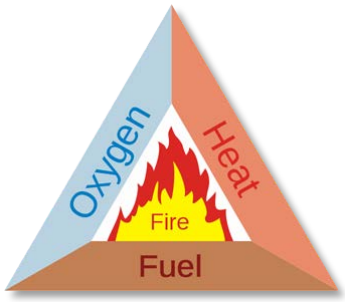
3.4 RISK ASSESSMENT: WILDFIRE

DESCRIPTION

Wildfires occur when all of the necessary elements of a fire triangle come together in a wooded or grassy area: an ignition source is brought into contact with a combustible material, such as vegetation, that is subjected to sufficient heat and has an adequate supply of oxygen from the ambient air. The hazard of wildfire is one that is significant not only in Idaho but in many areas of the United States.



A wildfire *front* is the portion sustaining continuous flaming combustion, where unburned material meets active flames, or the smoldering transition between unburned and burned material. As the front approaches, the fire heats both the surrounding air and woody material through convection and thermal radiation. First, wood is dried as water is vaporized at a temperature of 212°F. Next, the pyrolysis of wood at 450°F releases flammable gases. Finally, wood can smolder at 720°F or, when heated sufficiently, ignite at 1,000°F. Even before the flames of a wildfire arrive at a particular location, heat transfer from the wildfire front warms the air to 1,470°F, which pre-heats and dries flammable materials, causing materials to ignite faster and allowing the fire to spread faster. High-temperature and long-duration surface wildfires may encourage flashover or *torching*: the drying of tree canopies and their subsequent ignition from below.

Wildfires have a rapid forward rate of spread when burning through dense, uninterrupted fuels. They can move as fast as 6.7 miles per hour (mph) in forests and 14 mph in grass and range lands. Wildfires can advance tangential to the main front to form a flanking front, or burn in the opposite direction of the main front by *backing*. They may also spread by jumping or spotting, as winds and vertical convection columns carry firebrands (hot wood embers) and other burning materials through the air over roads, rivers, and other barriers that may otherwise act as firebreaks. Torching and fires in tree canopies encourage spotting, and dry ground fuels that surround a wildfire are especially vulnerable to ignition from firebrands. Spotting can create *spot fires* as hot embers and firebrands ignite fuels downwind from the fire. In Australian bushfires, spot fires are known to occur as far as 6 miles away from the fire front.

Large wildfires may affect air currents in their immediate vicinities by the stack effect: air rises as it is heated, and large wildfires create powerful updrafts that will draw in new, cooler air from surrounding areas in thermal columns. Great vertical differences in temperature and humidity encourage pyrocumulus clouds, strong winds, and fire whirls with the force of tornadoes at speeds of more than 80 kilometers per hour (50 mph). Rapid rates of spread, prolific crowning or spotting, the presence of fire whirls, and strong convection columns signify extreme conditions.

There are four main types of fires, which include:

Ground fires are fed by subterranean roots, duff, and other buried organic matter. This fuel type is especially susceptible to ignition through spotting. Ground fires typically burn by smoldering and can burn slowly for days to months.

Crawling or **surface** fires are fueled by low-lying vegetation such as leaf and timber litter, debris, grass, and low-lying shrubbery.

Ladder fires consume the material between low-level vegetation and tree canopies, such as small trees, downed logs, and vines. Kudzu, Old World climbing fern, and other invasive plants that scale trees may also encourage ladder fires.

Crown, **canopy**, or **aerial** fires burn suspended material at the canopy level, such as tall trees, vines, and mosses. The ignition of a crown fire, termed *crowning*, is dependent on the density of the suspended material, canopy height, canopy continuity, and sufficient surface and ladder fires in order to reach the tree crowns.

Three principal factors have a direct impact on the behavior of wildfires: topography, fuel, and weather.

Topography can have a powerful influence on wildfire behavior. The movement of air over the terrain tends to direct a fire's course. Gulches and canyons can funnel air and act as a chimney, intensifying fire behavior and inducing faster rates of spread. Similarly, saddles on ridge tops tend to offer lower resistance to the passage of air and will draw fires. Solar heating of drier, south-facing slopes produces upslope thermal winds that can complicate behavior.

Slope is an important factor. If the percentage of uphill slope doubles, the rate at which a wildfire spreads will likely double. On steep slopes, fuels on the uphill side of the fire are closer to the source of heat. Radiation preheats and dries the fuel, thus intensifying fire behavior. Terrain can also inhibit wildfires: fire travels down slope much more slowly than it does upslope, and ridge tops often mark the end of a wildfire's rapid spread.

Source: Idaho Firewise website

Fuels are classified by weight or volume (fuel loading) and by type. Fuel loading, often expressed in tons per acre, can be used to describe the amount of vegetative material available. If fuel loading doubles, the energy released also

can be expected to double. Each fuel type is given a burn index, which is an estimate of the amount of potential energy that may be released, the effort required to contain a fire in a given fuel, and the expected flame length. Different fuels have different burn qualities. Some fuels burn more easily or release more energy than others. Grass, for instance, releases relatively little energy, but can sustain very high rates of spread.

Firefighters generally classify wildfire fuels into three types:

Ground Fuels: This vegetation is close to or lying on the ground. Ground fuels include dead grass and leaves, needles, dead branches, twigs, and logs.
Surface Fuels: These plants and trees are close to the ground but not actually lying on the ground. They are usually shrubs, grasses, low-hanging branches, and anything not located in the high branches of trees. They are also referred to as "ladder fuels", because a fire can move from ground fuels to surface fuels, then onto crown fuels.
Crown Fuels: Crown fuels are found only in the crowns or tops of trees. They do not touch the ground and are usually the high branches of trees. When a wildfire burns in the tops of the trees, it is called a crown fire.

Continuity of fuels is an important factor. Continuity is expressed in terms of both horizontal and vertical dimensions. Horizontal continuity is what can be seen from an aerial photograph and represents the distribution of fuels over the landscape. Vertical continuity links fuels at the ground surface with tree crowns via ladder fuels.

Another essential factor is fuel moisture. Like humidity, fuel moisture is expressed as a percentage of total saturation and varies with antecedent weather. Low fuel moistures indicate the probability of severe fires. Given the same weather conditions, moisture in fuels of different diameters changes at different rates. A 1,000-hour fuel, which has a 3- to 8-inch (8- to 20-centimeter) diameter, changes more slowly than a 1- or 10-hour fuel.

Of all the factors influencing wildfire behavior, **weather** is the most variable. Extreme weather leads to extreme events, and it is often a moderation of the weather that marks the end of a wildfire's growth and the beginning of successful containment. High temperatures and low humidity can produce very vigorous fire activity. The cooling and higher humidity brought by sunset can dramatically quiet fire behavior.

Fronts and thunderstorms can produce winds that are capable of radical and sudden changes in speed and direction, causing similar changes in fire activity. A fire's rate of spread varies directly with wind velocity. Winds may play a dominant role in directing the course of a fire. The radical and devastating effect that wind can have on fire behavior is a primary safety concern for firefighters. In July 1994, a sudden change in wind speed and direction on Storm King Mountain led to a blowup that claimed the lives of 14 firefighters. The most damaging firestorms are usually marked by high winds.

Effects of/on Other Hazards

Other hazard events can cause wildfires, and wildfires can intensify other hazards. According to a 1991 case study, winds gusting to 62 mph (100 km/h) downed power lines, resulting in 92 separate wildland fires in Washington (The National Wildland/Urban Interface Fire Protection Initiative, 1992). Earthquakes also have the potential to cause wildfires.

By removing vegetative cover, wildfires can contribute to mudslides, landslides, and floods. According to the National Commission on Wildfire Disasters, the 1992 Foothills Fire near Boise was so hot that not only was the vegetation removed, but the soils were . . . so heat damaged that they resist water penetration and cause flash runoff and erosion, as well as some that slide off steep slopes like dry sugar" (MacLeary, 1993).

Leading Causes of Fires in Idaho

All wildfires begin with an ignition source. The National Interagency Fire Center (NIFC) compiles this information yearly from a number of Federal agencies. Table 3.4.A below presents the summary of Idaho acres burned, by cause, over the past three years.

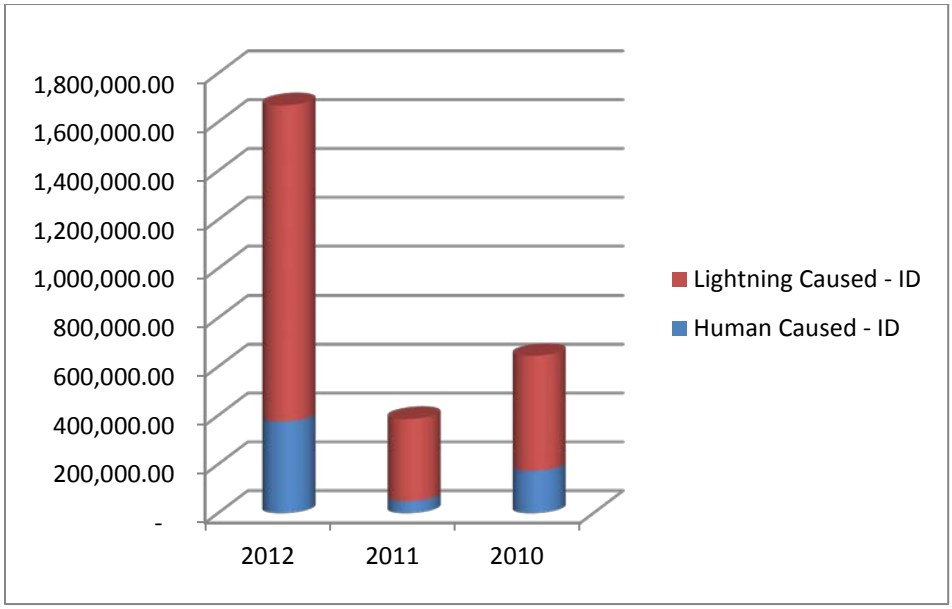


Table 3.4.A: Idaho Fires by Cause / Source: NIFC

LOCATION, EXTENT, AND MAGNITUDE

All but four of the local mitigation plans in Idaho identify wildfire as a significant hazard, and fires can occur anywhere in the State. Fire is an important part of Idaho's different ecosystems. It serves as a cleansing agent for both forests and rangelands in many ways. Idaho has two principle ecosystems affected by fire: forests and rangelands.

Idaho's Forests

Roughly 41 percent of Idaho is covered in forests. Over time, the trees in these forests grow thick and close together, along with other vegetation, both dead and alive. When this happens, the forest needs to be cleaned out to keep trees healthy and to provide new forage for wildlife. Wildfire helps forests to "clean themselves" by burning dead trees and other vegetation, along with the crowded plants and trees. Some wildfires burn all vegetation in a forest, but many of them burn in a "mosaic" pattern, which means that not all trees and vegetation are burnt. After a wildfire, new vegetation has room to grow. Trees can start to rejuvenate, and new trees sprout because they have access to sunlight. Tender grasses begin to grow, which attracts wildlife such as elk, deer, and antelope. Forest lands predominate in the Northern, North Central, and Northeast planning regions.

Source: ThinkStock.com

Idaho's Rangelands

Rangelands form the majority of the remaining land in the State that is not used for agriculture. These areas do not receive much rain, and their native vegetation is made up of grasses, broad-leaved plants (forbs), and shrubs that can survive on little moisture, especially during the summer months. Rangeland can describe a prairie, plain, savannah, steppe, grassland, and many other ecosystems. Rangelands predominate in the Southwest, Central, and Southeast planning regions of Idaho.

