Fallen Bear
Air Quality Report

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Regulatory Framework

Current direction to protect and improve air quality on national forests is provided by: 1) the Forest and Rangeland Renewable Resources Act of 1974 (16 U.S.C. 1601), as amended by the National Forest Management Act (16 U.S.C. 1602); 2) the Federal Land Management Policy Act of 1976 (43 U.S.C. 1701); and 3) the Clean Air Act amendments of 1977, 1990, 1999 (42 U.S.C. 7401-7626). The Clean Air Act (Section 110) requires states to develop State Implementation Plans (SIPS), which identify how states will attain and maintain air quality standards.

The Clean Air Act amendment of 1977 defined a process that includes designation of Class I, II, and III areas for air quality management. Airshed classifications are defined in Table 1. A map of the Idaho and Montana airsheds and designated restricted areas is available on the following web page: http://www.smokemu.org/map.php.

The Clean Air Act does not apply to wildfire emissions.

Table 1 Airshed Classification Definitions

Class I – These area include all international areas and National Parks greater than 6,000 acres, and national wildernesses greater than 5,000 acres, that existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional man-made air pollution, which can be added to these areas. The nearest federally designated Class 1 areas are the Cabinet Wilderness, the Selway-Bitteroot Wilderness, and the Flathead Tribal Reservation. The intrusion of smoke into Class I airsheds from prescribed burning operations in the Fallen Bear Project Area would be minimal due to distance, the smoke dispersion, and the prevailing southwest to northeast air flow.
Class II – These areas include all other areas of the country. These areas may be upgraded to Class I, pending further legislation. A greater amount of additional man-made air pollution may be added to these areas, as opposed to Class I airsheds. All National Forest System lands that are not designated Class I are Class II airsheds. All of the lands in the Fallen Bear Project Area are designated Class II.
Class III – These areas have the least amount of regulatory protection from added air pollution. To date, no Class III areas have been designated in the country.

The Clean Air Act requires the Environmental Protection Agency (EPA) to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter less than or equal to 10 microns (PM 10). Idaho and Washington also have standards for these pollutants. Particulate standards were originally defined in terms of Total Suspended Particulate (TSP). In recent years the EPA has changed the particulate standard to apply to small particulates less than 10 microns in diameter (PM 10) and less than 2.5 microns in diameter (PM 2.5). This change was made because PM 10 and PM 2.5 represent particles that are too small to be effectively filtered by the human respiratory system and are likely to penetrate deeply into the lungs. These particulates can cause respiratory problems,

especially in persons sensitive to smoke such as the young, elderly, or those predisposed to respiratory ailments. The Act defines NAAQS as levels of pollutant above which detrimental effects on human health and welfare could occur. An area that is in violation of NAAQS is called a "non-attainment area". Pollution sources in these areas are subject to tighter restrictions. Spokane, Washington; Libby, Montana; Pinehurst, Idaho; and Sandpoint, Idaho are federally designated non-attainment areas, because of an excess of PM 10. A portion of Kootenai County, Idaho (Coeur d'Alene) is a proposed non-attainment area for PM 10.

Airshed groups in northern Idaho and Montana work cooperatively in an attempt to "minimize or prevent" accumulation of smoke in Idaho and Montana to the degree necessary to meet state and federal ambient air quality standards when prescribed burning is necessary to achieve accepted forestry objectives (i.e. hazard reduction, site preparation, and wildlife habitat improvement). As monitoring units, the airshed groups may limit burning, cease burning in specific areas, or cease entirely when meteorological or existing air quality conditions so warrant. Forest management burning is thereby regulated during the months of March through November (Montana/Idaho Smoke Management Unit Operating Guide). The Idaho Panhandle National Forests, including the St. Joe Ranger District, is a member of the North Idaho Memorandum of Agreement and adheres to the North Idaho Smoke Management Plan.

Burning during any time of the year is also regulated by the Idaho Department of Environmental Quality which may issue burning closures when necessary to protect air quality. The Forest Service cooperates with the State by requesting approval to burn through the Montana/Idaho Airshed Management System in compliance with the Idaho State Implementation Plan.

Analysis Area

The project area is the analysis area and those areas downwind from prevailing wind patterns during those times of year that prescribed fires are proposed, and for which available smoke modeling products and local experience indicate are potential smoke receptors for direct, indirect and cumulative effects. No other areas are likely to be impacted by scheduled activities.

