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# **PRESCRIBED FIRE, SMOKE, AND PUBLIC HEALTH:**

**A Community Response Plan for the Bend Smoke Sensitive Receptor Area**



CITY OF BEND



# Prescribed Fire, Smoke, & Public Health Community Response Plan

Bend Smoke Sensitive Receptor Area

October 2019

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## Prescribed Fire, Smoke, & Public Health Community Response Plan

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### Declaration of Agreement

The Bend City Council, in coordination with the Deschutes County Board of County Commissioners, has reviewed and approved the Bend Smoke Sensitive Receptor Area Community Response Plan (Bend SSRA CRP). Per OAR 629-048-0180 of the 2019 Oregon prescribed fire Smoke Management Plan, the City of Bend and Deschutes County jointly agree to submit the Bend SSRA CRP to the Oregon Department of Forestry and Oregon Department of Environmental Quality as a formal request for exemption from the 1-hour smoke intrusion threshold for the Bend SSRA.



Sally Russell, Mayor  
City of Bend

Nov 6, 2019  
Date



Philip G. Henderson, Chair  
Deschutes County Board of County Commissioners

10-16-19  
Date

# Prescribed Fire, Smoke, & Public Health Community Response Plan

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## Executive Summary

The City of Bend, in coordination with the Deschutes County, has approved the following Prescribed Fire, Smoke, and Public Health Community Response Plan for the Bend Smoke Sensitive Receptor Area (hereafter referred to as the Bend SSRA CRP) consistent with OAR 629-048-0180. The Bend SSRA CRP will be included in the request to the Oregon Department of Forestry (ODF) and Oregon Department of Environmental Quality (DEQ) for an exemption from the 1-hour smoke intrusion threshold within the 2019 Oregon prescribed fire Smoke Management Plan (SMP). The goals of the Bend SSRA CRP and exemption request are:

1. To increase opportunities to accomplish critical prescribed fire treatments in the Wildland Urban Interface (WUI) to improve forest health, reduce the risk of extreme wildfires, and increase community and firefighter safety when wildfires do occur;
2. To enhance coordination, communication, and notification of residents and visitors of Bend (and Central Oregon more broadly) about planned prescribed fire, potential smoke and air quality impacts, and recommendations to reduce exposure and mitigate the health impacts of wildland fire smoke from all sources (prescribed fire and wildfire).

## Rationale for the Bend SSRA Community Response Plan

Fire is a natural and necessary component of the dry forests of Central Oregon. Prior to the late-1800's, frequent, low-intensity fires burning every ten to twenty-five years sustained forests composed of fire-adapted trees and plants, provided wildlife habitat for a diversity of native animals, recycled nutrients, and maintained healthy watersheds with significantly lower risk of large, high-severity fires. Many of the functions that were historically provided by these healthy, fire-adapted forests are the same benefits people depend upon today, including reduced wildfire risk to communities, robust populations of fish and wildlife, high quality water, and a thriving local tourism, recreation, and forest products economy.

However, over the past century the fire-adapted forests surrounding Bend have undergone dramatic changes, driven primarily by past forest management and highly-effective fire suppression efforts that all but eliminated the natural role of fire. The unintended consequences of these actions are evident in the unnatural and unhealthy conditions in our forests today (i.e., uniform, dense, primarily young forests, with a century of accumulated burnable material), and the extreme wildfires such conditions fuel.

Several factors exacerbate the forest and fire challenge facing Bend: our population has more than tripled in the past twenty years; development in the WUI has steadily decreased the buffer between forests and human communities; and across the western U.S. we are experiencing a steady trend towards longer, hotter, and drier summers, and therefore larger, longer duration, and more intense wildfires. These factors compound the overall threat of catastrophic wildfire, Bend's high exposure (4<sup>th</sup> highest in Oregon) to such wildfires, and the significant ecological, economic, social, and human health and safety costs they carry. (See Figure 1 below)



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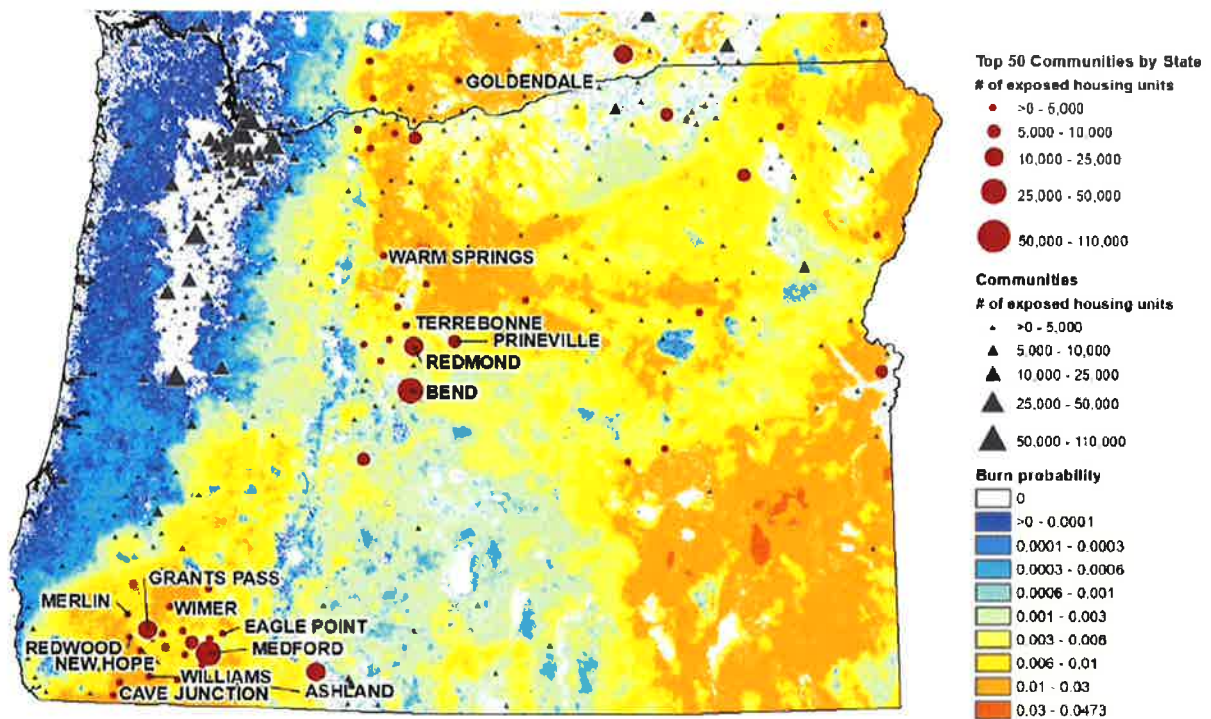


Figure 1: Annual burn probability across Oregon and exposed human communities. The 50 most-exposed communities are mapped in dark red. Bend is the fourth most vulnerable community in Oregon. (from Scott et al. 2018)

That is why the City of Bend and Deschutes County are working together, in partnership with state and federal forest managers, local elected officials, and community groups, to address this challenge through proactive fire-adapted forest restoration treatments and fire-adapted community preparedness efforts. Using a combination of strategically-placed forest thinning, mechanical fuels removal, and prescribed fire, we are finding a safe and controlled way to reintroduce fire in order to restore a more natural and healthy forest landscape and reduce wildfire risk in the forests around Bend. Moreover, we are partnering with diverse community organizations to engage a broad cross-section of community members and groups to ensure that residents and visitors alike have access to much-needed information about forest restoration activities, including prescribed fire.

Thanks to these ongoing efforts – some more than a decade in the making – the City of Bend and Deschutes County are well-positioned to develop the following Community Response Plan. The Bend SSRA CRP outlines our strategy to provide timely, accurate, reliable, locally-relevant, and advanced notification regarding planned prescribed fire (and unplanned wildfire), potential smoke impacts, air quality, and public health recommendations. The Bend SSRA CRP was developed through a collaborative process involving a diversity of local stakeholders from Deschutes County Health Services, Deschutes County Natural Resources, Deschutes Collaborative Forest Project (DCFP), ODF, DEQ, Oregon Health Authority (OHA), Project Wildfire, The Nature Conservancy (TNC), U.S. Forest Service – Deschutes National Forest (DNF), and Central Oregon Fire Management Service (COFMS).