Wildland-Urban Interface (WUI)

'The WUI consists of areas where human habitation adjoins, or is mixed with, the wildland and wildland fuels. The character of the WUI ranges from urban areas adjoining wildlands to isolated ranches or cabins. Using county WUI designations, approximately 78% of the lands IDL protects from wildfire falls within the WUI.'[1]

The WUI is thus a focal area for human environment conflicts, such as the destruction of homes by wildfires, habitat fragmentation, introduction of exotic species, and biodiversity decline. Of the 11 Western States, Idaho has the fifth largest area of undeveloped, forested private land bordering fire prone public lands.[2]

[1] Fire in Idaho 2011. State Fire Marshall, Idaho Department of the Interior.
[2] Headwater Economics. 2011 http://headwaterseconomics.org/interactive/wui-development-and-wildfire-costs

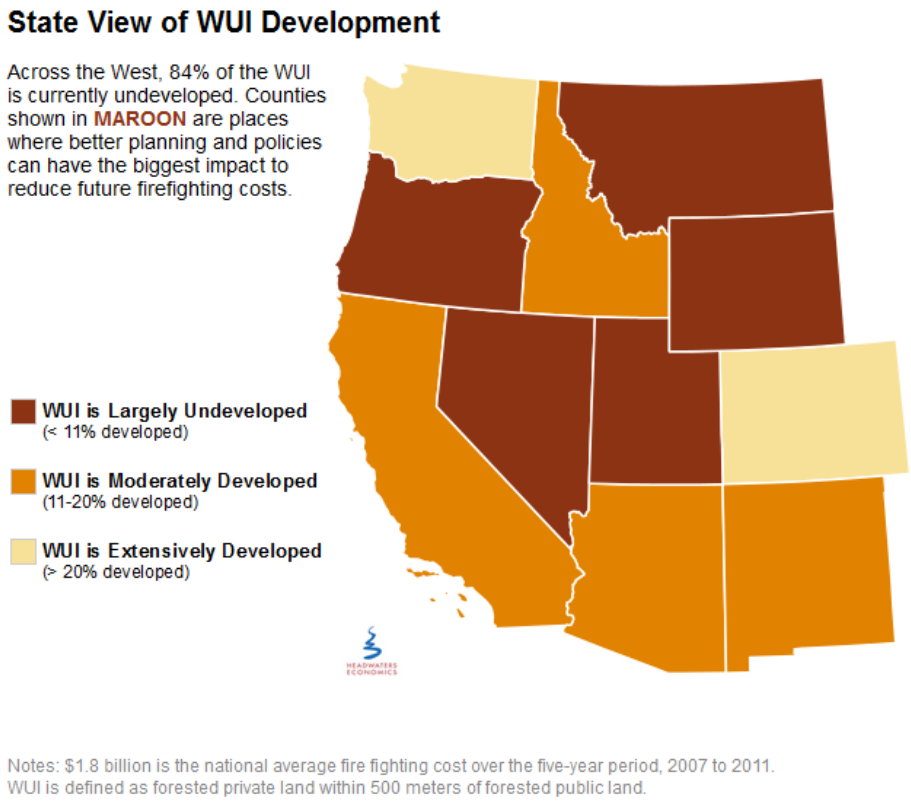


Figure 3.4.B: State View of WUI Development / Source: Headwater

Map 3.4.Q, at the end of this section, depicts the locations of highest vulnerability based on WUI boundaries compiled by the Idaho Department of Lands (IDL) from the local jurisdictions. It is in the WUI that the protection of structures from wildland fires is most challenging and human-caused fire ignitions are most common.

PAST OCCURRENCE

Recently, wildfire has been the most prolific source of Federal disaster declarations. Since 2000, seven of the thirteen overall Presidential Declarations in Idaho have been for wildfires (54%). Because fire location characteristics are not designated in official records, a substantive analysis of past events is difficult. Federal and State wildland firefighting agencies generally only note the number of fires and the acreage. The State Fire Marshall records the number of calls to certain types of fires (including outdoor fires) but does not note whether the call is related to wildland fires or the significance of the response.

Some illustrations of the wildland fire danger are possible. Table 3.4.E (located later on in this section) and Map 3.4.O (at the end of this section) present some of the significant wildland fires that have been recorded in Idaho. While specific references to WUI-type losses are limited in this table, the scale and

frequency of Idaho wildland fires are well illustrated. Map 3.4.P, also at the end of this chapter, displays historical fire perimeters from 2000-2011.

The 'Fire in Idaho 2011' report from the State Fire Marshall summarized statistics of past wildfires from the National Interagency Fire Center. Table 3.4.C, below, lists the largest wildfires that have occurred in Idaho from 1999-2011.

Year	Fire Name	Location	Size in Acres
2007	Murphy Complex	BLM Twin Falls District	652,016
2010	Long Butte	BLM Twin Falls District	306,113
2007	Cascade Complex	Boise National Forest	302,376
2007	East Zone Complex	Payette National Forest	300,022
2006	Crystal	BLM Idaho Falls District	220,042
2000	Clear Creek	Salmon-Challis National Forest	216,961
2000	SCF Wilderness	Salmon-Challis National Forest	182,600
2007	Rowland	Idaho	180,000
2007	Elk Mountain	BLM Twin Falls District	160,000
2000	Diamond	Payette National Forest	149,772
1999	Mule Butte	BLM Aberdeen	138,915
2007	Shower Bath	Salmon-Challis National Forest	122,600
2010	Jefferson	DOE National Laboratory	109,727
2007	Rattlesnake	Idaho	102,000

Table 3.4.C: 100,000+ Acre Fires in Idaho / Source: Fire in Idaho 2011

1910 Fire

The following text was excerpted from an article written by Jim Kershner from the August 15, 2010, edition of the *Spokesman-Review*. Map 3.4.D provides an overview of the event for reference.

Some came to call it The Big Blowup. Others called it the Big Burn. By any name, it was easily the biggest forest fire in the Inland Northwest's history – actually the biggest forest fire in U.S. history.

A century ago, 3 million acres of North Idaho, Montana and Washington forest were turned to charcoal in two wind-whipped days. The towns of Taft, Haugan, DeBorgia in Montana, and Grand Forks and Falcon in Idaho, were destroyed. One-third of Wallace was obliterated. At least 85 people died.

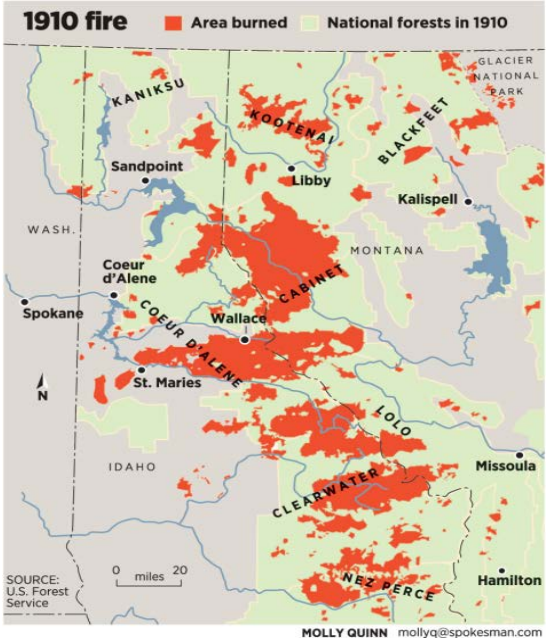
A forest the size of Connecticut was exploding in a fearsome whoosh – generating, with fire and oxygen, its own tornadoes and cyclones. One survivor called it "the sound of a thousand trains rushing over a thousand steel trestles." Another said it could be compared only to the "roar of Niagara Falls." The noise was a deafening combination of 60 mph gales, colossal fire-driven updrafts, and the clamor of hundreds

of trees cracking, snapping and slamming against earth. One witness said it sounded like being in the midst of "heavy cannonading."

1910 began with a disastrously snowy winter and then turned into an ominously dry spring and summer. The first wildfires in the Northern Rockies flared up in the unheard-of month of April. The drought persisted into summer and by late June and early July crews already were patrolling the forest "reserves," as the national forests were then called, putting out dozens of spot fires. By late July and early August thousands of fires were smoldering deep in the mountains of Idaho, Montana and Washington.

The smokiest areas of all were in the vast St. Joe River drainage and the more thickly settled Coeur d'Alene River drainage of North Idaho.

The fires had three main sources. Lightning strikes (including hundreds on July 26 alone); people, mainly farmers, prospectors and loggers who were clearing land and burning slash; and railroads, including one of the most audacious and expensive rail lines ever built, the Chicago, Milwaukee, St. Paul and Pacific line (called The Milwaukee Road) completed a year earlier over the Bitterroots. "Locomotives threw sparks like a Roman candle chugging down the tracks," wrote Pyne.



Map 3.4.D: 1910 Fire / Source: United States Forest Service

The forest rangers at Wallace acquired a small fleet of velocipedes, or "speeders," which were like bicycles that could be used on railway tracks. The rangers scooted along behind the trains and put out the fires alongside the tracks.

By mid-August, thousands of firefighters — including thousands of Army troops — were out in the mountains. Most were already exhausted from cutting fire lines (essentially, trenches) for miles through wilderness. The rangers were only too aware that hundreds of small fires were still alive, creeping along through brush and smoldering in the duff. The rangers' biggest fear was that a big wind would whip all of these fires into flame simultaneously.

On Aug. 20, 1910, that's exactly what happened.

Fire crews deep in the forests noticed with apprehension that the wind was freshening from the southwest. By mid-day it was a full-blown gale on the mountain ridges — the dreaded "Palouser," named for the Palouse country to the southwest.

The crews knew the winds boded ill, but it wasn't until that afternoon that they looked up to see a truly horrifying sight: Huge black clouds, like giant inky thunderheads, blotting out the sun. These were clouds of smoke, ash and cinders, carried high aloft by giant, roaring updrafts. It meant that those hundreds of small fires across the Clearwater, St. Joe, Coeur d'Alene and Bitterroot regions had flared, marched and in many cases, joined up together and created a massive chain reaction of fuel, flame and oxygen. It was a true firestorm, massive enough to create its own roaring vortexes. Witnesses estimated clouds of smoke and ash 2,000 feet in the air.

Down on the ground, these winds and updrafts created crown fires that moved faster than a man could run – faster than a locomotive could steam, said some witnesses. Entire mountainsides of trees were blown down like matchsticks.

The scale was immense. Telegraph operators sent out desperate messages describing the approach of a solid line of flame 30 miles wide, and that was no exaggeration. Today, you can drive Interstate 90 east from Wallace, Idaho to just short of St. Regis, Mont. — about 45 miles — and be within the old burn zone every mile of the way. And this was by no means the only burn zone in the Northern Rockies – just the biggest.

Fires of 2000

During the fires of 2000, smoke from the fires became a constant companion to residents throughout the State, affecting the health, recreation, and daily life of many communities. Several times, the Idaho Department of Environmental Quality issued air quality advisories to several communities in Idaho because of "very unhealthy" or "hazardous" air quality concerns. The town of Salmon requested and received air purifiers for their residents.

The recorded losses include 700 cattle on one ranch in Dietrich, Idaho. Within the State of Idaho, 109 structures were destroyed: 38 residences (homes, cabins, or trailers), 70 outbuildings, and one commercial building/business. A total of 9,568 structures were threatened: 6,061 primary residences, 1,635 outbuildings, and 1,872 commercial building/businesses. The town of Atlanta imported potable water because the town's water system was damaged.

Emergency closures of Federal and State lands affected approximately 3 million acres. Over 2,000 miles of trails, over 80 miles of river, and almost all public airstrips were closed. Restrictions were placed on campfires, smoking, and the use of chainsaws and other equipment.

These closures and restrictions had an enormous impact. Many businesses that depend on the region's tourism in the summer and fall seasons suffered economically. During the 26 days that the Salmon River in the Frank Church River of No Return Wilderness was closed to recreation, 4,000 outfitter floaters, 2,300 private floaters, and 140 commercial jet boaters who were scheduled to float the river were unable to take their trips. These lost trips resulted in a loss of personal income and employment for surrounding communities. The closures also affected the plans of about 600 hunters, who had booked

guided hunts in the wilderness area, in addition to the large number of resident hunters depending upon big game for their winter food supply.

During the period 1976 to 2000, 12 wildland fire events (or groups of events) resulted in State-declared disasters. Nine of these disasters covered the entire State. Throughout the West, the number of large wildfires, and of acres burned by them, has increased over the last decade, as have the costs of attempting to put them out. Table 3.4.E lists all significant wildfires that have occurred in Idaho.