Temporal Scope of Analysis

This analysis assumes burning would occur over a three year period.

Analysis Methods

Smoke from burning forest vegetation contains emissions that are regulated in accordance with the National Ambient Air Quality Standards by the Department of Environmental Quality. Particulate matter and carbon monoxide are the major emissions of concern in wood smoke because of the large quantities produced and potential health effects. Elevated particulate matter is generally the cause of violations of ambient air standards in the regional non-attainment areas (see Affected Environment below). Thus, estimated $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter) and PM_{10} (less than 10 microns in diameter) particulate emission levels from the various burning activities are assessed. $PM_{2.5}$ is the portion of smoke that is most easily inhaled into the lungs as it is the smallest and constitutes the majority of visible smoke by volume. $PM_{2.5}$ particles can build up in the respiratory system, aggravate mucus glands, and lead to a variety of health problems or aggravate existing health problems. The production of $PM_{2.5}$ and PM_{10} also contributes to potential effects on visibility. Production of $PM_{2.5}$ corresponds with the amount of fuel consumed. The differences in production are due to burn types, fuel moistures, and volumes of fuel consumed.

The First Order Fire Effects Model (FOFEM) predicts the amount of $PM_{2.5}$ and PM_{10} production from selected fuel models using specified fuel moistures, fuel loadings and expected fire behavior (Reinhart and others 1997).

The FOFEM uses cover type and dominant species to determine fuel models, and the FOFEM includes typical default values for fuel components (duff, litter, live and woody down fuels, etc.) associated with the cover type unless altered to better represent known conditions. All proposed site

preparation/hazard reduction burns for timber harvest areas were analyzed with the default typical values for the appropriate cover type. The proposed prescribed burns were analyzed using expected spring or fall moisture conditions, depending on the fuel reduction activity proposed. Drier summer conditions were analyzed for potential wildfire smoke production.

The wildfire scenario assumes that crown fire would occur in this project area. The total potential of wildfire smoke from all proposed activity acres is displayed for Alternative A. This represents the potential smoke production in lieu of any management activities. The total estimated smoke emissions for the action alternatives includes all acres of prescribed burning, as proposed by each action alternative, and wildfires occurring post-activity in project areas where prescribed fire was not utilized.

Literature related to the application of herbicides for weed control was reviewed to provide supporting information for the cumulative effects analysis.

Affected Environment

The Fallen Bear Project Area is within North Idaho Airshed 12B. Portions of the Project Area are within 3 miles of Montana Airshed 2, which includes some communities (St. Regis, Superior) that are downwind of the project area.

The Clean Air Act designates Class I, II, and III areas for air quality management. There are no Class I or Class III areas within the IPNF: all areas are designated as Class II. Class II areas have good air quality with no additional air quality restrictions other than the NAAQS. Class I areas are the most pristine areas which receive special visibility protection. The Cabinet Wilderness and the Flathead Indian Reservation are designated Class I areas and lie approximately 50 miles northeast and 60 miles to the north-northeast respectively. The Selway-Bitteroot Wilderness is a designated Class I area that lies approximately 70 miles south of the St. Joe Ranger District.

The EPA designates air quality sensitive sites as "non-attainment areas" because of violations of a NAAQS. Airshed 12B has no non-attainment areas within its boundaries. The nearest non-attainment areas are Pinehurst, Idaho (30 miles to the northwest), Thompson Falls, Montana (22 miles to the north) and Missoula, Montana (68 miles to the southeast). These areas occasionally are in violation of the PM_{10} standard during periods of winter inversions. The North Idaho and Montana Smoke Management Plans establishes "impact zones" around the non-attainment areas to include areas where emissions from prescribed burning could significantly impact the non-attainment area. There are no impact zones from non-attainment areas in Airshed12B.

The air quality of the Fallen Bear Project Area is generally good throughout the majority of the year due to good air dispersion. Human caused and natural events inside and outside the project area do occasionally affect air quality. Human influences such as stationary industrial pollution sources, camp fires, vehicle exhaust, and road dust in the area are low; however, regional haze occasionally occurs due to agricultural dust, agricultural field burning, and forest slash burning. Natural events such as dust storms and wildland fire events have contributed to reduced air quality at times.

