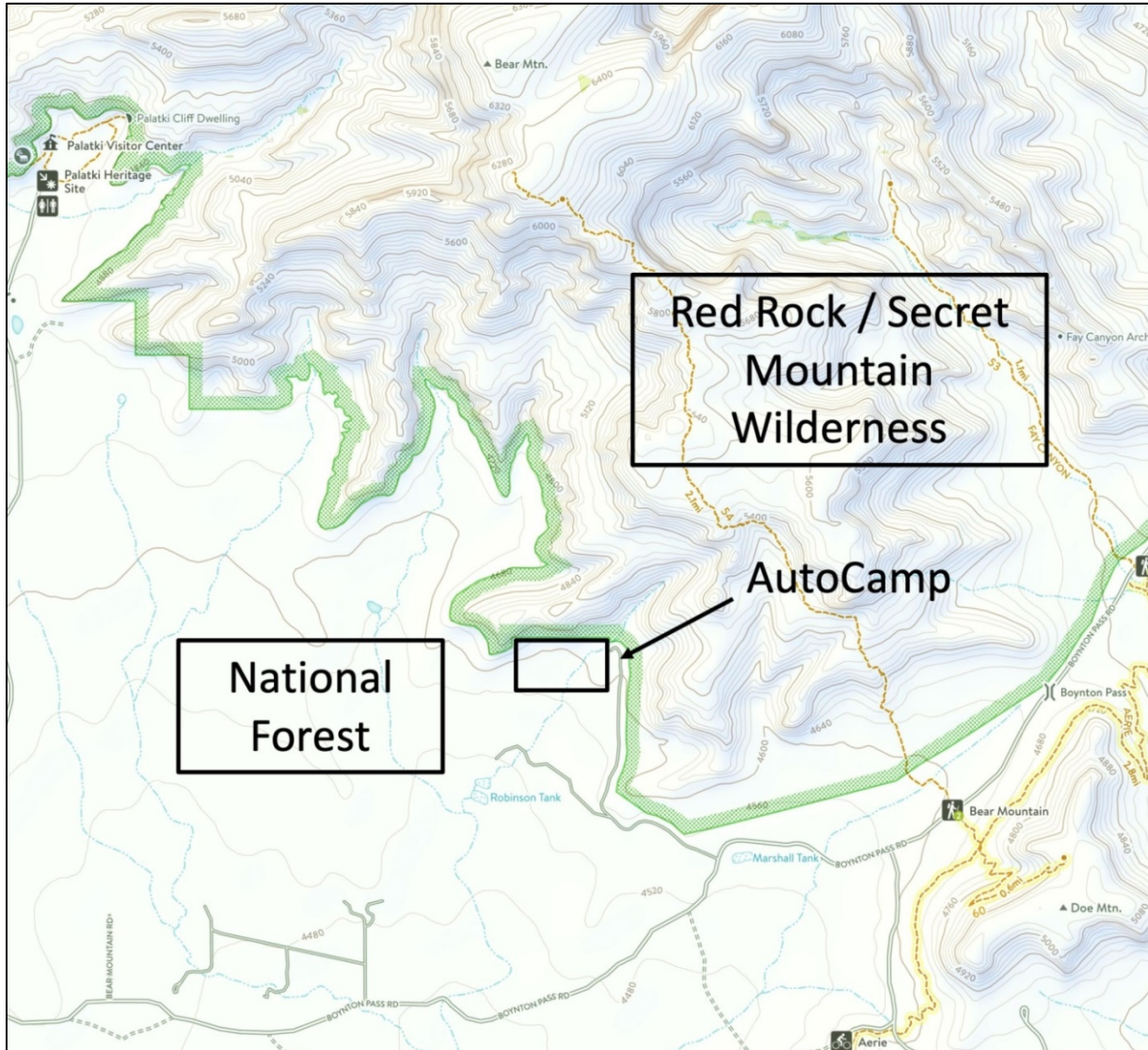


Figure 2. Proposed AutoCamp development location in relation to Wilderness and other federal lands managed by the Coconino National Forest (KSB mailing 10/8/2020).