Together, the City of Bend and Deschutes County will be submitting the Bend SSRA CRP to ODF and DEQ as part of a formal request under the 2019 Oregon prescribed fire SMP for an exemption from the 1-hour smoke intrusion threshold. Such action is necessary because of the urgent need to

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increase the pace and scale of prescribed fire treatments in the forests in the Wildland Urban Interface around the Bend SSRA (+/- 15 miles). It is from these prescribed burn areas that, due to topography and seasonal nighttime temperature inversions, residual prescribed fire smoke invariably settles into the Bend SSRA along the Deschutes River causing short-duration smoke impacts that would, based on analysis of past smoke events, periodically exceed the 1-hour smoke intrusion threshold (See section titled Fire, Smoke, & Air Quality Analysis for the Bend SSRA CRP below for further detail).

For this reason, an exemption for the Bend SSRA is critical to local, state, and national initiatives underway in Central Oregon to increase strategic forest restoration and prescribed fire treatments in the WUI surrounding Bend to improve forest health, reduce the risk of extreme wildfires, and increase community and firefighter safety when wildfires do occur. Through enhanced community outreach, communications, and notification as outlined in this document, we will both increase the window of opportunity for these critical treatments while mitigating public exposure to smoke from all wildland fire sources (prescribed and wildfire) and better protecting public health and safety in the near- and long-term.

## State-Required Components of the Community Response Plan

As required by the 2019 Oregon SMP, this plan has been coordinated through the local public health authority, which in this case is the Deschutes County Board of Commissioners, and was developed collaboratively with input from members or representatives of vulnerable populations, community officials, representatives from entities that have responsibility for prescribed fire, forest restoration collaborative groups, local businesses, and other interested members of the public.

As the 2019 Oregon prescribed fire SMP states, ODF and DEQ “recommend communities that are SSRAs and have experienced repeated smoke incidents and/or intrusions in the past collaboratively develop a community response plan and program. Within the SMP, OAR 629-048-0180, Section 2 spells out the following required components of such a plan:

1. A description of populations in an SSRA community that are vulnerable to the health effects of short-term smoke;
2. Adequate means by which the public, especially vulnerable populations in the SSRA community, will be notified in a clear and reliable way of anticipated smoke impacts in a timely manner;
3. Adequate options for protecting the health of vulnerable populations (or helping such populations to protect themselves) from short-term exposure to smoke, and;
4. A plan and program for communications between the entities that conduct prescribed fire, the local public health authority, and the community's public and vulnerable populations who may be impacted by smoke.

Prior to the finalization of the 2019 Oregon SMP a local group called the Central Oregon Prescribed Fire, Smoke, and Public Health Collaborative convened a diverse group partners (including representatives from the DCFP, The Nature Conservancy, Deschutes County Health Services, Deschutes County Natural Resources, Deschutes County Public Health Advisory Board, Project Wildfire, Oregon Department of Environmental Quality, Oregon Health Authority, Oregon Department of Forestry, Deschutes National Forest, and Central Oregon Fire Management Service) to craft a shared strategy to address the components outlined above through a shared strategy of

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proactive community outreach regarding fire, smoke, and public health in Central Oregon. This group began meeting in early 2018 and formed two working subcommittees, which collectively met more than 16 times, to develop shared messaging and a central platform to disseminate information. In addition to consistent messaging, the larger group discussed and agreed upon additional actions that were needed and feasible to protect smoke-vulnerable populations in Central Oregon.

The outcome and deliverable of this group's work is a shared community outreach platform, key messages, and agreement on how to disseminate information regarding fire, smoke, and public health impacts in Central Oregon. Central to the strategy is the new website [www.centraloregonfire.org](http://www.centraloregonfire.org), which was launched in June 2018 to serve as a "one-stop-shop" for all information in Central Oregon on fire, smoke, and public health. The website answers the following questions:

- Why is prescribed fire essential to make our forests healthier and communities safer?
- When and where is prescribed fire and prescribed fire smoke expected?
- What is being done to minimize smoke impacts during prescribed fires?
- What can people do to reduce their exposure and protect themselves from smoke?

In addition, the website includes interactive maps on prescribed fire locations and status, as well as air quality. It is also designed to transition easily between wildfire and prescribed fire seasons, so that the information and overarching communication and engagement strategy is relevant and applicable regardless of the source of smoke.

Once the group finalized its initial work feedback was solicited from the Deschutes County Public Health Advisory Board, adjoining counties' (Crook and Jefferson) public health staff, the Deschutes County Board of Commissioners, the Bend City Council, and the Project Wildfire Steering Committee to assure that diverse needs were met. The Central Oregon Prescribed Fire, Smoke, and Public Health Collaborative continues to meet on a quarterly basis to adaptively manage the strategy, make improvements to the website, messaging, and the delivery of information based on input received from partners and the community at large.

In summary, we were able to develop the Bend SSRA CRP quickly and robustly following final approval of the 2019 Oregon prescribed fire SMP thanks to a year-long effort by diverse partners working collaboratively to reach shared agreement about how to proactively address fire, smoke, and public health in Central Oregon.

## Components of the Bend SSRA Community Response Plan

In developing the Bend SSRA CRP, including the state-required components detailed below, we have relied on communication best-practices gleaned from the best available social science related to community engagement and communications during wildland fire and smoke events.

A synthesized list of these best-practices as they apply to prescribed fire, smoke, air quality, and public health includes:

- Providing timely, accurate, reliable, locally-relevant, and advanced notification about planned prescribed fire and potential smoke impacts;

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- Using clear, simple, and consistent messaging to improve recall, understanding, and compliance with public health recommendations to reduce smoke exposure;
- Preemptively identifying smoke-vulnerable populations and strategies to provide advanced warning so these individuals can take appropriate actions to reduce their exposure;
- Using multiple channels/methods of communication to optimize reach across a diverse public;
- Using innovative technologies, such as social media networks and text alerts, to complement and enhance traditional communication systems, and;
- Collaboratively developing and implementing communications plans to leverage the reach of partner organizations, ensure trust and credibility of messages and messengers, and thereby enhance communication effectiveness.

## 1. Description of Smoke-Vulnerable Populations in the Bend SSRA

Many factors influence a person's sensitivity to smoke, including severity and duration of smoke exposure and a person's health. Smoke may worsen symptoms for people who have pre-existing health conditions and those who are particularly sensitive to air pollution. These smoke-vulnerable populations include:

- Persons with asthma or other chronic respiratory diseases, such as COPD and emphysema
- Persons with cardiovascular disease
- Persons 65 years of age or older
- Infants and children
- Pregnant women
- Smokers, especially those who have smoked for several years
- Persons without housing or access to closed-loop air conditioning

According to 2017 Census data, Deschutes County's total population is approximately 186,875. When considering Smoke-Vulnerable Populations in Deschutes County, the data below provides insight into how many residents may be more vulnerable during smoke events. Please note, one individual may fall into multiple categories.

Deschutes County persons with asthma or other chronic respiratory diseases:

- Around 9.4% of Deschutes County adults aged 18+ report that they have asthma – estimated 14,221 adults (*Source: Oregon Behavior Risk Factor Surveillance System (BRFSS)*)
- Around 8.3% of Deschutes County 8<sup>th</sup> graders and 12.1% of Deschutes County 11<sup>th</sup> graders report that they have asthma (*Source: Oregon Healthy Teens Survey*)
- Around 5.0% of Deschutes County adults have Chronic Obstructive Pulmonary Disease (COPD) – estimated 7,564 adults (*Source: Oregon BRFSS*)

Deschutes County persons with cardiovascular disease:

- Around 6.3% of Deschutes County adults aged 18+ have cardiovascular disease (defined as angina, heart attack, and/or stroke) – estimated 9,531 adults (*Source: Oregon BRFSS*)
- Around 29.4% of Deschutes County adults aged 18+ have hypertension – estimated 44,478 adults (*Source: Oregon BRFSS*)

Deschutes County older adults:



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- Population size of adults aged 65+: 35,868 (*Source: American Community Survey, U.S. Census Bureau, 2017 population estimates*)

Deschutes County infants and children:

(*Source: American Community Survey, U.S. Census Bureau, 2017 population estimates*)

- Population size of children aged <18: 35,589
- Population size of children aged <5: 9,716
- Population size of children aged <1: 1,867

Deschutes County pregnant women:

- Total number of pregnancies: 2,179 (*Source: Oregon birth certificates and induced abortion records, 2017*)

Deschutes County smokers:

- Around 15.6% of Deschutes County adults aged 18+ currently smoke cigarettes – estimated 23,600 adults (*Source: Oregon BRFSS*)
- Around 1.9% of Deschutes County 8<sup>th</sup> graders and 9.3% of Deschutes County 11<sup>th</sup> graders report that they smoked cigarettes over the past 30 days (*Source: Oregon Healthy Teens Survey*)

Persons without housing:

- Point-in-time estimate of total number of individuals who experienced homelessness in Deschutes County: 960 (*Data source: Central Oregon point-in-time homeless count, 2018*)

It is critical to ensure that the most smoke-vulnerable individuals in the community are included in the development of communication materials and outreach plans. To do this, staff from Deschutes County Health Services consulted with organizations serving vulnerable populations, as well as individuals that are smoke-vulnerable, to get feedback on draft messaging and identify communication strategies that would reach those most likely to experience health impacts from smoke. Key findings were that neighborhood associations are a trusted way to disseminate information in this community and that text alerts were highly valued. These findings were incorporated into the plan and ongoing feedback will be incorporated following an annual community-wide survey to evaluate and improve the efficacy of the Bend SSRA CRP strategy.