Fires of 2012

According to the University of Idaho, 2012 was the "worst wildfire year in Idaho in well over a decade" with 1.7 million acres of mostly rural forests burned. Sixty-six homes were lost in a Pocatello wildland fire. The Idaho Bureau of Homeland Security reported 13 structures were lost in the Trinity Ridge Fire, and areas near Atlanta, Pine, and Featherville were evacuated. Homes and businesses were threatened and evacuations were issued for communities affected by the Halstead Fire in Custer County, the Karney Fire in Boise County, the McGuire Fire in Idaho County, and the Mustang Complex Fire in Lemhi County. The Governor requested and received two Fire Assistance Management Grants from FEMA to offset structure protection costs. In total, there were 1,149 wildfires in Idaho in 2012, which consumed 1,667,654 acres.[3]

TABLE 3.4.E: SIGNIFICANT IDAHO WILDFIRES

Year	Disaster Declarations (1976-2000)	WUI Impact	Comments
1910	-	X	85 lives lost; fire consumes 1/6 of north Idaho forests, destroying many communities
1960	-		Large fires burn in Hells Canyon and Idaho City areas
1967	-		10 counties in Panhandle affected; 50,000 acres burned in nine hours
1985	State (2)		Two Statewide declarations (July and August)
1986	State		Statewide declaration
1987	State (4)		Three counties declared individually: Ada (June), Adams (August), and Bannock (August); Statewide declaration in August
1989	State	X	The worst fires since 1910 burn thousands of acres in south-central Idaho, partially destroying the town of Lowman and leading to State-wide declaration
1992	State (2)	X	One life lost in the worst fire season in Idaho history to date; one of two Statewide declarations was for an unusual spring event (April)
1994	State	X	One life lost and one home lost; summer wildfires burn over 750,000 acres, resulting in a Statewide declaration
1999			Mule Butte, BLM Aberdeen District, 138,915 acres
2000	State, Federal	X	More than 1,500 individual fires: Clear Creek, Salmon Challis

[3] 'National Report of Wildland Fires', National Interagency Fire Center.

TABLE 3.4.E: SIGNIFICANT IDAHO WILDFIRES			
Year	**Disaster Declarations (1976-2000)**	**WUI Impact**	**Comments**
			National Forest 216,961 acres; Crystal Complex, Idaho Falls BLM District, 220,042 acres; SCF Wilderness, Salmon Challis National Forest, 182,600 acres; Diamond, Payette National Forest, 149,772 acres
2003			Cramer Complex Fire, 13,845 acres, two lives lost
2005			Wildland fire totals: 1,154 fires, 442,391 acres. Clover Complex, Twin Falls BLM District, 192,846 acres; East Idaho Complex, Idaho Falls BLM District, 192,450
2006			Wildland fire totals: 1,831 fires, 933,548 acres
2007	State, Federal		Wildland fire totals: 1,473 fires, 1,980,552 acres. Cascade Fire complex, East Zone Complex, Castle Rock Complex
2008			Wildland fire total: 997 fires, 116,796 acres
2009			Wildland fire total: 1,142 fires, 22,681 acres
2010	State, Federal		Wildland fire total through Sept 18: 908 fires, 608,821 acres, Hurd.
2012	State, Federal	X	Trinity Ridge Fire, Fire Management Assistance Declaration, 146,832 acres, human-caused
2012	State, Federal		Karney Fire, Fire Management Assistance Declaration, 440 acres, arson
Source: National Interagency Fire Center, http://www.nifc.gov/fireInfo/fireInfo_statistics.html			

FUTURE OCCURRENCE

There is a 100-percent chance of wildfires occurring in any given year in Idaho. Since 2002, an average of 1,294 wildfires has occurred per year, burning an average of 597,644 acres. However, while the number of wildfires per year is relatively consistent, the number of acres burned can be highly variable (see Table 3.4.F below). Considering factors affecting growth and forest health, the future occurrence of this hazard should not be expected to diminish from current trends.

TABLE 3.4.F: Idaho Historical Wildfires		
Year	Total # of Wildfires	Total Acres Burned
2012	1,149	1,667,654
2011	1,094	384,103
2010	977	613,868
2009	1,142	22,681
2008	997	116,796
2007	1,473	1,980,552
2006	1,831	933,548
2005	1,154	442,391
2004	1,098	13,981
2003	1,834	313,546
2002	1,486	84,964
Average	1,294	597,644
		Source: National Interagency Fire Center

Recent climatological changes seem to also be pointing towards increased wildfire activity in the coming years. Factors including: minimal snowpack, higher temperatures, and lower than average rainfall amounts across Idaho have contributed to drought conditions that will do little to reduce the threat for wildfires across the State.

The recent 2012 CoreLogic® Wildfire Hazard Risk Report provided the following conclusion that is applicable to both Idaho and the entire western United States:

'Given the heightened sensitivity among homeowners, insurers, city officials, and many others around the U.S. to natural disasters in the wake of recent destructive events, it is no surprise that wildfires have gained considerable attention over the past few years. As CoreLogic analysis clearly shows, damage to land acreage and residential property is increasing from year to year, and the threat of destruction is very real. Unfortunately, identifying wildfire risk is complicated by the fact that it is the only natural hazard that can be sparked by human behavior. For that reason, it is imperative to accurately identify high risk areas and the proximity of homes and other structure to those areas, rather than to focus on how or why a fire might potentially start.

Even though history demonstrates that urban homes located on the edge of development have never been safe, it is the continued expansion of cities and ever present wildfire threat that puts more homes in the path of future wildfires. For some properties, an evaluation of the risk within the parcel boundary may be all that is necessary to identify wildfire risk, but for an increasing number of homes, primarily in urban areas, it is critical to also consider and incorporate wildfire risk that is located in close proximity to

the property. Living within a city boundary does not prevent a wildfire from reaching a home and the ability to accurately assess that "distant" risk is necessary for accurate wildfire risk decision making.

The number of homes at risk and the associated values are both significant. And while some communities may be considered safe due to a lack of recent wildfire activity, the extensive analysis within this report indicates it is increasingly essential to understand and prepare for the possibility of wildfires and other natural hazards that may occur infrequently.[4]

RELATIONSHIPS TO OTHER HAZARDS

Wildfires do influence a large number of other hazards, mainly due to the dramatic and long-term changes that such events apply to the landscape. Flooding hazards increase wherever a wildfire occurs. The loss of vegetation increases runoff, thereby increasing the threat of flood. Sediment from wildfires also has the possibility to block stream channels and waterways, which would result in localized flooding. The loss of vegetation also enhances the conditions needed to initiate landslides and avalanches. Burned, standing timber is more vulnerable to high winds and even unburned areas neighboring burn zones would experience new wind patterns that those trees are not prepared to handle. Drought conditions could be influenced in areas where burns have occurred, as there may be less vegetation and soil to retain moisture.

From a human-caused perspective, wildfires could damage energy transmission and communication infrastructure. This could result in energy shortages or cyber disruptions. As wildfires can produce extremely large and impacting events, a worst-case event could be a driving cause for civil disturbances. Facilities that store radiological materials may also be impacted should they be located in an area affected by wildfire.

ENVIRONMENTAL IMPACTS

Idaho has experienced several large, long-lasting wildfires in recent years, which burned thousands of acres at a time. These fires are not always considered to be good for the forest, because they burn such a large amount of vegetation all at one time. Wildlife is often affected by these large burns. For example, animals such as deer, elk, rabbits, chipmunks, and other foraging creatures must find new areas to forage for food when thousands of acres have burned all at one time. It is safe to say that these large burns are "bad fires."

Why do we have large fires? In many cases, large fires occur because of hot, dry temperatures and an intense build-up of vegetation in the forest. When wildfires do not burn frequently in a given forest, the vegetation accumulates and provides more fuel for larger fires. More fuel means more fire, which in turn creates large wildfires that are difficult to suppress and spread quickly.

[4] 2012 CoreLogic® Wildfire Hazard Risk Report

Good fires occur when a fire ignites and burns slowly, burning mostly ground vegetation and a few trees. These fires help Idaho's ecosystems by cleaning out dead and/or crowded vegetation, but leaving the majority of large trees alive and able to repopulate the forest.

Some trees rely on wildfire to repopulate the forest. Many of these trees drop "serotinous cones" from their branches. The seeds, sealed in the cone by resin, are stored for many years until they are exposed to intense heat that melts the resin covering the cone and allows the cone to open. The seeds are then able to germinate when conditions are optimum; in the ashes immediately after a forest fire. For example, the Lodgepole Pine trees in many of Idaho's forests drop serotinous cones on the forest floor. These trees are considered "fire dependent," because they need fire in order to spread their seeds.

Wildfire plays an important role in the health of Idaho's rangelands, just as it does in Idaho's forests. Juniper trees grow on Idaho's rangelands. They are also fire dependent. Without regular wildfires, juniper trees begin to grow in areas where sagebrush and grasses grow naturally. The juniper trees crowd out the sagebrush and grasses, causing habitat loss for sagebrush-dependent birds such as the sage grouse.

Wildfire can also bring opportunities for noxious weeds to grow on Idaho's rangelands. Nonnative species, including their seeds, eggs, spores, larvae or other biological material capable of propagation, that cause economic or environmental harm and are capable of spreading in the state are collectively known as invasive species. In Idaho, an invasive species is defined as a species that is (1) non-native to the state and (2) whose introduction causes or is likely to cause economic or environmental harm. Invasive species can be plants, animals, and other organisms. Human actions are the primary pathway (as opposed to natural shifts in the distribution of species). Nationally, the current environmental, economic, and health costs of invasive species were estimated as exceeding the costs of all other natural disasters combined.

At least 200 well-known, high-impact, non-native species presently occur in the United States. They range from the Japanese beetle and emerald ash borer to zebra mussel, cheatgrass, and hydrilla, annually costing well over a billion dollars to control. Some even pose human health risks. Others threaten widespread disruption of ecosystems and the displacement or loss of native plants and animals.

Invasive species introduced into Idaho are affecting plant and animal communities on farms, ranches, parks, waters, forests, natural areas and in backyards. Human activity such as trade, travel and tourism have all increased substantially, escalating the speed and volume of species movement to unprecedented levels. Invasive species are often unintended hitchhikers on conveyances, animals and people. Still more nonnative species are deliberately introduced as pets, ornamental plants, crops, biofuels, food, for recreation, or other purposes. The majority of nonnative species brought into Idaho, including most of our sources of food and fiber, are not harmful; many are highly beneficial.

Although invasive species, in most cases, primarily cause environmental damage and degradation, there are situations in which serious threats to public health, safety, and well-being can occur. For example, a widespread insect infestation, such as that of the Emerald Ash Borer, can create serious public safety threats (especially in densely populated urban areas such as the Treasure Valley) due to dead and dying trees being fire prone (because of their dry, brittle nature) or to partial/total collapse due to high winds or ice/snow accumulation. The falling trees or limbs can also cause property damage, block roads, bring down power lines, cause damage to public and private structures, and cause injuries or even death. Emerald ash borer has caused extensive damage to trees in other states, and those weakened trees have often collapsed and caused property damage, or required removal, at considerable expense.

Cheatgrass is one invasive weed that is widely distributed throughout the western U.S. It is not native, meaning that it was introduced from another continent. Cheatgrass probably originated in southwestern Asia; scientists think that grain brought from Europe in the late 1890s had cheatgrass seeds in it, and they were then spread to Idaho's rangelands. Because cheatgrass can grow in Idaho's climate and soils, it has spread rapidly throughout Idaho's rangelands.

After fires burn on Idaho's rangelands, cheatgrass begins to grow before Idaho's native plants, because it sprouts early in the spring. When cheatgrass grows first, Idaho's native plants do not have soil and water to grow. Cheatgrass is also very flammable and grows in a continuous bed of grass, whereas Idaho's native grasses grow in clumps with separation between them. Because cheatgrass covers large areas, wildfire burns rapidly through it, creating larger, faster-moving wildfires that are difficult to control.