Topography

The southern two-third of the analysis landscape is flat to gently sloped, with a southerly to westerly aspect, and is incised by numerous arroyos of up to 25 feet in depth. The northern third of the analysis area, comprised largely of the RR/SM Wilderness, consists of steep cliffs and canyons. The area gradually rises from the south at 4549 feet to the wilderness area, where it sharply rises to the ridgetops at 6447 feet.



Access

The analysis area can be accessed via the Boynton Pass Road and the Loy Butte/USFS Road 525; unpaved USFS and private roads (many one-way in and out, including to the AutoCamp site) spur off this access. Access to much of the interior is limited to foot travel, 4-wheel-drive vehicle, or helicopter. A small number of USFS trails lead up to the RR/SM Wilderness.

Fuels

Wildland fire fuels in the southern and central analysis area consist of a mix of highly-flammable annual and perennial grass and manzanita/scrub oak shrub species; individual junipers are scattered throughout (Photo 1.). The arroyos are more densely vegetated with the aforementioned species. Heavier concentrations of brush, juniper, and conifers are located in the northern wilderness. The grass percentage determines the fuel model selection to the south; the fast- and hot-burning GR2 characterizes areas with more grass (Photo 2.), while the slightly slower-spreading (but still hot) GS2 characterizes areas with slightly more shrubs. The northern wilderness consists of slow-spreading and somewhat discontinuous timber-litter models (TL3 and TL8), along with non-burning bare rock.



Photo 1. View of vegetation from Bear Mountain Road area looking northeast (Charley Pitcher).



Photo 2. Grass and brush wildland fire fuels near the AutoCamp Site (Charley Pitcher).

Climatology

The analysis area is hot and very dry, with annual precipitation listed at 21 inches or less at local Remote Automated Weather Stations (RAWS). Summer temperatures reach over 100 degrees with relative humidity in the single digits; winds are generally south to southwest and can reach 25 mph or higher. Fire seasons typically begin in April and peak during June; midsummer precipitation usually occurs during the monsoons, which begin in early to mid-July and extend into August.

Long-term, accessible weather data sources that represent the analysis area were somewhat difficult to locate, as the area is located in a rain-shadow (Matthew Russo, personal communication). The Cherry RAWS 23 miles southwest of the area was selected as the most representative and consistent weather data source.



Values at Risk

The following Values at Risk are located within 3.5 miles of the AutoCamp site (Figure 3):

- Bear Mountain Road area residences 0.64 mi
- The Aerie residences 1.31 mi
- The Palatki Heritage Site 1.65 mi
- The Enchantment Resort 2.00 mi
- Dry Creek Road residences 3.05 mi
- The Grassy Knolls 3.25 mi
- The RR/SM Wilderness (Bear Mountain) Immediately adjacent to the north