## 2. Means of Communication & Notification about Fire, Smoke Impacts, & Air Quality

Providing timely, accurate, reliable, locally-relevant, and advanced notification about planned prescribed fire in the forests around Bend and potential smoke impacts has been shown to be critical in effective communication plans, as well as a key factor in ongoing efforts to build and maintain local social license to support prescribed fire use. Providing this information through multiple channels or methods of communication using clear, simple, and consistent messaging is also the most effective means of helping residents and visitors plan for and avoid smoky conditions and potential health impacts. With respect to smoke-vulnerable individuals, we have paid particular attention to describing who and how many individuals comprises these sub-populations, which will be provided a wide range of possible communication and notification methods outlined below.

Prescribed fire smoke levels in the Bend SSRA can rise and fall rapidly depending on many factors, such as topography, seasonal nighttime temperature inversions, wind speed, and wind direction.

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Consequently, we are utilizing a wide-range of existing and new communications and notification strategies and tools to expand our reach among a diverse public with different preferences for how they receive information. One of the central components of this multi-pronged strategy is the newly-created Central Oregon Fire website ([www.centraloregonfire.org](http://www.centraloregonfire.org)). The impetus for creation of the website came from a collaborative effort involving Deschutes County Health Services, Deschutes County Natural Resources, DCFP, ODF, DEQ, OHA, Project Wildfire, TNC, DNF, and COFMS who together recognized the need for agreed upon language and a corresponding central website to serve as a clearinghouse for information regarding wildland fire (prescribed and wildfire), smoke impacts, air quality conditions, and public health recommendations. From this platform, we provide (in English and Spanish) a range of information, tools, and resources regarding wildfires, planned prescribed fires, smoke impacts, air quality, and public health information serving all Central Oregon, including Deschutes, Crook, and Jefferson counties. Components of the website include:

- Important information, key messages, and recommendations addressing: 1) the purpose and importance of prescribed fire, 2) when and where prescribed fire is planned, 3) strategies employed to reduce emissions from prescribed fire, 4) the health impacts of smoke from all sources, and 5) recommendations to reduce exposure and mitigate potential health impacts caused by smoke;
- Blog and subscription-based newsfeed providing press releases from local, county, state, and federal partner organizations regarding prescribed fire, smoke, and air quality;
- Integrated text-alert system to receive real-time notifications from local, county, state, and federal partner organizations regarding prescribed fire, smoke, and air quality;
- Embedded interactive prescribed fire planning and implementation map providing real-time updates about planned, upcoming, and completed prescribed burning on federal lands across Central Oregon provided by COFMS;
- Embedded interactive Air Quality Index map for current air quality information provided by DEQ;
- Information and instructions for using the 5-3-1 Visibility Index when/where air quality monitoring data is not available, and;
- Links to online resources provided by agencies, such as OHA

Through this effort, local partners worked together to craft clear, simple, and consistent messaging that will be used in a wide range of traditional (or existing) and novel communication and notification methods. Much of this strategy will be utilized prior to every planned prescribed fire on public lands in Central Oregon. However, particular attention will be paid to fully implementing this strategy for prescribed burns in the WUI surrounding Bend, where past experience with prescribed fire and smoke events has taught us that enhanced communication and notification is critical. These enhanced means of communication and notification include:

- Press releases disseminated by local, state, and federal partners to the public through local media (television, radio, and print);
- Personal phone calls conducted by fire managers to interested individuals and community groups;
- Online and social media channels, such as Central Oregon Fire Info, partner organization websites, newsfeeds, Twitter, and Facebook, and;

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- Email notification to community organizations connected to smoke-vulnerable populations, such as local school districts, the Health Alert Network, neighborhood associations, and more;
- Voluntary opt-in text-alert system provided through Deschutes County Emergency Services;
- Information about Cleaner Air Spaces when smoke is severe

In addition, Deschutes County Health Services provides information about emerging health threats, including smoke, to the community and to healthcare providers through the Health Alert Network (HAN). The HAN reaches approximately 200 health care providers in the County, including many who serve populations most vulnerable to smoke. This allows an opportunity to share consistent, accurate information with providers and to share information (e.g. factsheets) that providers can share with their patients. At the beginning of fire season, Deschutes County Health Services will share health information and best practices for protecting health during periods of smoke with the HAN. In addition to sharing information through the HAN, Deschutes County Health Services conducts seasonal outreach to local agencies to share key messages. This includes sharing information through social media, the Central Oregon Emergency Information Network that covers over 30 local agencies, and on the Deschutes County webpage. During periods of significant smoke, these messages also include information on current local Cleaner Air Spaces. Deschutes County Health Services maintains a list of public spaces in the community that are equipped with high efficiency air filtration systems. This allows Deschutes County Health Services to serve as a resource to the local healthcare system and assure that accurate information is available to protect community health.

The above information is also disseminated through person-to-person interactions and presentations including events such as community meetings, city club events and other civic group presentations, homeowner association meetings, and pub talks. Collectively, this array of methods complements and enhances our ability to reach the widest population possible with advanced notification and clear, simple, and consistent recommendations to improve the overall effectiveness of this strategy.

To assure that these communication methods are reaching the intended audiences and providing information that is relevant to the public, the Central Oregon Prescribed Fire, Smoke, and Public Health Collaborative will conduct an annual community-wide survey. This survey will capture information on where they turn for information about fire, smoke, and public health, as well as resources that they feel are lacking, and feedback on how to improve communication. Annual survey results will be used to continually improve the program and inform outreach in the community each year.

In addition to ongoing feedback and annual surveys, Deschutes County Health Services also participates in and seeks feedback from the Central Oregon Access and Functional Needs Work Group. The Oregon Office of Emergency Services defines access and functional needs (AFN) as individuals who are or have: physical, developmental or intellectual disabilities, chronic conditions or injuries, limited English proficiency, older adults, children, low income, homeless and/or transportation disadvantaged (i.e., dependent on public transit), and pregnant women. Messaging and communication methodology is shared with this work group prior to prescribed fire season to assure that access and functional needs are considered when sharing information.

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## 3. Options to Protect Public Health & Mitigate Exposure to Smoke

A great deal of work happens in the forest before a prescribed burn is conducted, including thinning and removing trees and mowing brush. Completing these steps reduces the amount of combustible material available to burn, which in turn reduces the intensity of the fire and helps ensure that prescribed burns produce less smoke, achieve forest restoration goals, and can be safely controlled. During prescribed burn operations, a great deal of care and attention is paid to monitoring changing weather, fuel, and fire behavior, as well as where smoke is going during and after prescribed fires, to minimize smoke impacts to nearby communities. Nonetheless, some smoke in the air is inevitable during burn operations and the night and early morning immediately after prescribed fires.

Based on our analysis of the air quality data during prescribed fire smoke events in the Bend SSRA (see section titled Fire, Smoke, & Air Quality Analysis for the Bend SSRA CRP below) we have devised the following key messages and recommendations for the public to mitigate and reduce their exposure. This analysis highlights a clear and consistent pattern of prescribed fire smoke events that occur in the Bend SSRA, namely short-duration, low to moderate magnitude, occurring overnight or pre-dawn hours, and resulting primarily from WUI burns in the spring (see subsequent section below for detailed explanation). The recommendations are also consistent with established state protocols outlined in the June 2018 Oregon Severe Wildfire Smoke Episode Response Protocol created by DEQ, LRAPA, OHA, OOSHA, OEM, ODF, and USFS designed to address short-term (i.e. less than 24 hours) wildfire smoke impacts.