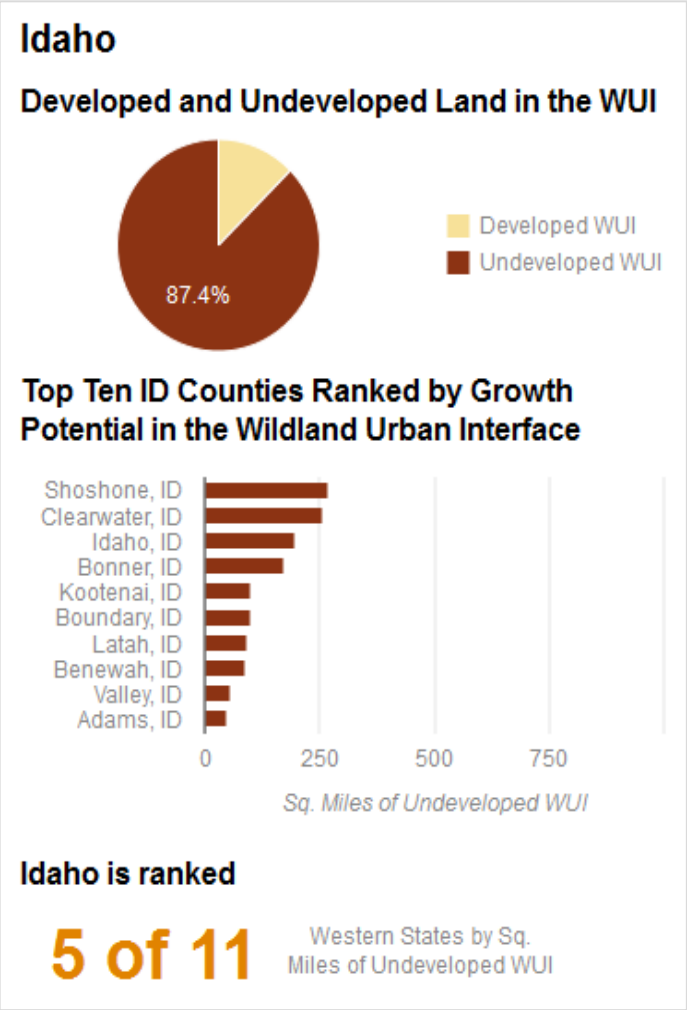


Figure 3.4.G: Idaho Development in WUI / Source: www.headwatereconomics.org

DEVELOPMENT TREND IMPACTS

Numerous studies have resulted in different figures for the size and number of homes in the WUI, and the fact is that there is no agreed spatial definition of the "WUI zone". But, all studies agree that the WUI is extensive and is rapidly expanding.

For example, USFS researchers estimate that 44 million homes in the continental United States are located in the WUI, with approximately 8.4 million of these homes built during the 1990s. NAPA predicts that by 2030, the number of homes in the WUI will be 40-percent higher than 2001 levels. The Western Wildfire Risk Assessment reports that there are 245,188 people across the State that live within wildland development areas. Figure 3.4.H, below, shows the exponential increase in structures destroyed by fire over the past few decades.

According to Headwaters Economics, only 12.6 percent of available private land in the WUI is developed in Idaho, leaving a huge potential for growth in the remaining 87.4 percent of the acreage (see Figure 3.4.G on the previous page). This ranks Idaho as the State with the 5th most undeveloped land in the WUI.

According to a 2007 study by Headwater Economics, based on the large number of undeveloped private land in the WUI, future development trends will result in increased wildfire risk, especially to homes and personal property.

Northern Idaho has an exceptionally high potential risk. The current risk of wildfire (number of square miles of WUI with existing homes) and the potential risk (number of square miles of WUI that remains undeveloped) are both highest in the northern parts of the State. Both Shoshone and Clearwater counties have more than 250 square miles of undeveloped land that occur in the WUI (Figure 3.4.G above). Combined, the 10 most northern counties in Idaho have more than 1,500 square miles of undeveloped, forested private land adjacent to fire-prone wildlands, where homes are likely to be built in the future.

A recent study from the University of Oregon's Institute for a Sustainable Environment conducted analysis of the economic impacts of large wildland fires in the western U.S. This study found that economies increase .9-1.5% in a community directly after a wildfire, but that these gains are short-lived and decreases are then seen a year and a half to two years following the event. This is interesting to note and is the inverse of those patterns seen for most other hazards, where communities generally experience a decrease in economy during a disaster event with economic growth seen during subsequent recovery.

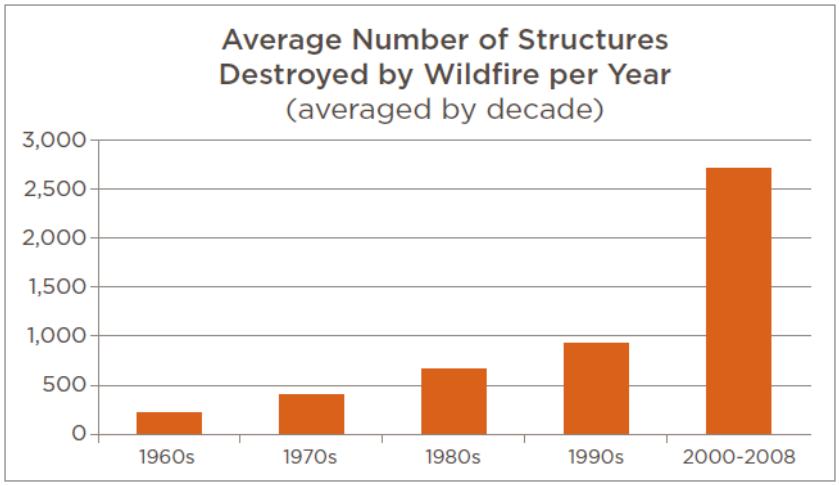


Figure 3.4.H: U.S. Structures Destroyed by Wildfire / Source: 2012 CoreLogic® Wildfire Hazard Risk Report (from Blue Ribbon Panel Report on WUI Fire, 2008)

CRITICAL INFRASTRUCTURE AND STATE FACILITY IMPACTS

Major highways, railways, and power/communication transmission lines would be some of the State assets with the potential to be impacted by a wildfire event. State facilities that border or are located in the WUI would be the structures most vulnerable to the negative impacts arising from a wildfire.

As part of the 2010 Plan update, one action that the State identified was the need to collect improved and up-to-date State-owned facility and infrastructure data in a geospatial format. As of the writing of the 2013 Plan update, this action is still considered in progress, although great strides have been made.

Source: ThinkStock.com

The State Chief Information Officer (CIO) is currently working towards the realization of a State-owned facilities and infrastructure geodatabase. This on-going process has been slowed by recent budget shortfalls in addition to inconsistent data holdings across many of the State's Agencies. Once available, this database will enable for a more in-depth review of State-owned facilities and infrastructure, as it relates to both vulnerabilities to hazards and the associated loss estimations.

VULNERABILITY ASSESSMENT AND LOSS ESTIMATION

Statewide Analysis

Wildfire risk is complicated. More than the other major hazards, wildfire risk has major consequences for both the natural and human environments. Also, there is no consensus on what constitutes the WUI. Different Federal agencies have different definitions of the WUI.

Similarly, wildfire losses are difficult to estimate. Losses are usually the result of several types of costs:

Direct Costs: Wildfire costs are most easily measured when they have immediate and direct impacts. This category prominently includes Federal, State, and local suppression costs. These costs, in turn, can be broken down into expenditures for aviation, engines, firefighting crews, and agency personnel. In addition to suppression costs, other direct costs include private property losses (insured and uninsured), damage to utility lines, damage to recreation facilities, loss of timber resources, and aid to evacuated residents. Most of these costs are incurred during or immediately following the fire.

Rehabilitation Costs: Immediate emergency rehabilitation costs are sometimes considered direct, since those costs are incurred in the days, weeks, and months following the fire and are clearly attributable to the wildfire event. The costs are shouldered by Federal, State, and local agencies and, again, the data are relatively accessible. Longer-term rehabilitation costs, however, are harder to measure, and ongoing rehabilitation expenses may not be clearly connected to the wildfire event. Watersheds

damaged by fire, in particular, can take many years to recover and require significant restoration activities. Post-fire flooding events can create additional damage to the already scarred landscape, and subsequent impacts may include an increase in invasive species and erosion.

Indirect Costs: Once the fire has been extinguished and rehabilitation efforts have begun, additional costs continue to accumulate. These costs have historically escaped accounting by land management agencies, and may extend years beyond the wildfire event. Indirect wildfire costs include lost tax revenues in a number of categories, such as sales and county taxes, as well as business revenue and property losses that accumulate over the longer term. For example, properties that escape damage in the fire may still experience dramatic drops in value as the area recovers.

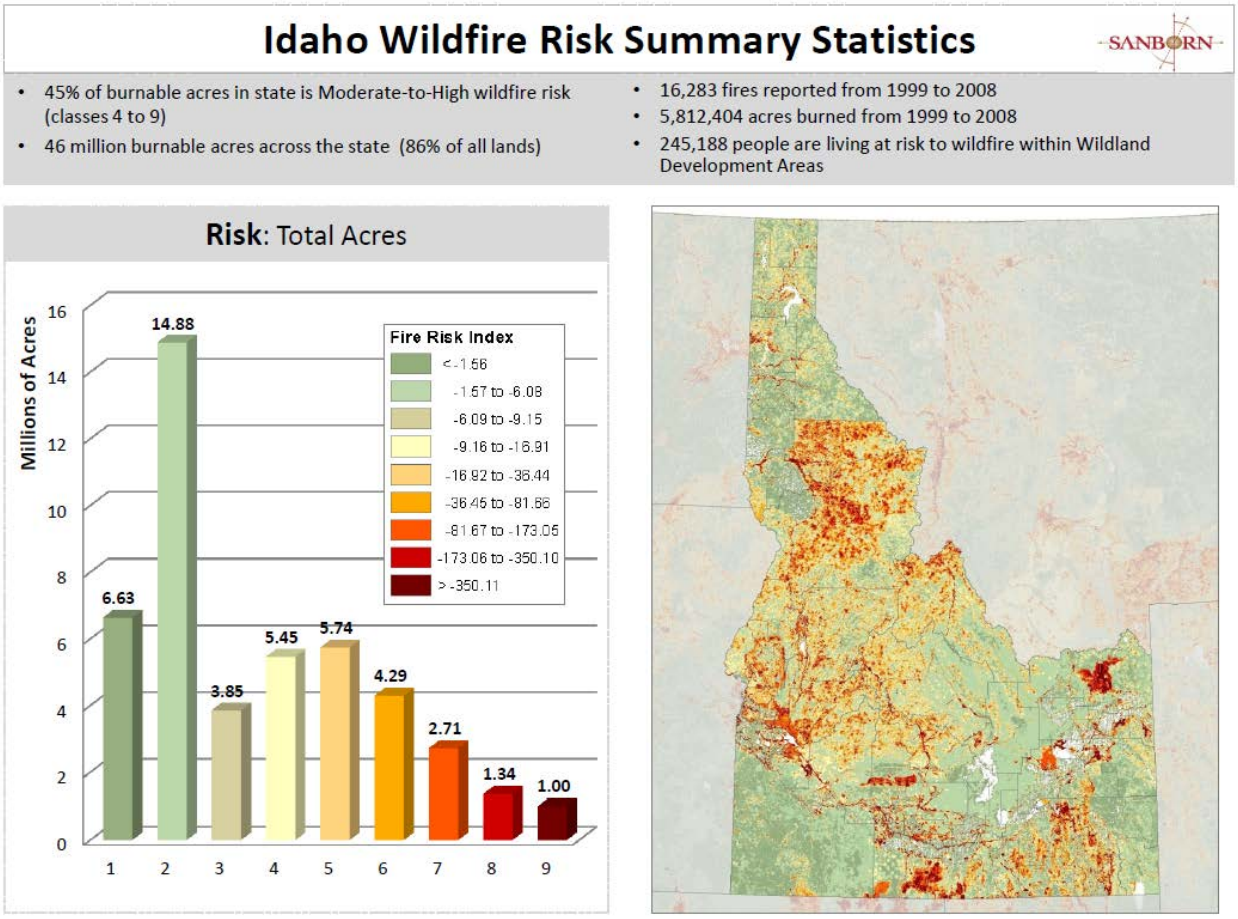
Special Costs: Beyond the indirect costs associated with wildfire are longer-term costs, often called "special" costs. Putting a numerical value on human life is always a dubious effort, but some standardized numbers do exist for guidance. When a firefighter perishes in the line of duty, families receive a set sum for their loss; this number serves as a proxy for the cost of lost life. Loss of civilian life, ongoing health problems for the young, old, and those with weak respiratory or immune systems; and mental health needs also fall into this category but are rarely quantified. Additionally, there is an extensive loss of ecosystem services, some of which are inherently difficult to quantify—aesthetic and scenic beauty and wildlife existence values.

The USFS determined that over a 20-year period, suppression actions cost an average $582 per acre. According to the study *The True Cost of Wildfire in the Western U.S.,* by the Western Forestry Leadership Coalition, the true costs of wildfire are shown to be far greater than the costs usually reported to the public; total expenses range from 2 to 30 times the reported suppression costs. Estimates of total costs appear to be determined by a host of factors including fire severity, nearby population density, terrain, and the boundaries of the analysis itself. Based on the past average number of acres burned (597,644 - see Table 3.4.F located previously in this chapter) and the costs cited above, the average annual losses in Idaho have been approximately $348 million.