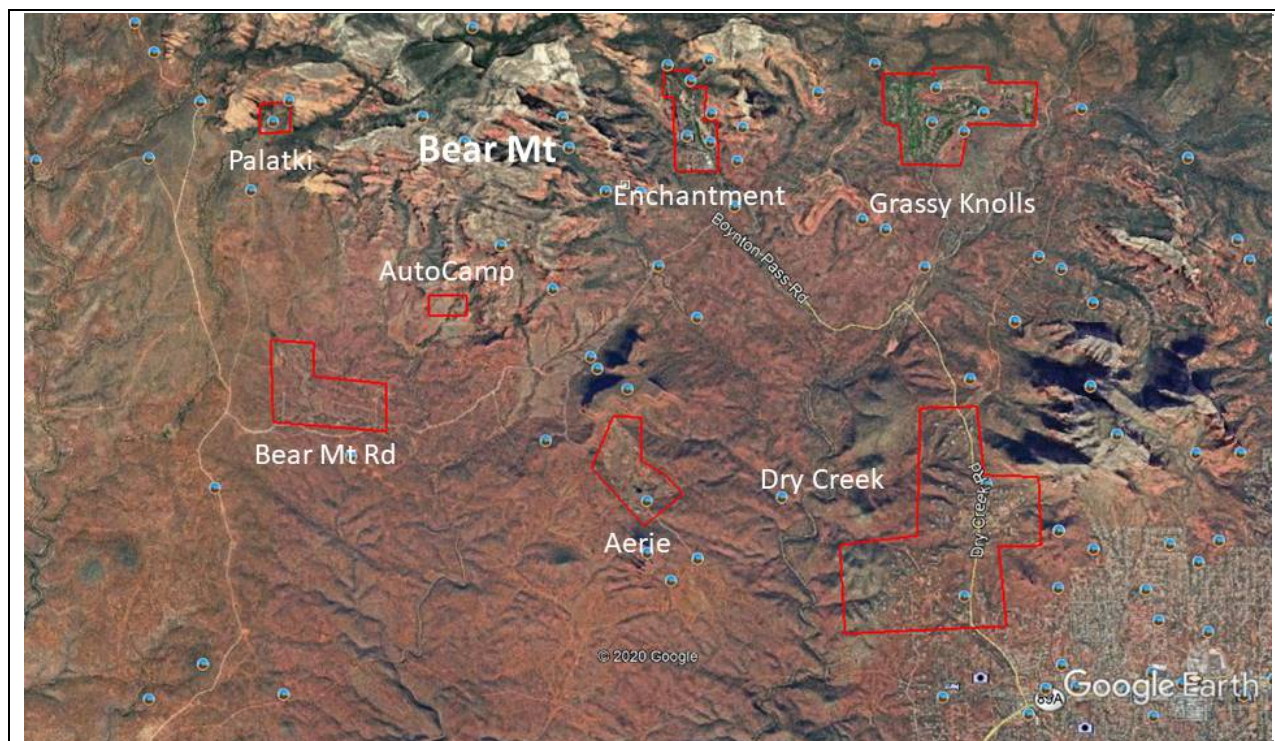


Figure 3. Analysis area Values at Risk.

Fire Behavior Analysis

The intent of this analysis is to determine the risks posed by the hazards associated with the analysis area. Risk in this case is defined by the likelihood of hazardous consequences in terms of severity or probability (Interagency Standards for Fire and Fire Aviation Operations 2020, P. 162.)

Four different analyses were run in order to capture general fire behavior potential, specific fire scenarios, and probabilities the fire would impact values-at-risk. The analysis “landscape” is comprised of 30-, 60-, or 90-meter pixels that are layered with wildland fire vegetation and topographical data that



are input into the fire behavior calculations. Other inputs include weather and fuel moisture data gathered from representative federal land management Remote Automated Weather Stations (Figure 4.). Weather and fuel moisture inputs are selected after an analysis of up to 20 years of data.