**Key Messages:** Smoke is made up primarily of small particles, gases, and water vapor. These particles can be inhaled deeply into the lungs, damaging lung tissue and causing respiratory and cardiovascular problems. Regardless of the source, smoke is a form of air pollution that can pose a health risk. Symptoms of short-term smoke exposure can include:

- Watery or dry eyes
- Persistent cough, phlegm, wheeze, scratchy throat, or irritated sinuses
- Headaches
- Shortness of breath, asthma attack, or lung irritation
- Irregular heartbeat, chest pain, or fatigue

**Recommendations:** The following guidelines are things members of the public and vulnerable populations can do to minimize short-duration smoke impacts from prescribed fire or wildfire:

- Limit your exposure to smoke.
- Reduce time spent outdoors when smoke is present. This can usually provide some protection, especially in a tightly closed, air-conditioned house. Set your A/C or heating unit to recycle or recirculate when at home or in your car, to limit your exposure.
- Reduce the time you engage in vigorous outdoor activity. This can be an important, effective way to lower the amount of smoke you are breathing in. It can minimize health risks during a smoke event.
- Stay hydrated. Drink plenty of water.
- Reduce other sources of indoor smoke and dust. These can be burning cigarettes, candles, gas or propane ranges, wood burning stoves and furnaces, and vacuuming.



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- If you have heart or lung disease or respiratory illnesses such as asthma, follow your health care provider's advice about prevention and treatment of symptoms.
- More vulnerable or smoke sensitive persons may consider using an indoor high-efficiency air filter (HEPA) or electrostatic precipitator for your home or to help create one or more rooms with cleaner air to breathe.
- Before you go to bed at night, close doors and windows to prevent outside smoke from getting inside and keep indoor air clean.
- If you feel like smoke is already impacting your health, avoid outdoor physical exertion and remain indoors. Contact your medical provider if you experience serious health problems caused by smoke.

These mitigation actions are listed on the Central Oregon Fire Info website and incorporated into all communication and notification methods outlined above to ensure we have clear, simple, and consistent messaging and that the public is aware of the actions they can and should take to protect themselves from potential smoke impacts.

In addition to these key messages and recommendations, to protect the public's health and mitigate the impact of smoke, Deschutes County Health Services develops an annual list of Cleaner Air Spaces that are equipped with high efficiency air filtration systems that the public can access during periods of heavy longer duration smoke. Furthermore, in 2019 Deschutes County Health Services received grant funding from the Region 7 Health Care Coalition to purchase eleven portable air cleaners to station at locations serving smoke-vulnerable populations. Increasing the number and capacity of Cleaner Air Spaces and communicating those locations to the public is critical to protecting the health of the community. As events arise that warrant the use of Cleaner Air Spaces these locations will be communicated to the public through the communication and notification methods outlined above, such as press releases, social media, and text alert systems.

Finally, to assure that smoke-vulnerable populations receive these key messages and recommendations we conduct additional outreach targeted specifically at these sub-populations. These messages, along with information about the [www.centraloregonfire.org](http://www.centraloregonfire.org) website and text alert system are shared annually with: local school districts, health care providers, Parks and Recreation, Homeless Leadership Coalition, Latino Community Association, neighborhood associations, sports associations, and the Health Care Coalition. By building relationships with and informing these agencies, we are able to get critical health information to the public and smoke-vulnerable populations through trusted, pre-existing relationships.

## 4. Coordination & Communication Plan for Fire, Air Quality, & Public Health in Bend

The Bend SSRA CRP and underlying information and notification options were developed through the Central Oregon Prescribed Fire, Smoke, and Public Health Collaborative involving partners from state and federal forest and fire management (ODF, DNF, and COFMS), local forest collaborative (DCFP), community wildfire protection (Project Wildfire), forest conservation and restoration (TNC), Deschutes County (Natural Resources and Health Services), OHA, and DEQ. This group provided the knowledge and expertise to develop the strategy, core messages, and communication and notification methods that underlie the Bend SSRA CRP, as well as formal mechanisms, such as quarterly cross-organizational meetings, shared information and notification platforms, and collaboratively-developed messaging, to formalize coordination and communication across the relevant partners.

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The core elements of this coordinated strategy now live on the Central Oregon Fire website and all the communication and notification methods to be utilized in the Bend SSRA and across the Central Oregon region. And because all the relevant partner organizations have web access and editorial privileges to provide real-time press releases and news updates through this integrated platform, as well as their respective communication and notification methods, we have greatly enhanced our already robust community outreach and engagement efforts here in Central Oregon. In addition to the website, the collaborative has developed coordinated language for press releases to assure health information is included in pre-season, burn season, burn day, as well as when smoke is currently impacting the SSRA and post-season communication. Examples of these press releases are provided in appendix A. The responsibility to initiate each of these press releases lies with the agency who is primarily responsible for the information. For example, the U.S. Forest Service will in most cases initiate messaging for planned burns while Deschutes County Health Services may initiate messaging about ongoing smoke impacts. The most regular communication will be related to planned burn units. In this case the U.S. Forest Service prescribed fire burn boss leading the burn will initiate the process and work with the public information officer to populate a press release with the relevant information. The press release is distributed to media partners, posted on the Central Oregon Fire website, partner social media platforms, and a text alert is initiated. In addition, the burn boss supplies the needed information to update the online interactive prescribed fire map showing the burn unit location, extent, and notes about potential smoke impacts. See the appendices for sample press releases, messaging protocols, and interactive map update protocols underlying this strategy.

In addition to the messaging procedures outlined above, we also use a variety of methods to provide other venues for people to learn more about prescribed fire and provide their input. These include presentations to civic groups and utilizing venues such as the Central Oregon City Club, visiting with homeowner associations in neighborhoods that are likely to experience smoke, holding public meetings in advance of some highly visible burns, as well as prescribed fire field tours. The public is also able to engage in the process followed by the federal agencies that is required by the National Environmental Policy Act (NEPA), offering the opportunity for public comment on proposed actions.

Furthermore, through the Central Oregon Prescribed Fire, Smoke, and Public Health Collaborative, we have institutionalized the process to address challenges, unanticipated changes, new opportunities, feedback from residents and community partners to any of our organizations, changes in technology, or identified gaps in the strategy, through our quarterly cross-organizational coordination meetings and the annual community-wide survey.

## Fire, Smoke, & Air Quality Analysis for the Bend SSRA Community Response Plan

The health of residents, visitors, and smoke-vulnerable populations in Central Oregon is important. A sense of wellbeing, healthy environment, and high quality of life are important reasons why people choose to live in and visit Bend. For that reason, we are interested in preparing our forests and our community to be healthy and resilient in the face of all wildland fire (prescribed and wildfire) in both the near- and long-term and are carefully weighing the tradeoffs between prescribed fire and wildfire across a broad suite of ecological, economic, and social/community values. Syntheses of research from across the western United States has consistently shown that prescribed fire, when used in conjunction with mechanical thinning and applied across the

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landscape, can significantly reduce the intensity and severity of future wildfire, thereby protecting the broad values our community cares about.

To that end, we have sought to better understand the duration, magnitude, time of day, smoke source location, and seasonality of both wildfire and prescribed fire smoke impacts in the Bend SSRA. Detailed analysis of air quality data from the Bend Pump Station nephelometer, as well as statewide permanent air quality monitoring sites, highlights the following important facts that inform the Bend SSRA CRP and our strategy with regard to fire, smoke, air quality, and public health messaging.

## 1. Prescribed Fire Smoke and Air Quality

Prescribed fire is not a significant cause of degraded air quality in the Bend SSRA. As Figure 2 below indicates, between 2011 and 2016, prescribed fires were responsible for only 112 hours, or 0.5%, of degraded air quality hours as measured in the 26 permanent air quality monitoring sites around the state. Locally, between 2011 and 2018, there was on average 10 hours per year, or 0.1%, of degraded air quality (moderate or worse) caused by prescribed fire in the Bend SSRA.

### Causes of Degraded Air Quality from 2011-2016 in Oregon

(as measured by 1-hour PM<sub>2.5</sub> concentration)

Air Quality Index	Prescribed Fire	Wildfire	Other (woodstove, mobile, industry, etc.)	TOTAL
Moderate	90	3,716	16,044	19,850
Unhealthy for Sensitive Groups	14	712	976	1702
Unhealthy	8	558	148	714
Very Unhealthy	0	78	1	79
Hazardous	0	42	0	42
<b>TOTAL</b>	<b>112</b> 0.5%	<b>5,106</b> 22.8%	<b>17,169</b> 76.7%	<b>22,387</b> 100%

Figure 2: Causes of degraded air quality between 2011 and 2016 in the 26 permanent air quality monitoring sites in Oregon.