The recent 2012 CoreLogic® Wildfire Hazard Risk Report, referenced previously, provided state by state estimates of residential properties potentially at risk to wildfire damages. Across western states, Idaho ranked 9th and 8th, respectively, for residential properties in the High and Very High risk categories. This equates to a total of 10,633 residences.[5]

The 2012 Western Wildfire Risk Assessment has produced a fire risk index for Idaho. This assessment attempted to measure the likelihood of a wildfire occurring, through a combination of a Threat and Effects inputs. The Fire Threat Index is a mathematical calculation for determining the likelihood of an acre of land burning. The Fire Effects Index attempts to identify those areas that can be affected by wire as well as those areas that are difficult or costly to suppress. Map 3.4.I below presents the results of that assessment. The full report can be accessed at http://www.westwideriskassessment.com/.

[5] 2012 CoreLogic® Wildfire Hazard Risk Report



Map 3.4.I: Idaho Wildfire Risk Summary Statistics

IDL has recently compiled a layer of all county WUI boundaries into a statewide GIS dataset. Using this data layer, vulnerability analysis was performed on the ICRMP locally-owned facilities data. Table 3.4.J below presents the results of that analysis, showing those facilities that are contained within the WUI. This table, summarized at the BHS Regional level, includes counts of structures considered to be vulnerable to the threat of wildfire, in addition to the associated building values and building content values. Map 3.4.Q at the end of this chapter presents this same information, although it is difficult to visually present structure-related information on a State-wide map. Additional details regarding the ICRMP data can be found in the introductory section of this chapter, Section 3.0.

The analysis below shows that all BHS Regions, except the Southeast, have local jurisdictionally-owned structures in the Wildland Urban Interface. Those most vulnerable include the Northern and Southwest Regions, with 89% and 82% of the facilities, respectively, in these high hazard zones. Statewide, those structures in the zones most vulnerable to wildfire equate to 56% of the overall inventory, which is approximately $2.39 billion in combined building values.

TABLE 3.4.J	In Wildland Urban Interface			Statewide		
	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)
Central	864	$591	$696	1,570	$815	$972
North Central	481	$118	$142	756	$248	$289
Northeast	126	$34	$46	994	$474	$580
Northern	1,188	$636	$808	1,334	$669	$850
Southeast	0	$0	$0	1,270	$381	$488
Southwest	2,068	$1,006	$1,205	2,513	$1,090	$1,310
TOTALS	**4,727**	**$2,387**	**$2,899**	**8,437**	**$3,677**	**$4,489**

The ICRMP data itself also lends some valuable information as it relates to the vulnerability of those structures to the risk of fire. All structures in the database contain an International Organization for Standardization (ISO) Fire Classification. Additional details are included below:

The ISO is an advisory organization that collects information and presents it to the public for insurance companies to use in order to determine rates for those that they insure. The ISO measures the amount of public fire assistance in each community across the United States and uses this information to classify each area on a numerical scale. The classifications offered by this rating schedule help the insurance companies develop policies, paperwork, language and premiums for those to whom that they provide service based on the classification of the ISO.

The PPC Program

The Public Protection Classification (PPC) Program is used to provide a score to every area across the United States based on their ability to provide public assistance in the case of a fire. The ISO evaluates each area's community-based programs in regards to their ability to answer fire calls efficiently and prevent resulting property loss. This rating helps communities throughout the United States to be aware of their ability to suppress fires and also helps insurance companies, as the higher the classification of a community, the lower the premiums will be in that area. In

order to arrive at this classification the ISO evaluates water supply, fire departments and fire alarms.

Classes One through Three

Classes one through three are the highest classifications that a community can receive. A community will receive a class one ISO fire classification if they receive a score of 90 or above based on a 100 point scale after the ISO has evaluated all of the elements mentioned above concerning their ability to efficiently respond to fires. A community will receive a class two ISO fire classification if their score is between 80-89.99 and a class three ISO if 70-79.99. Fire insurance costs in these areas are typically lower due to the community's ability and resources to quickly respond to and suppress fires.

Classes Four through Six

A class four ISO fire classification is given to those communities that score between 60-69.99 on the 100 point scale, a class five ISO fire classification to those between 50-59.99 and a class six ISO classification to those 40-49.99. Fire insurance premiums in these areas are slightly higher than in areas with better ISO classifications, as the ISO has determined that there are some areas of improvement that need to be addressed in order to make the community more efficient at responding to and suppressing fires.

Classes Seven through Ten

A class seven ISO fire classification is issued to those communities who score between 30-39.99 on the 100 point scale, a class eight ISO classification to those communities between 20-29.99 and class nine to those between 10-9.99. The classification of ten is the worst possible ISO fire classification a community can receive, and is reserved for those who severely lack the ability to respond to fires. A class ten fire classification is issued to those communities that score less than 10 points on the 100 point scale. The premiums for fire insurance within these communities will be higher due to the increased probability of loss from fire.[6]

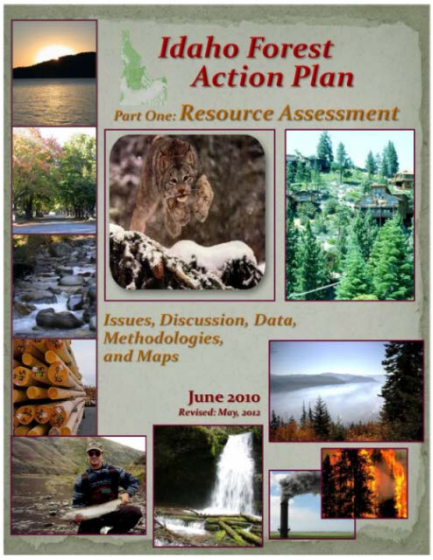
Table 3.4.K below presents the results of the ISO Fire Classifications, showing those facilities that are rated in classes seven through ten. This table, summarized at the BHS Regional level, includes counts of structures classified as such to the threat of wildfire, in addition to the associated building values and building content values. Map 3.4.R at the end of this chapter presents this same information, although it is difficult to visually present structure-related information on a State-wide map.

The analysis below shows that all BHS Regions have local jurisdictionally-owned structures rated in classes seven through ten. The Region most vulnerable from a percentage basis is the North Central, where 44% of those structures were determined to be most vulnerable to fire. The Southwest Region

[6] http://www.ehow.com/info_8556497_iso-fire-classifications.html

contains the highest count of these types of structures, which includes 572 buildings. Statewide, those structures in class seven to ten equate to 24% of these ICRMP local jurisdictional buildings, with a combined building value of $355 million.

TABLE 3.4.K	ISO Fire Classifications of 7 - 10			Statewide		
	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)	Number of Facilities	Building Value ($M)	Building & Contents Value ($M)
Central	284	$49	$56	1,570	$815	$972
North Central	336	$49	$63	756	$248	$289
Northeast	196	$36	$45	994	$474	$580
Northern	317	$86	$108	1,334	$669	$850
Southeast	322	$33	$41	1,270	$381	$488
Southwest	572	$102	$124	2,513	$1,090	$1,310
TOTALS	**2,027**	**$355**	**$437**	**8,437**	**$3,677**	**$4,489**



The 2012 version of the Idaho Forest Action Plan also contains some analysis useful for analyzing risks faced by the State from wildfires. One set of analysis conducted by the IDL included defining the relative risk to communities from wildland fire. Map 3.4.S at the end of this chapter presents the results of this analysis. Those communities at the highest risk to wildland fire can be seen occurring across the entire State. A majority of these are located in the Southwest Region.

Local Hazard Mitigation Plan Vulnerability Assessments

All 47 of the State's local hazard mitigation plans were analyzed for use in the State's hazard mitigation plan update. Certain sections of the plans were then collected into a central database that allowed for further analysis. These data were summarized, and some of the results are provided below. Map 3.4.T, at the end of this section, highlights the 43 local plans that identified wildfire as one of their significant hazards. For these jurisdictions that would be considered the most vulnerable to the hazard of wildfire (based on their own prioritization), Table 3.4.L summarizes the number of structures impacted by the wildfire hazard and the corresponding loss estimate. Collectively, more local jurisdictions consider wildfire to be a major hazard than any other hazard type.

BHS directly participates in the Idaho Lands Resource Coordinating Council (ILRCC), which is described in Appendix D. The ILRCC is a multiagency (local, State and Federal) organization that has oversight of the

county Community Wildfire Protection Plans (CWPPs). As a matter of practice, the CWPPs are developed in collaboration with the State Fire Plan and have been integrated into the counties' Local All-Hazard Mitigation Plans. Consequently, BHS maintains a high degree of confidence in the local plans and the oversight of the ILRCC as a means of coordinating and implementing viable, comprehensive, and locally derived wildfire hazard mitigation plans.

Since the 2010 Plan update, Canyon County is the only jurisdiction to have added wildfire as one of their top-three hazards. No jurisdictions lowered their ranking of fire. Recent disasters and events have proven wildfire to be a major hazard facing all of Idaho. Seeing that the local jurisdictions agree with this statement is proof that both the State and locals are on the same page when it comes to the threat posed by wildfire.

TABLE 3.4.L – Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Wildfire as Significant Hazard

Local Plan Name	Wildfire Ranked as Significant	Structures in Hazard Area	Loss Estimate
Ada	X	72,610	$7,709,105,844
Adams	X		
Bannock	X	1,126	$13,959,542
Bear Lake	X	3,248	$128,921,860
Benewah	X	3,758	$411,705,781
Bingham	X	4,184	$364,802,960
Blaine	X	15,651	$5,116,656,494
Boise	X		
Bonner			
Bonneville	X	2,405 (parcels)	$114,414,454
Boundary	X		
Butte	X	2,452 (parcels)	$21,335,858
Camas	X		
Canyon	X	5,941	$890,325,375
Caribou	X	376	
Cassia	X	4,469 (parcels0	$289,455,008
Clark	X		$100,000s
Clearwater	X		
Custer	X	8,066	$322,082,265
Duck Valley Reservation	X		
Elmore	X		
Franklin	X	686	$70,230,000
Fremont			

TABLE 3.4.L – Local Hazard Mitigation Plan Roll-Up, Jurisdictions Ranking Wildfire as Significant Hazard			
Local Plan Name	**Wildfire Ranked as Significant**	**Structures in Hazard Area**	**Loss Estimate**
Gem	X	7,403	$2,169,803,579
Gooding	X		
Idaho	X		
Jefferson	X	2,076	$141,369,512
Jerome	X	7,059	$403,067,346
Kootenai	X	22,855	$1,928,226,724
Latah	X		
Lemhi	X	9,746	$458,784,542
Lewis	X		
Lincoln	X		
Madison			
Minidoka	X	3,060 (parcels)	$303,454,379
Nez Perce	X		
Nez Perce Tribe	X	487	$63,085,800
Oneida	X	2,705 (parcels)	$13,720,490
Owyhee	X		
Payette	X		
Power	X	2,452	$206,151,132
Shoshone	X		$38,232,892
Shoshone-Bannock Tribe	X		
Teton			
Twin Falls	X	24,576 (parcels)	$1,219,382,497
Valley	X		
Washington	X		
			Source: Local Hazard Mitigation Plans

Consequence Analysis Scenario

Another way vulnerability was assessed was by conducting a consequence scenario that analyzed a hypothetical hazard event. The Wildfire Technical Advisory Group (TAG) met on September 20, 2012 to analyze a wildfire scenario involving a 1910-type event in McCall. The event discussed occurred in August.