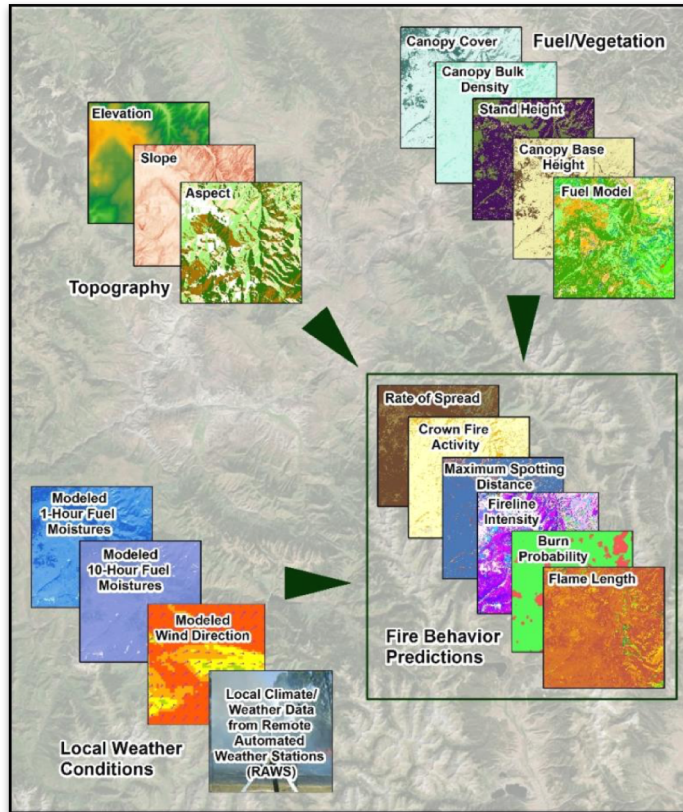


Figure 4. Inputs to fire behavior analyses.

The fire behavior outputs of interest include Rate of Spread in chains/hour (a chain is a forestry measure used in wildland fire suppression; one chain is 66 feet, and there are 80 chains to a mile), flame length measured in feet, fire spread arrival time measured in days and hours, and fire spread probability measured in percent.



Flammap

A Flammap analysis burns each 30-meter pixel within the analysis area independently of its neighbors in the direction of maximum spread. The weather and fuel moisture inputs were selected from the hottest and driest 3% of weather data from 2020; this also happened to fall in mid-June, the peak of wildland fire season in the Southwest.