## 2. Wildfire Smoke and Air Quality

Wildfire is a significant cause of degraded air quality in the Bend SSRA and statewide, as noted in Figure 2. In recent years (notably 2012, 2017, and 2018), wildfire has been a primary contributor to the poorest air quality experienced in the Bend SSRA throughout the entire year, as indicated in Figure 3 below.

## 3. Characteristics of Prescribed Fire Smoke Events & Impacts

Prescribed fire smoke events in the Bend SSRA demonstrate a clear and consistent pattern of smoke impacts. Analysis of hourly air quality data from the Bend Pump Station nephelometer reveals a clear and consistent pattern in terms of the duration, magnitude, time of day, smoke source

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location, and seasonality of historical prescribed burn smoke impacts in the Bend SSRA. For all prescribed fire smoke events between 2011 and 2018 which would, under the new SMP qualify as an intrusion above either the 1-hour or 24-hour PM 2.5 threshold, we found that:

- The average duration of degraded air hours (i.e., moderate or worse) was 6.5 hours
- The average 24-hour PM 2.5 concentration was  $30.9 \mu\text{g}/\text{m}^3$ , within the Moderate Air Quality Index category
- The average time of day of the max PM 2.5 concentration was 3:10am
- The average distance to the nephelometer was 11 miles, and 76% of the prescribed burns were WUI burns
- 70% of the prescribed burns occurred during the mid-April to early-June spring prescribed fire season

## 4. Prescribed Fire Smoke & the National Ambient Air Quality Standard (NAAQS) for PM<sub>2.5</sub>

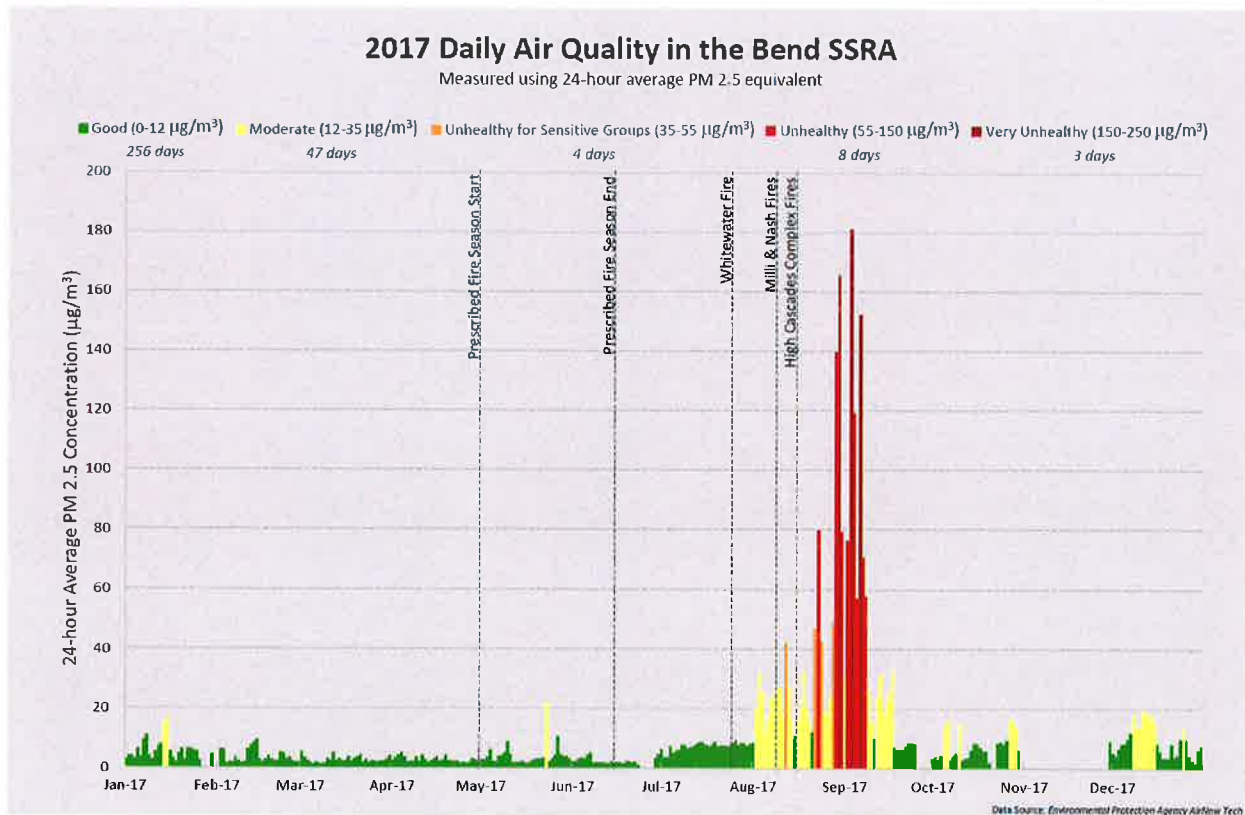


Figure 3: 2017 daily average PM 2.5 levels in the Bend SSRA, with additional notations indicating the start (early-May) and end (mid-June) of prescribed fire season, as well as primary local wildfires in central Oregon.

Due to Bend's generally high air quality throughout the year, prescribed burning does not pose a significant threat to violation of the National Ambient Air Quality Standards (NAAQS) for PM 2.5. In fact, analysis of hourly air quality data from the Bend Pump Station nephelometer helps us understand the potential risk of a violation. And while we understand that the Bend Pump Station is not a Federal Reference Monitor and therefore the data cannot be used in actual calculations of primary daily and annual PM 2.5 design values, the exercise is nonetheless informative. Figure 4 below illustrates that although Bend is not at risk of non-attainment for either the primary daily or



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### 2011-2018 Air Quality Trends in the Bend SSRA

Daily and annual PM 2.5 design values\* plotted alongside primary daily and primary annual National Ambient Air Quality Standards for particulate matter. Daily and annual design values are reported both including and excluding (per EPA Exceptional Events Rule) wildfire smoke for comparison.

\* Computed using federal methodology as explained in 40 CFR Appendix N to Part 50 - Interpretation of the National Ambient Air Quality Standards for PM 2.5

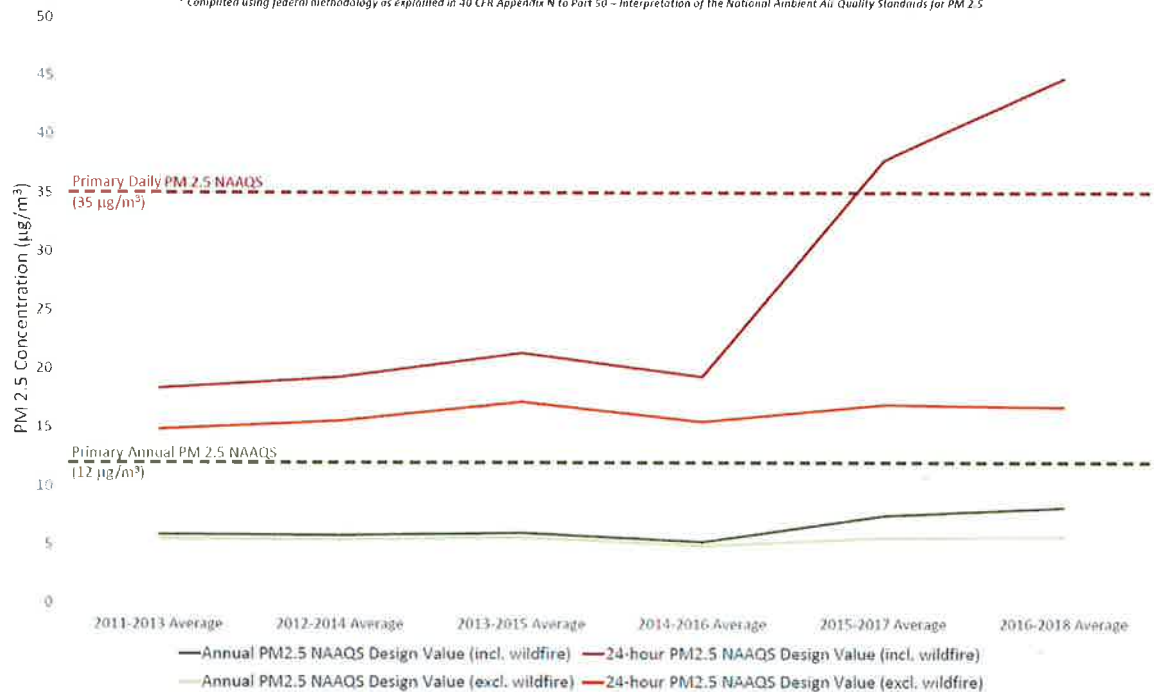


Figure 4: Primary annual and primary daily PM 2.5 design values relative to the primary daily and primary annual NAAQS for PM 2.5 for the Bend SSRA.

primary annual NAAQS for PM 2.5, it does reveal that the enhanced communication and notification we propose in the Bend SSRA about the public health impacts of smoke, in this case wildfire smoke, are particularly important to protecting the health and wellbeing of residents and visitors.