The wind direction in northern Idaho is generally from the southwest to west. Smoke dispersion is to the east and northeast. Long-duration, low-intensity frontal systems commonly occur from late fall to spring aiding atmospheric mixing and improving air quality.

The effects of smoke within this project area and surrounding areas are dependent upon a number of factors such as season, topography, atmospheric conditions and time of day of the burning.

Spring and early summer seasons have the best dispersion and mixing atmospheric conditions. Daytime heating lifts smoke high into the atmosphere, and seasonal instability disperses smoke down wind. Daytime heating usually lifts smoke out of valley inversions but smoke dispersion can be problematic under prolonged stable, high-pressure systems. Inversions in the fall can potentially create the worst smoke problems of prescribed burning. Spring and fall are the seasons monitored and regulated by the North Idaho Airshed Group. Cold winter months, however, are when the air quality can be poorest because of inversions. Prescribed burning rarely occurs during this season and is not scheduled in the Project Area due to access constraints.

The topographic location of a prescribed fire will either aid smoke dispersion if it is high on the ridge and exposed to free air wind, or conversely increase the potential of smoke impacts if it is located in a valley bottom. Smokes produced low on the slope and not lifted up and out of the valley can become subject to nighttime downslope winds, become trapped by nighttime inversion conditions, and contribute to valley smoke pooling until the next daytime heating. Wildfire smoke has naturally been a part of the project area ecosystem due to the frequent fire-return intervals of the drier ponderosa pine forests to the west, local wildfires within and in the vicinity of the project area, and the severe- and mixed-severity fire regimes within the project area. Wildfire smoke has been reduced in the fire-suppression era in the Fallen Bear Project Area where fires were kept small and quickly extinguished. The project area atmosphere was previously often smoky and had a general haze from nearby fires as well as fires elsewhere in the Northern Rocky Mountains. Fire researchers have stated that northern Idaho is perhaps unmatched by other regions for forest conflagrations of similar magnitude, frequency, or degree of destruction (Barrett 1982). The amount of smoke generated from wildfires began to decrease in the 1930s due to the advent of effective fire suppression. Prior to this time the northern Rocky Mountains probably had 1,500-2,000 fires burning annually. Before modern fire suppression these fires burned until wet weather extinguished them which included periods of up to 4 months. Journals from early explorers and newspaper articles from the late nineteenth century often mention smoky conditions in western Montana and northern Idaho. More recently, very large fires in the Great Basin, Pacific Northwest, and Northern Rockies geographical regions have again become common annually during the summer months.

Prescribed fire from both inside and outside the project area has generated smoke during the spring and fall. Agricultural burning restrictions in eastern Washington and portions of Idaho west of the St. Joe Ranger District have reduced levels of regional haze in recent years.

Environmental Consequences

Table 2 shows estimated particulate emissions from each action alternative and the potential wildfire smoke production for Alternatives A and C in lieu of harvest or prescribed fire activities proposed in Alternative B (AQ-1). For comparison purposes, the acres of a potential wildfire are equal to the number of acres that require piling, broadcast, and/or jackpot burning as described in Alternative B. Fuel models used for the wildfire simulation represent existing fuel conditions. The model showed that greater amounts of PM_{10} and $PM_{2.5}$ would be generated in a wildfire as would be generated by the prescribed burning proposed in Alternatives B or C. Air quality standards are assumed to be met through the regulatory process for planned prescribed fire, however, reduced visibility and air quality degradation would occur temporarily during times that burning is conducted.

Table 2 Estimated PM_{10} and $PM_{2.5}$ Emissions

Type of Emissions	Alternative A	Alternative B	Alternative C
Total Tons PM_{10}	295*	277	287**
Total Tons $PM_{2.5}$	250*	234	243**

** Represents potential wildfire smoke from proposed Alt. B treatment units*
*** Includes potential wildfire smoke from proposed Alt. B treatment units untreated in Alt. C*

Alternative A (No Action)

Direct and Indirect Effects

There would be no immediate adverse effect on air quality. Air quality would remain good.

The potential wildfire scenario that could occur in areas not treated in Alternative A would not be regulated and could result in greater particulate production per acre in the absence of fuel treatment and hazard reduction through timber harvest or prescribed fire, and has good potential to occur during poor dispersion conditions and drier conditions with more available fuel. In the long term, this area has been characterized by very large stand-replacing fires on average every 100-200 years.