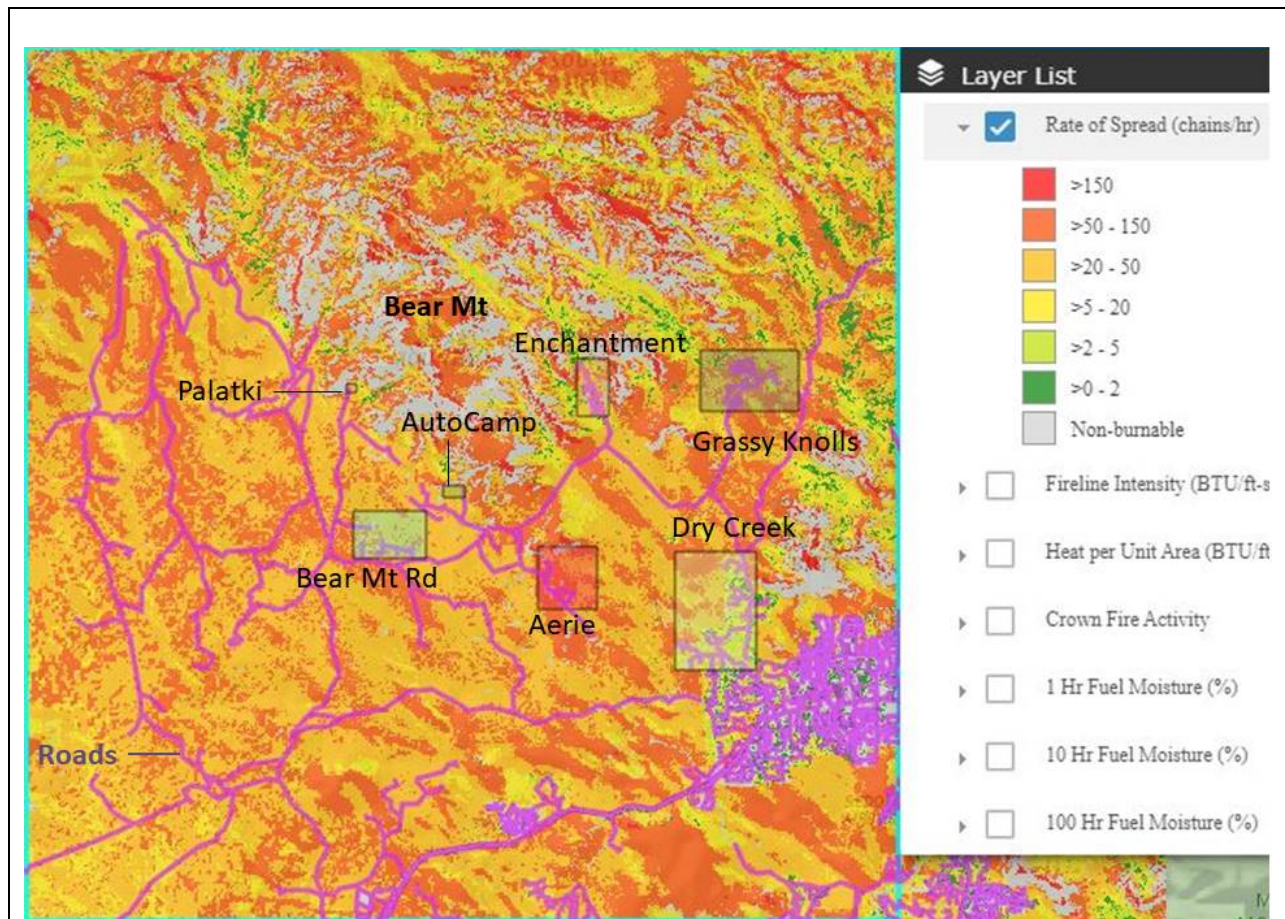


Figure 5. Flammap Rate of Spread.