## 5. Contrasting Emissions from First-entry and Second-entry Prescribed Burns

Re-introducing fire to the fire-dependent forests adjacent to the Bend SSRA is complex, particularly after more than a century's worth of accumulation of combustible material. However, empirical data (presented in appendix D) highlights significant differences in the smoke emissions produced from first- and second-entry prescribed fires. These burns were implemented on the same 234-acre unit five years apart under similar spring wind and weather conditions within the same two-week burn window using the same techniques for ignitions, holding, and mop-up. The data highlight the potential of repeated prescribed fire use to reduce future prescribed fire smoke impacts to the community.

## Annual Reporting

Per OAR 629-048-0180 Section 3(f) of the 2019 Oregon prescribed fire SMP, the City of Bend and Deschutes County jointly commit to reporting annually to ODF and DEQ on our implementation of the Bend SSRA CRP. In this report we will document continued compliance with the four required components of the Bend SSRA CRP outlined above, as well as summary of the methods used to communicate to the public and smoke-vulnerable populations, a log of dates and times the Bend SSRA CRP is initiated, and a record of local meetings to discuss or update the Bend SSRA CRP.

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Unless otherwise specified, we will plan to submit annual reports in March of each year, prior to the commencement of each spring prescribed burn season.

## Conclusion

In Bend and Deschutes County, we have a proven track-record of successful collaboration and coordination around the most pressing environmental and natural resource challenges facing our communities. Thanks to a long history of locally-driven initiatives, such as the Central Oregon Project for Wildfire Risk Reduction (COPWRR), the Greater Bend Community Wildfire Protection Plan (CWPP), Project Wildfire, the Upper Deschutes Fire Learning Network, the Deschutes Collaborative Forest Project, and now the Central Oregon Smoke and Public Health Collaborative we have a foundation of robust community dialogue, outreach, and engagement to build upon in the creation and implementation of the Bend SSRA CRP.

What we have outlined above is a significant step forward in timely, accurate, reliable, locally-relevant, and proactive outreach to residents, visitors, and smoke-vulnerable populations of Bend (and Central Oregon more broadly). As we work to increase the pace and scale of prescribed burning to ensure the near-term and long-term health, safety, and resilience of our forests and communities, we are confident that the Bend SSRA CRP will ensure that this important work does not compromise the health and wellbeing of the people who live and visit here, and that Bend and Central Oregon will continue to be a national leader in fire-adapted forest restoration and prescribed fire use.

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## Appendix A: Sample Press Releases

### Pre-season example (Smoke and Public Health Collaborative)

For Immediate Release

Contact: Alison Green  
Central Oregon Fire  
541-419-1116

#### Need Up to Date Prescribed Fire Information?

Land managers and public health officials have come together to develop two new tools that will provide Central Oregonians with a one-stop shop fire information resource. Central Oregon Fire ([www.centraloregonfire.org](http://www.centraloregonfire.org)) offers up to date information on prescribed fire and wildfire locations, smoke impacts, and health resources. Also, you sign up for text alerts about prescribed fire by texting “cofire” to 888777. Living in a fire adapted ecosystem means Central Oregonians have a season for wildfire and another for prescribed fire. Residents will start seeing prescribed burns around Central Oregon in preparation for fire season and to create a healthier forest.

Prescribed burning is primarily done in the spring and fall. Whenever fire is used deliberately as a tool to improve the health of the forest and increase community and firefighter safety, it requires careful planning and is conducted under specific conditions of temperature, wind, and humidity. This ensures land managers accomplish the desired ecological outcomes and the fire can be safely controlled, all while reducing the likelihood that heavy amounts of smoke will blow into nearby communities. Prescribed fire, when used strategically and repeatedly across larger areas, helps sustain healthy forest ecosystems, reduces the risk of out-of-control fires, reduces the severity of future wildfires when they do occur, and keeps our communities and firefighters safer.

With the implementation of prescribed burning, some communities in Central Oregon will have short duration smoke events. Many factors influence a person’s sensitivity to smoke, including severity and duration of smoke exposure and a person’s health. Your health and the health of your family are important. There are things you can do to minimize the impacts of smoke on you and your family; such as, limit your exposure, stay hydrated, and close windows during periods of smoke and at night when prescribed burns are planned to prevent smoke from getting inside.

For more information on prescribed burning, smoke and your health, interactive maps and wildfire information, visit [www.centraloregonfire.org](http://www.centraloregonfire.org) or text “cofire” to 888777 to receive text alerts.

####

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## Beginning season example (Deschutes National Forest)

### Prescribed Burning Season Begins on the Deschutes

Central Oregon – If conditions remain favorable, firefighters on the Deschutes National Forest plan to ignite two prescribed burns tomorrow, the first is southwest of Sisters and the other is approximately 25 miles southeast of La Pine. Ignitions are scheduled to begin around 10:00 a.m. for the burn on SAFR unit 131, 3 miles southwest of Sisters, just east of Forest Road 1513. The smoke from this 62 acre burn will be visible from Sisters and people using the Metolius-Windigo Trail can expect a short duration trail closure on a portion of the trail just north of Cow Camp. A reroute has been designated for hiker and horse travel will be offered through signage near the prescribed burn area.

Firefighters will also be burning a 350 acre unit off Forest Road 18 about 25 miles southeast of La Pine called Maintenance 2D. If there's time, they will also ignite the adjacent unit Maintenance 2C, that's 875 acres. Ignitions are scheduled to start at 10:00 a.m. and continue through late afternoon.

On Friday, ignitions are scheduled to begin at 10:00 a.m. on South Bend 137, a 286 acre unit south of Bend adjacent to Lost Tracks Golf Course and China Hat Road. The Deschutes National Forest has partnered with Oregon Department of Fish and Wildlife for this burn which is intended to improve habitat for wildlife. Additionally, there is a significant amount of trash that has been dumped on this unit. Before this burn can happen, inmates from the Deschutes County jail will be cleaning up trash on the unit and Bend Towing will be hauling off large abandoned campers on Thursday. The Deschutes National Forest appreciates the cooperation of our community partners in helping us clean and prepare the area to be burned so we can restore the forest and reduce hazardous fuel accumulations within the Wildland Urban Interface near Bend.

Due to the location of these units, the public could see smoke and drivers may experience smoke impacts on nearby highways and Forest roads. For all prescribed fires, signs will be posted on significant nearby Forest roads and state highways that could be impacted. The public is encouraged to close their windows at night and if smoke is on the roadway, turn on headlights and slow down while traveling through smoky areas. The public's health is important to the Forest Service. While significant preventive measures are taken, many factors influence a person's susceptibility to smoke, including severity and duration of smoke exposure and a person's health. If individuals feel impacted by smoke, they should avoid outdoor physical exertion and remain indoors. If people experience serious health impacts from the smoke, they should contact their doctor. For more information about smoke and health, visit the Oregon Health Authority recommendations through this link:

<http://www.oregon.gov/oha/PH/Preparedness/Prepare/Pages/PrepareForWildfire.aspx#health>

Fuels specialists will follow policies outlined in the Oregon Department of Forestry smoke management plan, which governs smoke from prescribed fires (including pile burning), and attempts to minimize impacts to visibility and public health. Keep up with prescribed burns in Central Oregon by visiting this live map: <http://www.fs.fed.us/r6/webmaps/deschutes/cofms-rxfire/>

For more information, visit the Deschutes website at [www.fs.usda.gov/deschutes](http://www.fs.usda.gov/deschutes) and follow us on twitter @CentralORFire.

-End-



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## Day of burning example (Deschutes National Forest)

Firefighters Plan Burn West of Bend for Wednesday

Burning has prompted several short term trail closures in the Phil's Trail System

*Central Oregon* – If conditions remain favorable, firefighters on the Deschutes National Forest are planning a burn west of Bend near the Cascade Lakes Welcome Station on Wednesday.