The Wildfire TAG walked through this group exercise, where they scored, from 0 (no consequences) to 5 (most severe consequences]), the short-term (0-6 month) and long-term (6+ months) consequences of the scenario as it pertained to the following systems:

- The public
- First responders
- Continuity of operations
- Property, facilities, and infrastructure
- Economic conditions
- Public confidence in government
- The environment

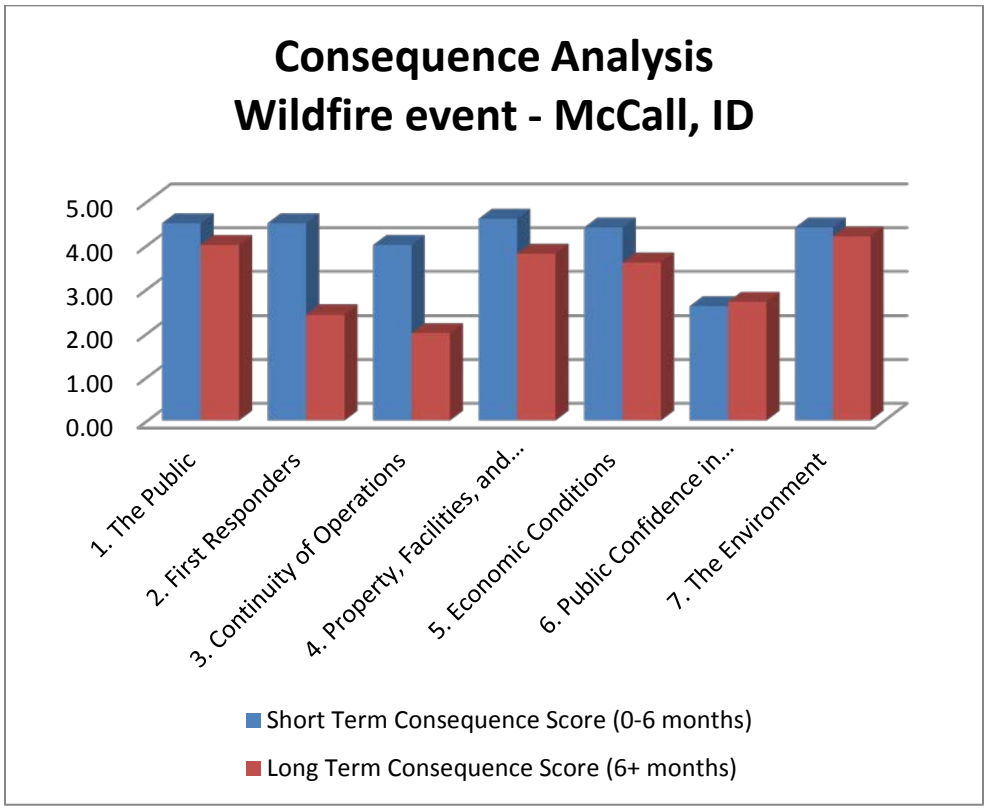


Figure 3.4.M: Consequence Analysis (2013)

The chart above (Figure 3.4.M) presents the results of the exercise. Looking at the short-term consequences of this wildfire event, the TAG felt that the most severe consequences would be felt by nearly all of the systems reviewed, with the exception of public confidence in the government. From a long-term standpoint, the four systems suffering the most severe consequences include the public, the built environment, the economy, and the environment. Overall, what stands out is that the short-term impacts of a large wildfire are closely identical to the long-term effects, except that long-term consequences are improved for the operational and responder systems.

Some observations of the group to note included:

The scenario in question is an extraordinarily massive and devastating disaster. All systems would be overwhelmed and would basically be starting from scratch.
Federal assistance would be needed to attempt to recover from this wildfire. The sooner those resources would be made available, the better the consequences could be dealt with.
The public, the built environment, the economy, and the environment would suffer severe consequences for an extended period of time.

In addition to the ranking exercise, the TAG discussed additional questions pertaining to the scenario, including:

- Would the season and timing of when the event occurred alter any of these consequences?
- What other hazards could be triggered by this initial event?
- Would any regional impacts result from this event?
- Have any changes since the last plan update altered any these consequences?

Some of the comments and discussions that were raised included:
This type of hypothetical event would only be possible in the summer or fall, unless climatic change's effects worsen over time.
The entire region would be dramatically affected from this event. The price of goods would skyrocket and tourism and jobs would relocate. This event could indirectly help other economies/locals.
Recent trainings and exercises have improved the capabilities to respond and recover from this event.
Public preparedness and awareness has increased as other recent major events occurred, coupled with improvements in technology and social media.
Recent fuel reduction activities have helped mitigate smaller-type events, but an event of this scale would not see the benefit of these actions.

The results of a similar exercise conducted as part of the 2010 Plan update are included below in Figure 3.4.N. Overall, similar trends were observed for the various systems, with the exception of the long-term rankings, which were rated higher overall in 2013. The 2010 exercises seemed to determine that the short-term impacts were greater than the long-term effects,

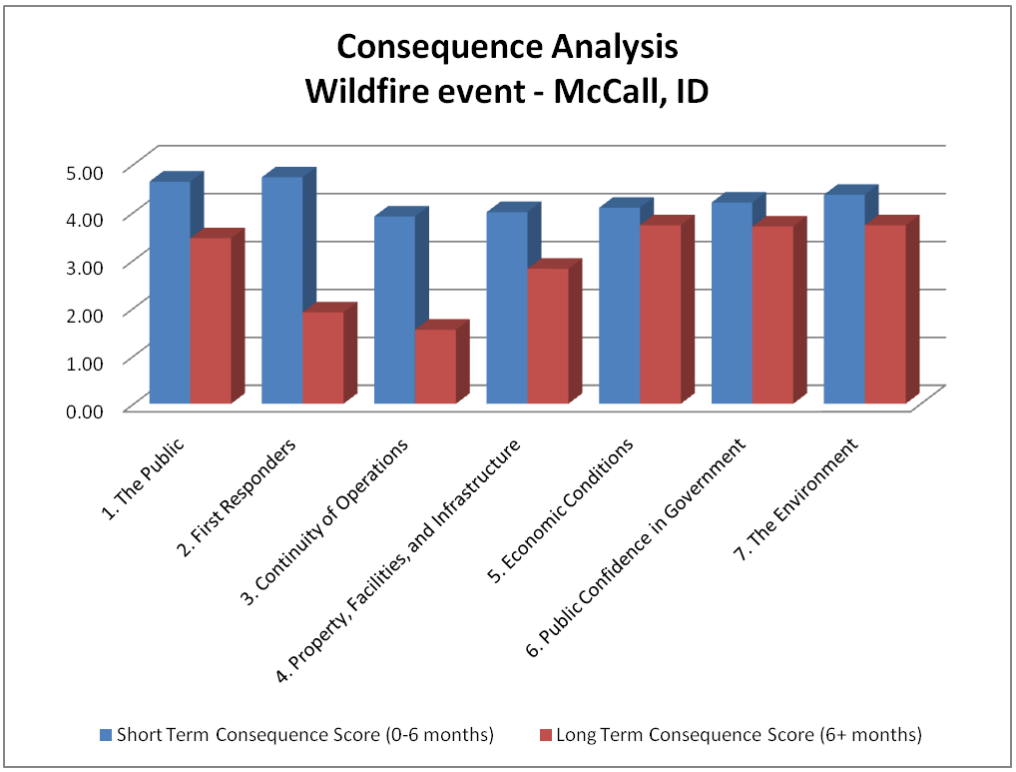


Figure 3.4.N: Consequence Analysis (2010)

MITIGATION RATIONALE

Wildfires are one of the most frequently occurring hazards in the State; in terms of total costs, they are one of the costliest, year in and year out, even though many of these costs may be externalized. It is considered a major hazard. The focus of wildfire mitigation is on the WUI, where most existing and new development is occurring. A significant area of Idaho's WUI is undeveloped.

Source: BHS

The recent "Federal Assistance for Wildfire Response and Recovery" report state that the recurrence of catastrophic fires cannot be prevented, "drought, lightning, and high winds make extreme wildfires inevitable". Structures can be protected though, by using non-flammable roofing, wildfire landscaping, and enforcing zoning standards for wildfire protection.

Recent studies on large-scale fires indicate that developed property in the WUI can be protected, even in intense firestorms. Thus, the application of correct mitigation techniques is critical.

GENERAL MITIGATION APPROACHES

Wildfire experts generally agree that increased fire suppression efforts alone will not be successful in stopping the large, intense wildfires likely to occur in the next several decades. Such conflagrations as occurred in summer 2000 are generally impossible for firefighters to stop and are only extinguished by rainfall or depletion of the fuel load.

It is clear, therefore, that the elimination of wildfires is not the goal of WUI fire mitigation. As a practical matter, and as discussed above, it has been shown that the immediate suppression of all wildfires is not an effective long-term strategy. The goal is rather to eliminate or reduce the risks to human lives, property, and desired resource values.

The specific goal of this Plan is to eliminate or reduce those risks in the WUI. Mitigation of WUI fires generally takes the form of creating fire-resistant landscapes and development, and eliminating possible ignition sources.

The National Cohesive Wildland Fire Management Strategy (Cohesive Strategy) is a collaborative effort to identify, define, and address wildland fire management problems and opportunities for successful wildland fire management in the three regions of the United States: the Northeast, the Southeast, and the West. Phase I of the Cohesive Strategy outlined a three-phase process to address the three primary factors presenting the greatest challenges and opportunities to make a positive difference to wildland fire management across America: restoring and maintaining resilient landscapes, creating fire-adapted communities, and improving wildfire response.

There are many possible ways to mitigate effects of wildfires. Approaches include the following:

Creating a Fire-adapted Community - Island Park, Idaho
Craig Glazier, Forest Service

Island Park, Idaho is a summer and winter resort community and is a gateway to Yellowstone National Park. Island Park relies on the recreational opportunities to support the community. Island Park has a large summer home population with private in-holdings interspersed with National Forest System Lands.

A collaborative group has been formed to develop a sustainable fire community within the Greater Island Park area. The collaborative group is comprised of representatives from the Forest Service, Bureau of Land Management, Idaho Department of Lands, Idaho Bureau of Homeland Security, Idaho State Fire Marshal's office, Fremont County and Island Park City officials, landowners, local fire officials, home insurance underwriter, forest products industry, and the environmental community. The goal of this group is to develop a sustainable fire-adapted social and ecological community that is resilient and accepting of fire, and insect and disease disturbances. The collaborative group will develop and implement a dynamic long-term strategy to achieve this goal by establishing management objectives and techniques, and prioritized treatment areas. This strategy will be attained through the following actions:

A. Create a landscape that is able to withstand large, or several large, canopy fires in the Island Park focus area, has minimal impact to West Yellowstone in the event of a large wildfire, and is resilient to disturbances such as wildfire, bark beetle outbreaks, and spruce budworm attacks.

B. Increase the capacity of the Island Park and West Yellowstone communities to withstand wildfires.

C. Utilize fire behavior and fuel treatment model under development by Missoula Fire Lab to determine fire behavior and treatment effectiveness under various conditions including climatic factors and fuels.

D. Provide a basis for collaboration in the focus area to promote effective management across all land ownership and public land administrative boundaries.

E. Develop a set of techniques and tools, with the aid of the Missoula Fire Lab, which will allow effective decision making.

F. Develop a long-term maintenance strategy.

G. Develop a treatment monitoring plan that tests efficacy of treatments to inform future projects.

H. Education and Marketing: Promote and develop Firewise communities and support markets for biomass such as the Salmon bio-char project.

1. Continue programs to reduce fuel loads in critical areas including but not limited to: power corridors, area communication sites, watersheds serving communities, and local and regional transportation routes.
2. Publish maps identifying areas with a high probability of wildland fires.
3. Increase public awareness of the financial consequences of building homes in fire-prone areas and of mitigation activities that can be taken (i.e., defensible space areas).
4. Improve land-use planning and land-use regulatory mechanisms for fire-prone areas.
5. Add incentives for counties to sign firefighting cost-share agreements.
6. Purchase or obtain easements on fire-prone lands.
7. Establish mitigation actions in accordance with the National Cohesive Wildland Fire Management Strategy to restore and maintain landscapes, promote fire-adapted communities, and encourage safe wildfire response.

Idaho Firewise (FW) has, in the last 5 years, formed a committee made up of individuals from the community, non-profit organizations, and federal, local, and state government agencies. The mission of Idaho FW is to coordinate, support, and promote statewide Wildland fire education to broaden the understanding of wildfire's role in ecosystems and encourage those who live in or visit Idaho to take responsibility in reducing the risk of loss from wildfire. The purpose of the Idaho Firewise Committee is to provide a coordinated, consistent, interagency, and consensus-driven approach to Wildland fire education. Idaho Firewise seeks to establish and grow partnerships with private and public entities that have a stake in wildfire prevention and education. The Idaho Firewise Committee also seeks to facilitate information sharing across agencies and jurisdictional lines in an effort to develop a coordinated message.