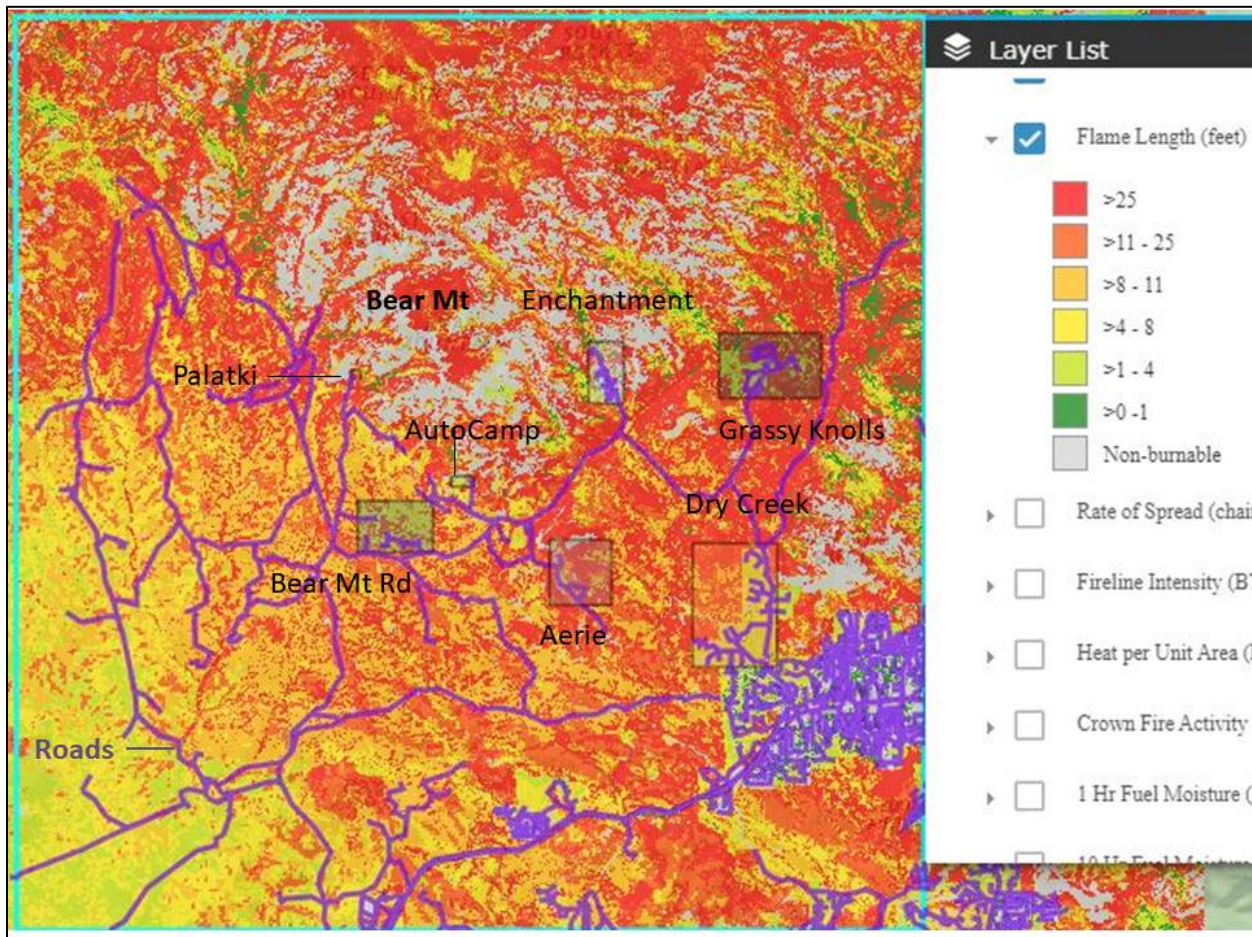


Figure 6. Flammap Flame length.

Figure 5 shows that forward rates of spread generated by the flashy grass and shrub vegetation are moderate to high, and would require a quick response from local wildland fire suppression agencies. Figure 6 demonstrates flame lengths of 8 to 25 feet that would require the use of fixed-wing retardant and/or rotor-wing water-dropping aircraft to suppress. Firefighters would most likely require water support from engines to follow up retardant and water drops in order to halt the spread and intensity of a wildfire in the analysis area during peak fire season.

The ability to keep a wildfire small would be hampered by the lack of roads into the area and a general lack of safety zones for firefighters. The ability to quickly evacuate residents from a fast moving wildfire would be similarly difficult and made more so by one-way in and out access roads that could be cut off by fire. Local firefighting personnel would also likely require mutual aid support from outside agencies, which would take time to arrive, require a complex incident management organization, add to incident management risk, and add to incident management costs.



Near-term

A Near-term analysis models spatial fire growth from a point source ignition over several days. In this analysis (Figure 7), a fire was simulated within the AutoCamp site under mid-June 2020 hot and dry weather conditions and allowed to spread for 6 days. The period of active burning for each day was set for 8 hours, which is a standard fire behavior analysis practice, but it is understood that burn periods may last longer in the driest conditions of peak fire season. Weather and fuels conditions were measured at the Cherry RAWS and fall within the hottest, driest 3 percent of all summer observations. The results of this analysis represent an average worst-case scenario, but this might be conservative compared to the most extreme fire seasons.

The analysis shows that the RR/SM Wilderness would be immediately impacted by a wildfire, with the Bear Mountain Road residences, the Enchantment Resort, and the Palatki Heritage Site affected on the second afternoon by wildfire fire backing against the prevailing south to southwest winds, in the absence of effective fire suppression operations. The Aerie would be impacted on Day 3 without effective suppression; the Grassy Knolls by Day 4. The residences in the Dry Creek Road area would be impacted on the sixth day of the fire barring effective suppression efforts. It is worth noting that backing fire is usually slower moving and less intense than forward-spreading head fire, and is often easier for firefighters to handle. It is also worth noting, however, that downcanyon winds from the north may develop in the evenings and may push a fire to the south at night during the driest weather conditions. Downslope night winds can be less intense than daytime winds, but fighting even a slower-moving head fire at night is a challenge for firefighters, especially since the firefighting aircraft available to Arizona cannot operate at night.