On May 8, ignitions are planned for approximately 9:00 a.m. on Welcome Station 9, a 231 unit one mile west of Bend near the Cascade Lakes Welcome Station on Cascade Lakes Highway. Due to the location of this burn, the project will close portions of the Ticket to Ride, COD and Westside Paved Path trails. These trails will likely be closed for a few days to allow firefighters to safely cool hot spots near the trail. Additionally, smoke will be highly visible from Cascade Lakes Highway and portions of Forest Road 41. Signs and flaggers will be available if smoke begins to impact traffic flow the highway. Forest Service firefighters will be assisted on this burn by Bend Fire, The Nature Conservancy and Interagency hotshots.

Outside of Sisters, firefighters are planning to burn the 138 acre SAFR unit 282 adjacent to the Cold Springs Cutoff (Forest Road 1012) northwest of Sisters. Smoke will be visible from Highway 20 and the town of Sisters but no closures are anticipated with this burn.

While no road closures are expected with any of these burns, smoke may be visible from state highways and nearby Forest Roads and drivers may experience smoke impacts. For all prescribed fires, signs will be posted on significant nearby Forest roads and state highways that could be impacted. The public is encouraged to close their windows at night and if smoke is on the roadway, turn on headlights and slow down while traveling through smoky areas. The public's health is important to the Forest Service. While significant preventive measures are taken, many factors influence a person's susceptibility to smoke, including severity and duration of smoke exposure and a person's health. If individuals feel impacted by smoke, they should avoid outdoor physical exertion and remain indoors. If people experience serious health impacts from the smoke, they should contact their doctor. For more information about smoke and health, visit the Oregon Health Authority recommendations through this link:

<http://www.oregon.gov/oha/PH/Preparedness/Prepare/Pages/PrepareForWildfire.aspx#health>

Fuels specialists will follow policies outlined in the Oregon Department of Forestry smoke management plan, which governs smoke from prescribed fires (including pile burning), and attempts to minimize impacts to visibility and public health.

Keep up with prescribed burns in Central Oregon by visiting: <http://www.centraloregonfire.org> or text "COFIRE" to 888-777 to receive text alerts.

For more information, visit the Deschutes website at [www.fs.usda.gov/deschutes](http://www.fs.usda.gov/deschutes) and follow us on twitter @CentralORFire.

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## Ongoing smoke impacts (Deschutes County)

Deschutes County Health Services advises residents to take health precautions during periods of smoke. Many factors influence a person's sensitivity to smoke, including severity and duration of smoke exposure and a person's health.

There are things you can do to minimize the impacts of smoke on you and your family:

- Reduce time spent outdoors when smoke is present.
- Use an indoor high-efficiency air filter (HEPA) or electrostatic precipitator in your home to help create one or more rooms with cleaner air to breathe.
- Set your A/C or heating unit to recycle or recirculate when at home or in your car.
- Stay hydrated. Drink plenty of water.
- Reduce other sources of indoor smoke and dust, including: burning cigarettes, candles, gas or propane ranges, wood burning stoves and furnaces, and vacuuming.
- Reduce the time you engage in vigorous outdoor activity.
- If you have heart or lung disease or respiratory illnesses such as asthma, follow your health care provider's advice about prevention and treatment of symptoms.
- Consider maximizing time in air-conditioned homes or buildings during smoky periods or visit public, air-conditioned places such as libraries, community centers, senior centers, restaurants, and retailers for relief from smoke.

Smoke may worsen symptoms for people who have pre-existing health conditions and those who are particularly sensitive to air pollution. Contact your health care provider to develop a smoke plan.

Sensitive groups include:

- Persons with asthma or other chronic respiratory diseases, such as COPD
- Persons with cardiovascular disease
- Persons 65 years of age or older
- Infants and children
- Pregnant women
- Smokers, especially those who have smoked for several years

For current information on air quality, visit <https://oraqi.deq.state.or.us/home/map> or use the 5-3-1 visibility index:

- **If visibility is well over five miles**, the air quality is generally good.
- **Even if visibility is five miles but generally hazy**, air quality is moderate and beginning to deteriorate, and is generally healthy, except possibly for smoke sensitive persons. The general public should avoid prolonged exposure if conditions are smoky to the point where visibility is closer to the 5-mile range.
- **If under five miles**, the air quality is unhealthy for young children, adults over age 65, pregnant women, and people with heart and/or lung disease, asthma or other respiratory illness. These people should minimize outdoor activity.
- **If under three miles**, the air quality is unhealthy for everyone. Young children, adults over age 65, pregnant women, and people with heart and/or lung disease, asthma or other respiratory illness. These people should minimize outdoor activity.
- **If under one mile**, the air quality is unhealthy for everyone. Everyone should avoid all outdoor activities.

For current information on fires and how to protect your health, visit: [www.centraloregonfire.org](http://www.centraloregonfire.org).

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## Appendix B: Press Release Protocols

### Prescribed Fire News Release Info Form

Please complete the following information and send to *DESCHUTES NF PUBLIC AFFAIRS OFFICER (PAO)*, [XXXX@fs.fed.us](mailto:XXXX@fs.fed.us), when you have finalized plans to conduct a prescribed fire. It would be helpful for you to fill out as much as you can ahead of time. Since there is usually a quick turnaround once the conditions are right, please provide a courtesy call to *DESCHUTES NF PAO* at office (xxx-xxx-xxxx) or cell (xxx-xxx-xxx). This also applies if your project is cancelled or delayed. If you cannot reach *DESCHUTES NF PAO*, please contact *BLM PAO* (for BLM-administered lands) at xxx-xxx-xxxx; *ALTERNATE DESCHUTES PAO* (for Deschutes NF lands) at xxx-xxx-xxxx; or *Ochoco NF PAO* at xxx-xxx-xxx

1. Name and size of the prescribed burn project.
2. Location in terms the public understands, as mileage from a nearby community or landmark (for example, "About seven miles southeast of Bend and in the vicinity of Coyote Butte").
3. Ignition date and approximate time, if possible.
4. Expected smoke impacts on Highways or Forest Roads and whether you'll have signing/flaggers. Any closures or traffic delays?
5. Burn objectives. Be specific – not just fuels reduction, but what are the specific goals (e.g., introducing fire back into the ponderosa pine ecosystem, maintenance burning, removing leftover vegetation associated a thinning project to prevent the possibility of high intensity crown fires in the wildland urban interface, restoring old-growth juniper woodlands, enhancing riparian areas, etc.). If possible, also identify NEPA document.
6. Any previous treatments or is this the first entry?
7. Any biomass utilization?
8. Agencies and cooperators involved. Specify if crews, such as the hotshots, will be involved or any unique partners.
9. Project duration. (How long will the burn take? Mop up? Will there be a patrol over the weekend or overnight?)
10. If a subdivision may be impacted, identify name of subdivision and distance from the project area and nearest community.
11. Any other item of interest, for example: Is it a second treatment, a helicopter ignition, or have other treatments in the area mitigated the spread of wildfire in the recent past? Have we already treated a significant amount of acres? Special funding source (e.g., Elk Foundation, ARRA, etc.)

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## Appendix C: Interactive Prescribed Fire Map Update Protocols

### Protocols for Updating and Editing the Central Oregon Prescribed Fire Interactive Map

The public facing Prescribed Fire Interactive Map can be found on the Central Oregon Fire Information website. <http://www.centraloregonfire.org/>

#### UPDATING INSTRUCTIONS

##### PRESEASON

GIS staff will solicit for GIS shapefiles that depict Fiscal Year prescribed fire units for the Deschutes and Ochoco National Forests and the Prineville BLM. **It is important for Divisions to ensure that the units they plan to burn are included on the map, prior to ignitions.** It is important that when the public views the map, they are receiving an accurate view of near term burn plans. Only those units available for burning and those units with a realistic chance (>25% likelihood) of being burned should be included on the map. Most often, only underburning and jackpot units should be included, but Divisions can submit GIS shapefiles for high visibility pile burning units as well.

##### DURING PRESCRIBED FIRE SEASON

Public Affairs, Map Editors (see below), Burn Bosses (or their delegate), and Prescribed Fire Managers (if assigned) will have a role in keeping the Prescribed Fire Interactive Map current. Note that the Map Editor role is not-technical; there is an editing app that allows for performing edits while on the Forest Service network, outside of ArcMap. Editing access can be granted by contacting GIS staff. See Map Editor Instructions below for more detail.