Idaho Firewise has established an online clearing house of information regarding Firewise practices and fire ecology information through a web page specific to Idaho wildland fire resources and tools that can be used by government and citizens http://www.idahofirewise.org/. Idaho Firewise has set up a mechanism for receiving and reviewing grant proposals submitted by local Firewise communities and county agencies. Grants have been rewarded to several government and local organizations to forward the education and practices of building Firewise communities. Idaho Firewise reaches out to government and officials and the public through fire prevention workshops, Firewise specific workshops, and by hosting and funding community based meetings on being Firewise.

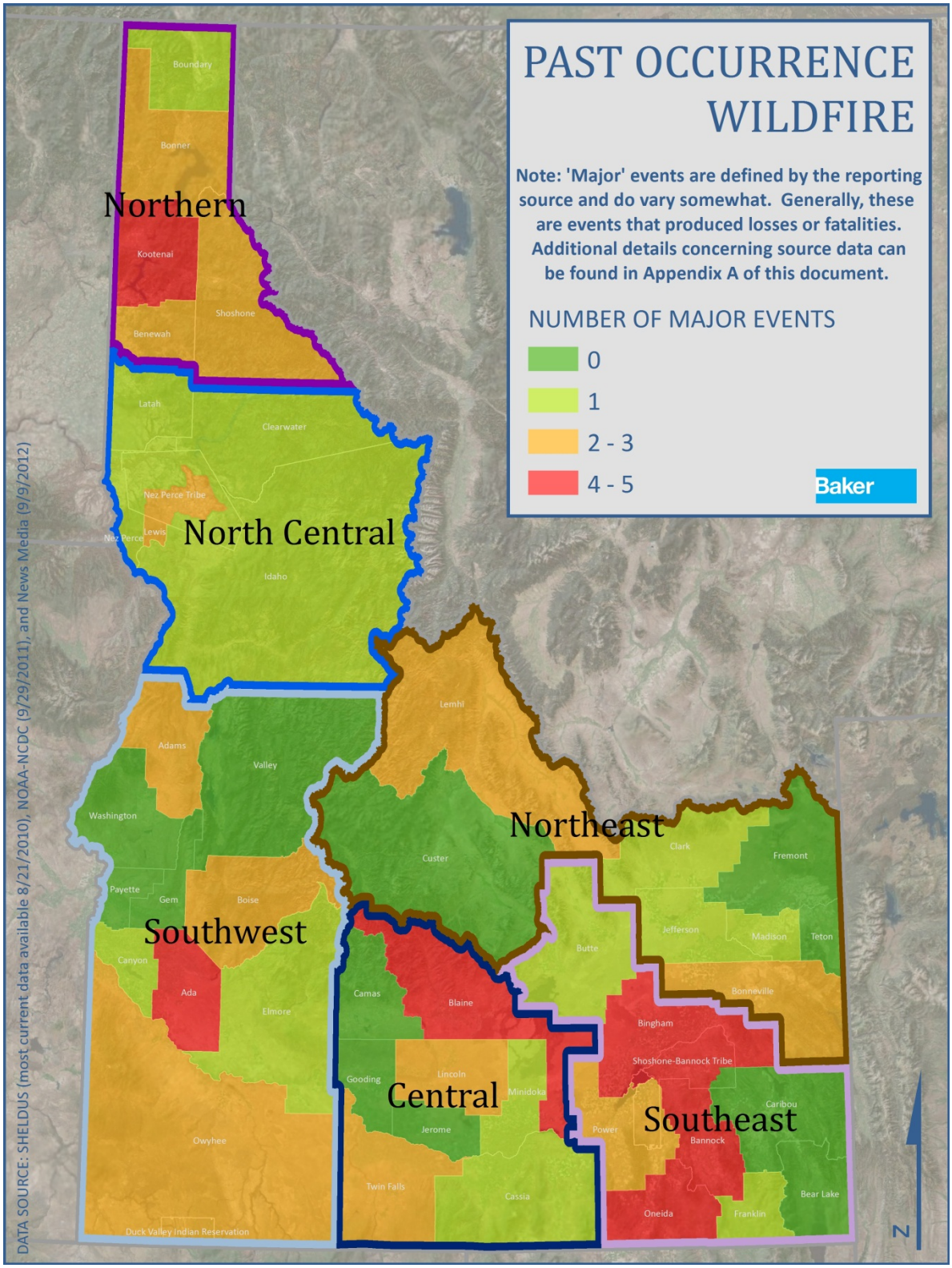
The Idaho Invasive Species Strategic Plan of 2012-2016 showcases the mitigation efforts of landowners in cooperating with state and federal partners. One example is in Hells Canyon where yellow Starthistle and invasive annual grasses have taken root following wildfires. Associated efforts such as the use of geographic information systems and Digital Aerial Ketch Mapping surveys help detect, inventory, map, and track the effects of wildfire and management activities. Weed control, prescribed burns, and rehabilitation are being coordinated in the grassland and forest community.

Mapping/Analysis/Planning

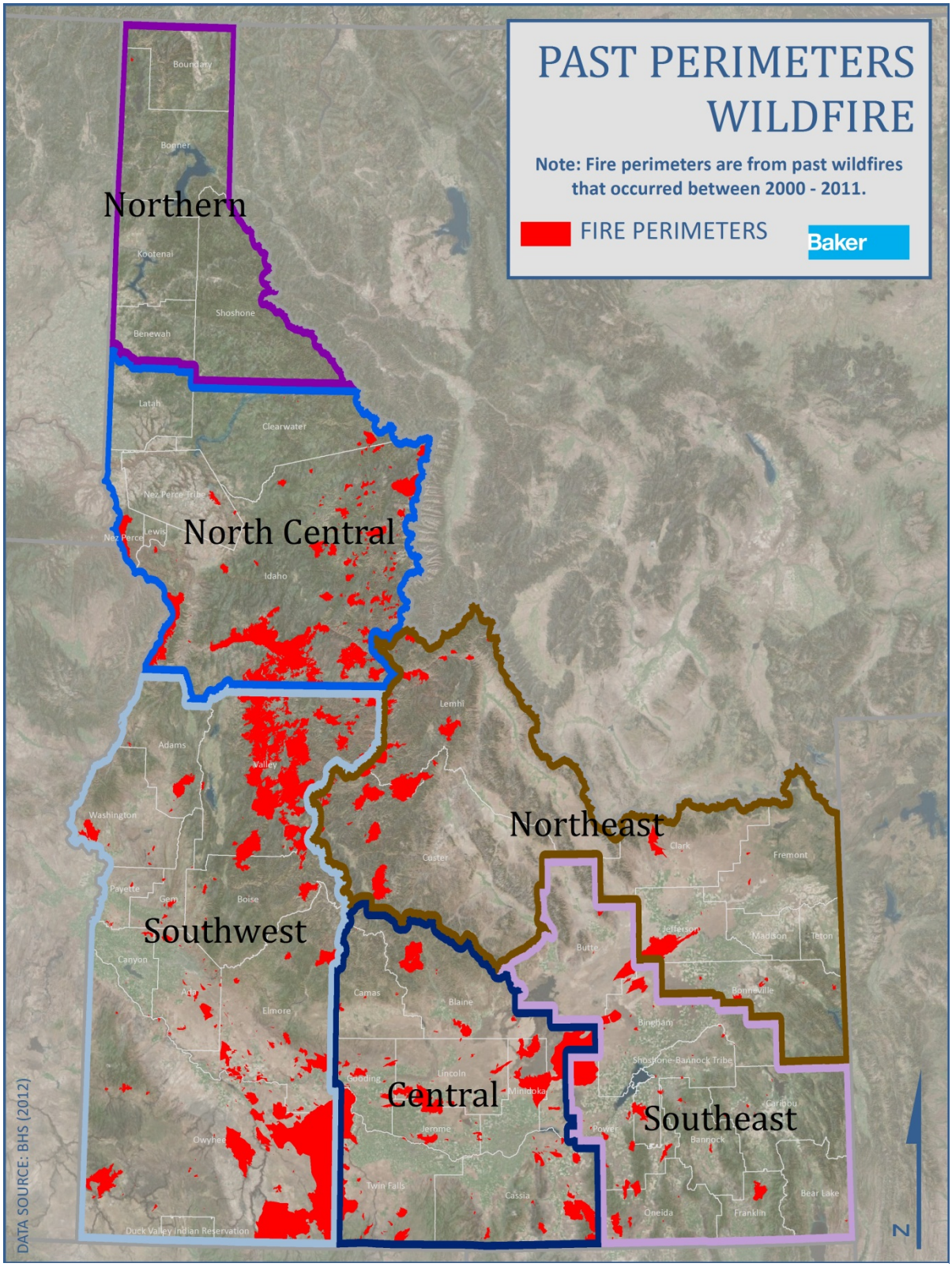
An accurate understanding of a hazard is the first step towards successful mitigation. To fully understand a hazard and the risk that it poses, the ability to accurately assess vulnerability is vital. After vulnerability is determined, it is then possible to assess potential losses if a state inventory of facilities and infrastructure is available.

At the time of the 2013 Plan update, major advances in the availability of various data inputs allowed for an improved vulnerability and loss assessment to be performed. Continued refinement of both vulnerability and inventory data will enable for continued refinements in the risk assessment process.