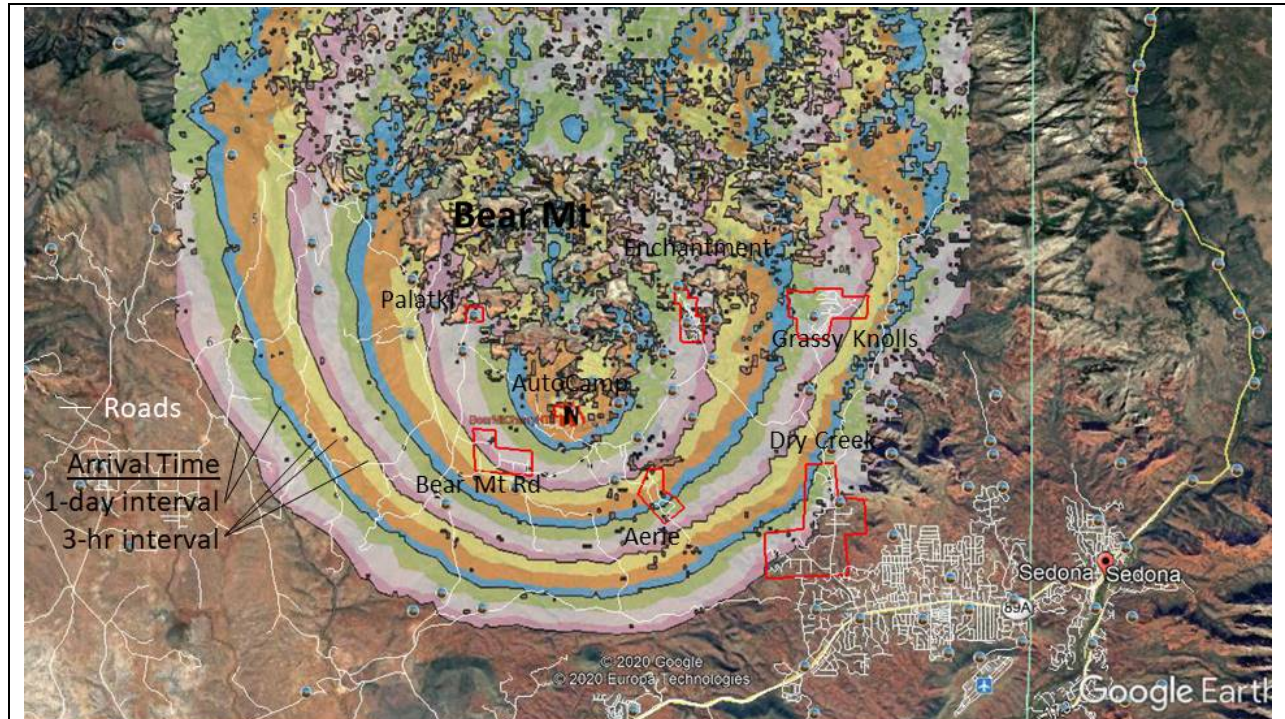


Figure 7. Near-term fire progression.

FSPro

An FSPro analysis calculates and spatially displays the probability that a fire ignited from a specific point will reach certain values at risk. In this analysis (Figure 8), 1000 fires were simulated within the AutoCamp site and allowed to burn unimpeded for 7 days under 21 years of historical core fire season weather conditions (mid-May through mid-July).

The analysis shows a very high likelihood of a wildfire impacting the natural resource and recreational values within the RR/SM Wilderness. Over half the modeled fires reached the Bear Mountain Road and Aerie residences, the Enchantment Resort, and the Palatki Heritage Site in the absence of effective fire suppression. The probabilities of fire reaching the Grassy Knolls and Dry Creek Road residences was less than 20 percent, but most fire managers would not consider that a negligible number.