During Prescribed Fire Season, the fields to keep current in the Prescribed Fire Interactive Map are **FIRESTATUS** and **NOTES**.

**FIRESTATUS** options are as follows:

- **COMPLETE** - ignitions were completed or partially completed (black color in the map)
- **ACTIVE** – unit is planned to be burned shortly (within 24 hours), is currently being burned, or was burned very recently (last 24 -48 hours) (red color in the map)
- **NOT ACTIVE**- unit could potentially be burned (green color in the map)

The **NOTES** field has a 254 character limit and can be used to document anything relevant to the burn unit. **However, for units with the potential to impact a Smoke Sensitive Receptor Area (SSRA), the NOTES field should be used to inform the public about potential smoke impacts.** This is important, as providing information on potential smoke impacts is one component of a Community Response Plan (CRP) – a plan that is developed to allow for exemptions to the 1-hour smoke intrusion threshold for SSRAs.

Example Notes:



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*Although the main plume is expected to avoid the city of Bend, residual smoke will settle at night and residents can expect smoke to linger in the Deschutes River drainage and other low lying areas through late morning. (219 characters)*

*Smoke is not expected to affect any communities. However, drivers on China Hat road should be prepared for potential impaired visibility due to smoke impacts. Pilot cars and other traffic control measures may be taken to ensure safety of drivers. (248 characters)*

*Phil's Trail complex users can expect smoke impacts during burn implementation. Portions of the COD trail will be closed. (121 characters)*

*With forecasted weather, the Day Road area will likely experience some smoke impacts during the afternoon and early evening hours. (130 characters)*

In order to ensure that the Prescribed Fire Interactive Map is kept current, whomever has been assigned to submit media release information to Public Affairs should CC a Map Editor (see below) on any correspondence about the prescribed fire. **Public Affairs will verify that the unit is showing FIRESTATUS "ACTIVE" in the Prescribed Fire Interactive Map prior to sending out any media releases.** If the map has not been updated, Public Affairs will update the map or contact a Map Editor to update.

If a Division is burning a unit that does not require a media release, the Burn Boss or their delegate has the responsibility of making edits or contacting a Map Editor to ensure that the map is updated prior to ignitions.

If a prescribed fire is cancelled OR approximately 24 – 48 hours after ignitions are complete, the Burn Boss or their delegate should change FIRE STATUS in the map from ACTIVE (red) to COMPLETE (black) or NOT ACTIVE (green) or contact a Map Editor to make these updates.

When a Prescribed Fire Manager is assigned, they will monitor the map for accuracy and either update the map or coordinate with a Map Editor for updates.

## MAP EDITOR INSTRUCTIONS

### LOGGING IN

Contact GIS staff for Access and instructions to the Prescribed Fire Interactive Map Editing Application

### VIEW AND EDIT FEATURE ATTRIBUTES

Zoom in to your area of interest. This can be done by using the + and – buttons in the upper left corner. Select the Edit Widget at the top of the page.



Click the point or polygon of interest. Note that if a red bar appears above the Smart Editor, editing will no longer work. Click another widget, such as the Basemap widget (4 white squares) next to the Edit widget, then click the Edit widget again.

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Use the drop down list to correct fields or complete any fields that are missing information. The primary fields that an editor will need update are: **FIRESTATUS** and **NOTES**.

Under **FIRESTATUS**, select one of the following: 1) ignitions were completed or partially completed (**COMPLETE**; black color in the map); 2) is planned to be burned shortly, is currently being burned, or was burned very recently (**ACTIVE**; red color in the map); OR 3) could potentially be burned (**PLANNED**; brown color in the map).

Under **NOTES**, anything relevant to the local unit can be entered. Some examples: "Expect smoke along Highway 242", "This is the second time this unit was burned over the last 10 years", "This project is a collaboration between the State and the US Forest Service". **Note however that for units with the potential to impact a Smoke Sensitive Receptor Area (SSRA), the NOTES field is used to inform the public about potential smoke impacts.**

Save any changes you make.



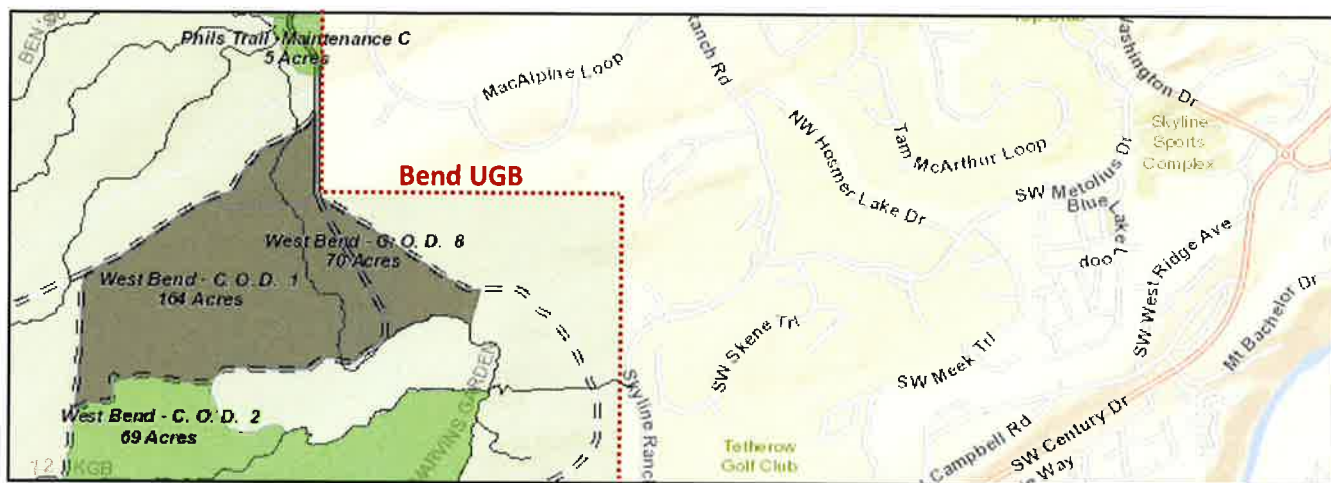
**REPEAT THIS PROCESS FOR BOTH THE POINT AND POLYGON FEATURES ASSOCIATED WITH THE UNIT.** Check that your updates were successfully by checking the public facing interactive map.

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## Appendix D: Comparing Emissions from First- & Second-entry Prescribed Fire Use



		First-entry Burn April 13, 2014	Second-entry Burn April 29, 2019
<b>West Bend Project</b> <i>C.O.D. Units 1 &amp; 8</i>  <b>Size</b> 234 acres  <b>Distance to Smoke Monitor</b> 4 miles	Fuel Tonnage (est.)	468 tons	234 tons
	Start time of Smoke Impact	0:00 am	10:00 pm
	Duration of Smoke Impact	13 hours	4 hours
	Max Hourly PM 2.5	251.2 $\mu\text{g}/\text{m}^3$	61.3 $\mu\text{g}/\text{m}^3$
	Max Hourly AQI Category	Unhealthy	Moderate
	Time of Max Hourly PM 2.5	1:00 am	0:00 am
	24-hour PM 2.5	30.0 $\mu\text{g}/\text{m}^3$	9.8 $\mu\text{g}/\text{m}^3$
	24-hour AQI Category	Moderate	Good

### Summary

The data from two prescribed burns presented above occurred on the same 234-acre unit in the West Bend Project on the Deschutes National Forest near Phil's Trailhead immediately west of the Bend Urban Growth Boundary. The first- and second-entry burns were conducted five years apart under similar spring wind and weather conditions within the same two-week burn window in the second half of April using the same techniques for ignitions, holding, and mop-up.

### Key Takeaways

- Estimated fuel load was half in the second entry, primarily due to consumption of stumps from early 20th century logging. These stumps are primary contributors to overnight smoldering smoke production that drive smoke intrusions in the Bend Smoke Sensitive Receptor Area.
- The maximum hourly PM 2.5 concentration in the second-entry was less than one-quarter of the first-entry burn, and fell within the "moderate" AQI range.

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- The maximum 24-hour average PM 2.5 concentration in the second-entry was less than one-third of the first-entry burn, never exceeding “good” AQI, and was less than one-third of the 24-hour NAAQS threshold.
- Both smoke events occurred late in the evening/overnight, however the duration of the smoke incident resulting from the second-entry burn was less than one-third the length of the smoke intrusion caused by the first-entry burn.