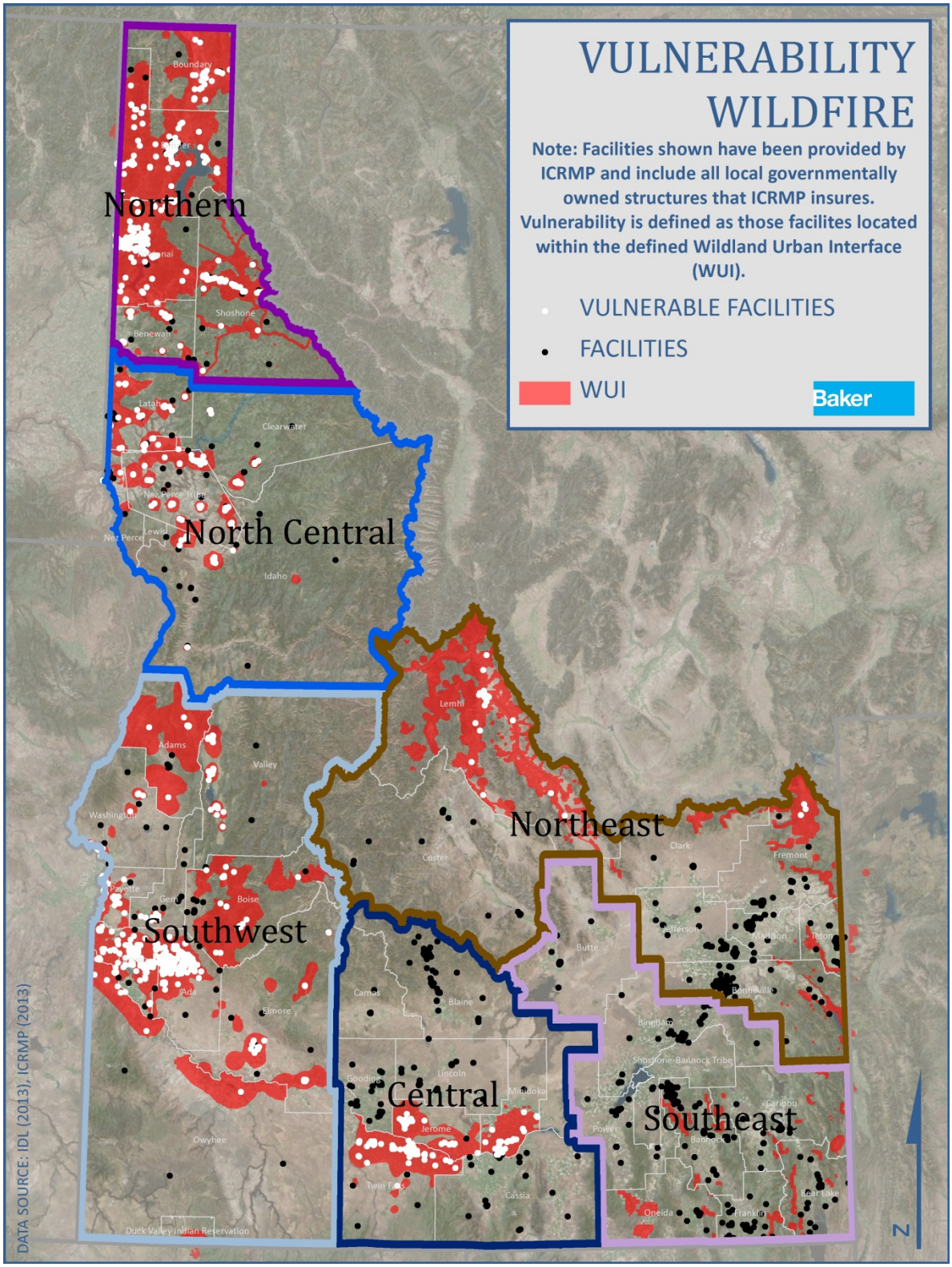
Source: ThinkStock.com



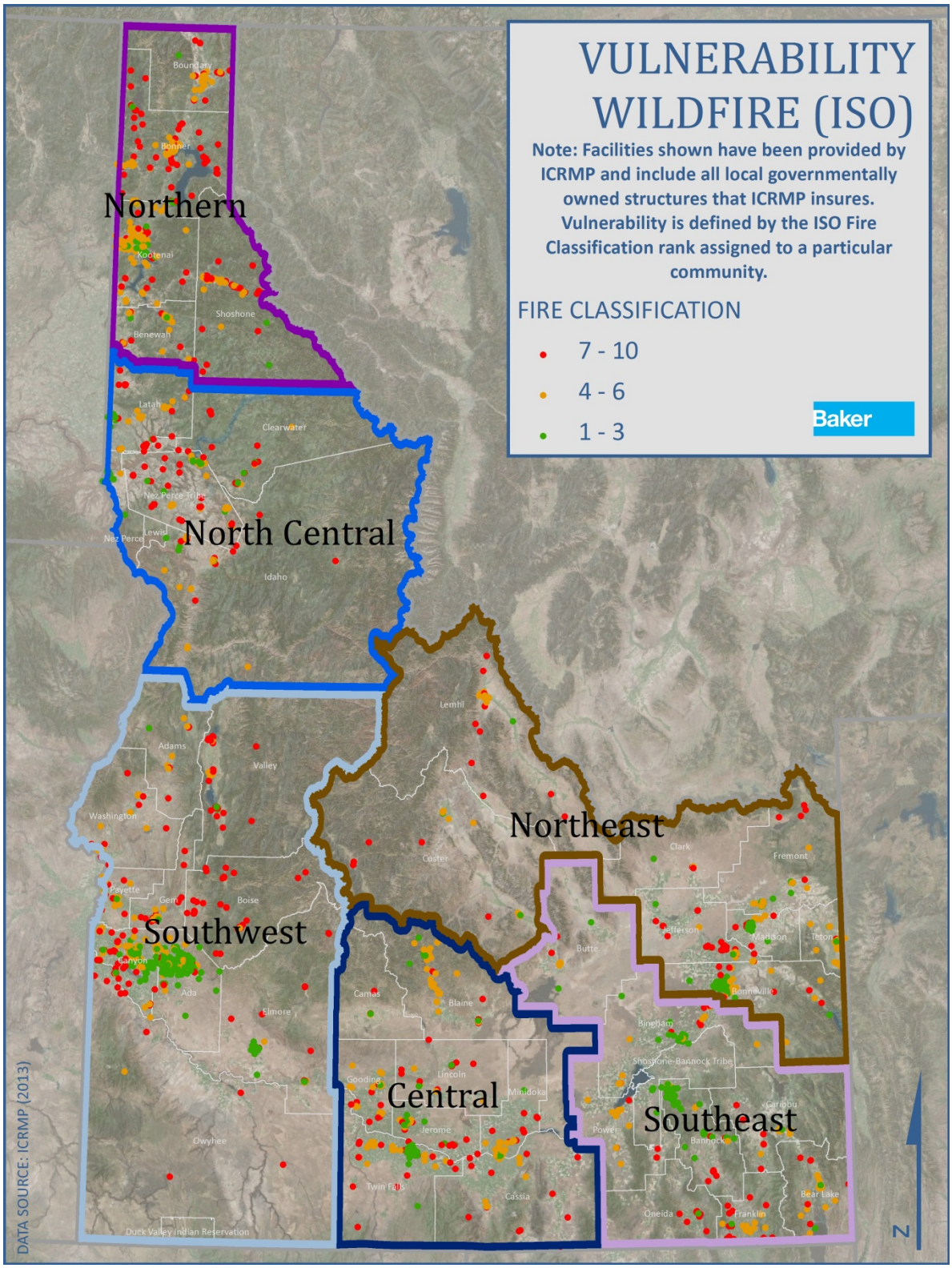
Map 3.4.O: Past Wildfire Occurrence



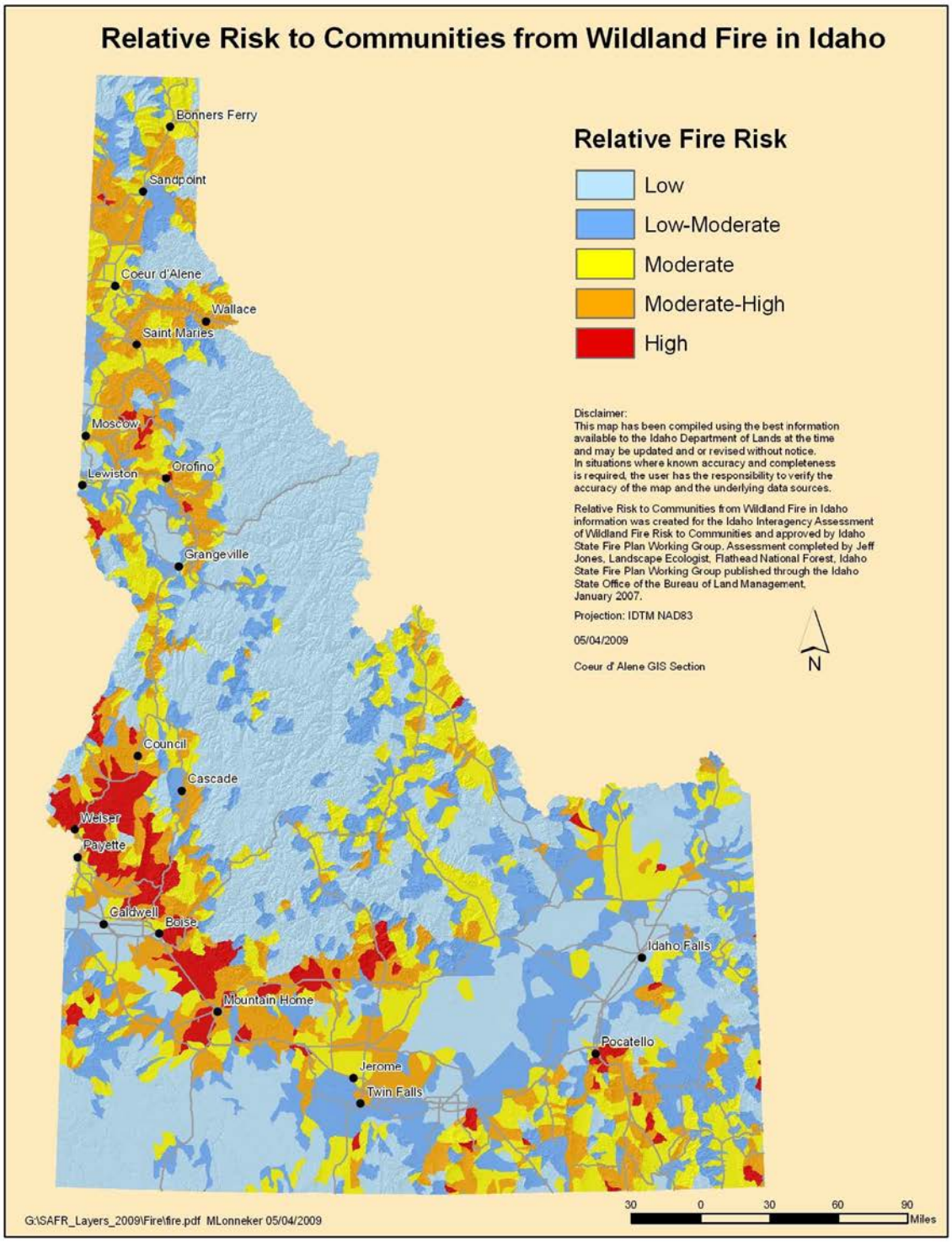
Map 3.4.P: Past Wildfire Perimeters



Map 3.4.Q: Wildfire Vulnerability



Map 3.4.R: Wildfire ISO Vulnerability



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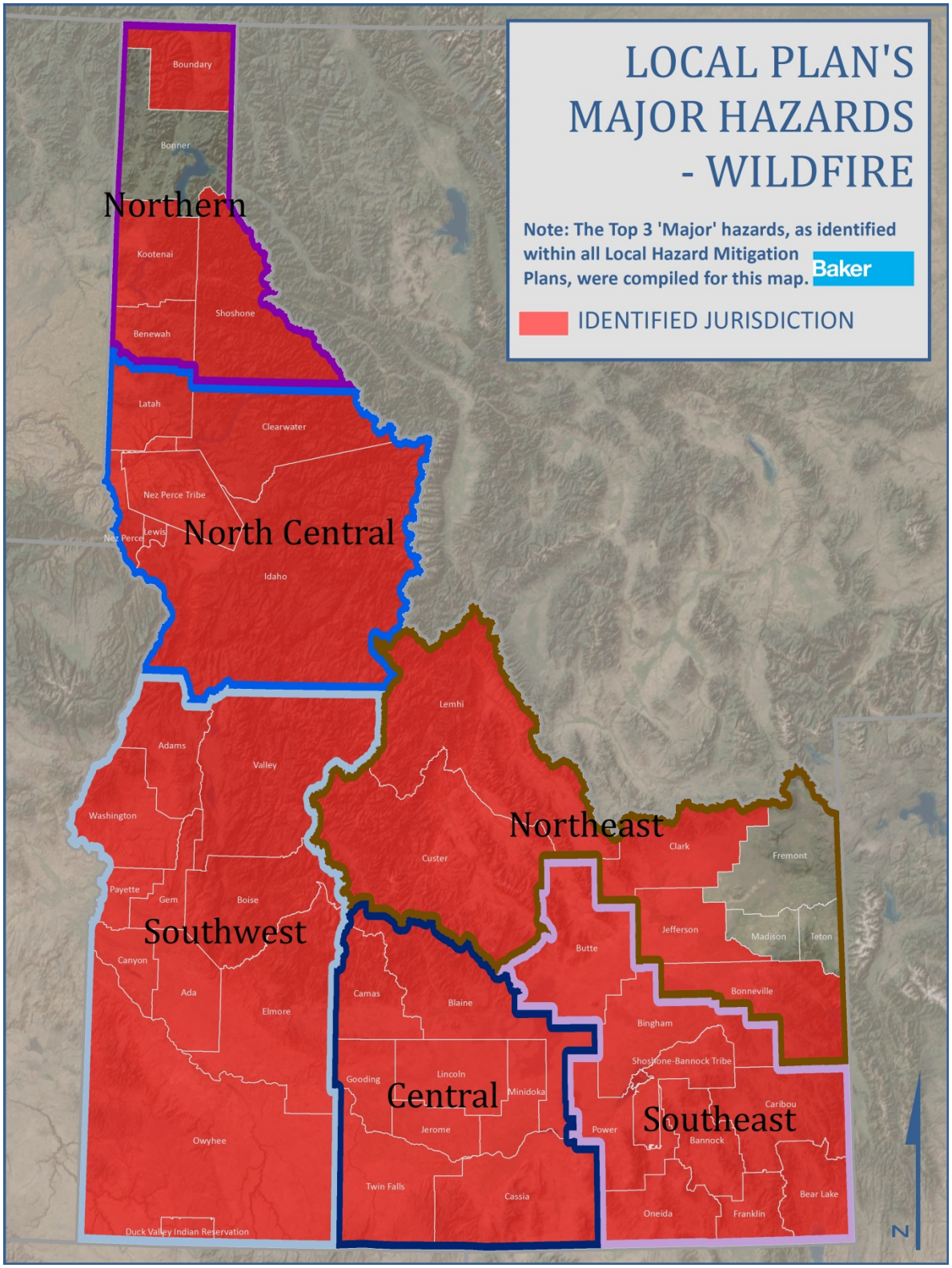
Map 3.4.S: Wildfire Risk



Map 3.4.T: Wildfire Identified as Local Plan Major Hazard