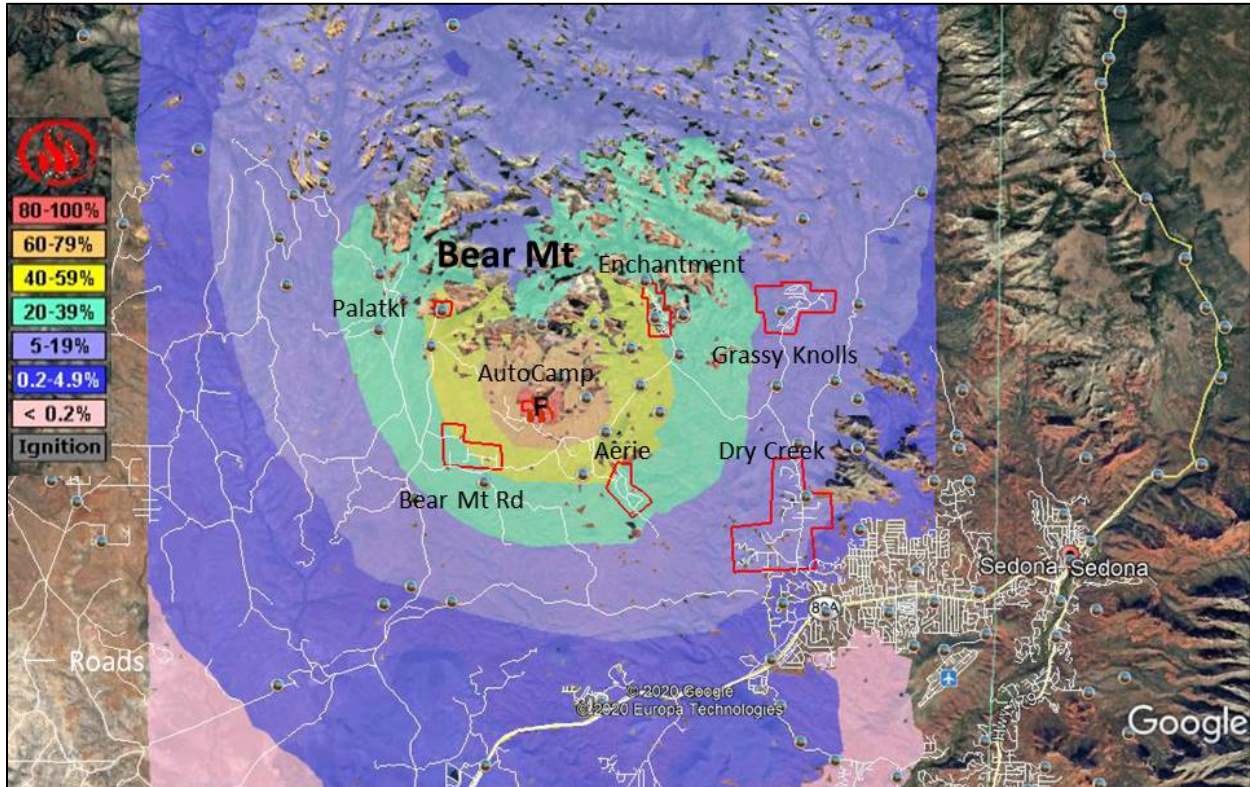


Figure 8. FSPro Probability map

About Anchor Point

Founded in Boulder, Colorado in 1999, Anchor Point develops and supports risk-based wildland fire solutions from community planning through forest plans. Our core focus is wildland fire risk assessment and protection of home, community and resource values. We use cutting-edge fire science and fire modeling techniques to provide quality assessments, which yield the highest quality fire management solutions available today. We are active fire managers, subject-matter experts and advisors on wildland-urban interface issues throughout the Nation and world-wide.