The potential for air quality degradation and reduced visibility may increase with Alternative A compared with the other alternatives. Fuel accumulation from ongoing tree mortality in the analysis area would potentially increase fire intensity and severity if a wildland fire were to occur within the analysis area. Consumption of increased fuel loads and understory biomass would increase the amount of smoke emissions. These emissions may remain in the local and surrounding airsheds for a period of a few days to several weeks depending on fire size and intensity. Research has found that emissions are greater from contemporary fires, even though they have burned fewer acres annually than fires historically did. This trend occurs because consumption of fuel per unit area burned has been greater in the current period than that of the preceding historic period (USDA, USDI 1997).

Cumulative Effects

Current management activities in this area contribute little additional pollutants. The primary source of pollution would be from vehicle exhaust, wood smoke, and dust from traffic.

The noxious weed treatment that may occur under the St. Joe Weed Control Project EIS and ROD would have short-term, localized impact on air quality because of the drift of spray particles. Generally the greatest part of this drift would settle within 25 feet of the site, although small amounts could carry greater distances (USDA Forest Service 1993). The smell of chemicals such as 2, 4-D may also persist at a spray site for several days following spraying. Human inhalation environmental exposures of herbicides would be less than occupational exposures since spray operators, involved with activities on the spray units, are more likely to be subject to spray mist than is a casual visitor. A casual forest visitor would be expected to receive an inhalation exposure of far lesser magnitude than that of a backpack sprayer (USDA Forest Service 1984).

All other activities (present and reasonably foreseeable; see list of activities in EA) would have no measurable effect on air quality in the project area. Pollution from vehicle exhaust, camp fires and road dust in the area is light.

It is reasonably foreseeable that smoke from wildfires from outside the project area would have some derogatory effect to the air quality within the project area during the summer months.

Regulatory Consistency

The No-Action Alternative would comply with the Idaho Panhandle Forest Plan, North Idaho Smoke Management Plan, and the Clean Air Act. The Clean Air Act does not apply to wildfire emissions.

Table 3 Approximate Fuel Treatment Acres

Treatment	Alternative A	Alternative B	Alternative C
Broadcast Underburning	0	202	112
Grapple Pile and Burn Piles	0	62	28
Lopping	0	196	139
Yard Tops	0	34	28
Landing Pile Burning	0	10	8

Alternatives B and C

Direct and Indirect Effects

Broadcast burning is done when there are no overstory trees to preserve or there are relatively few overstory trees to preserve that are predominantly fire tolerant and are expected to survive the prescribed fire. Occasionally live trees may be retained in a harvest area with the intent of creating snags by killing them with the subsequent broadcast burn that is meant primarily for site preparation and/or hazard reduction. Since crown scorch is a minor concern, a higher-intensity surface fire with a well defined convection column is planned. This will improve combustion efficiency and vertical lifting of smoke into transport winds aloft, thereby improving dispersion.

Slash would be piled in landing areas and in grapple pile units. Piles burn with high efficiency and can be scheduled in late fall when unstable atmospheric conditions, associated with frontal passages, and good dispersion exist. Substantial rain and/or snow are prerequisite for fall pile burning. Fall rain and/or snow events that elevate fuel moistures (outside of piles) above the moisture of extinction provide for the containment of fire spread and fuel consumption to the immediate vicinity of the individual piles.

The smoke emissions from prescribed burning activities could adversely affect air quality. In addition, dust may increase from road construction, maintenance, and stabilization as well as project-associated vehicular traffic. Dust is generally a very temporary and local problem. Road dust is primarily a minor local nuisance settling near the source. Dust is also generated at differing times than prescribed fire activity and not considered a significant cumulative impact.

Results of the FOFEM emissions modeling predicted annual $PM_{2.5}$ and PM_{10} standards are shown in Table 2. In Alternatives B and C predicted emissions range from 277 to 287 tons of PM10. However, accomplishment of the proposed prescribed burning would likely occur over at least a three-year time period and would be conducted only when atmospheric conditions are judged favorable. Given a three-year time frame for fuel activities, the annual expected smoke emissions would be between roughly 90 and 95 tons per year, depending upon the alternative selected. The proposed burns would result in less smoke produced per acre than wildfire and reduce the wildfire risk on those acres treated. Alternatives B and C include prescribed burning that would occur in both fall (pile burning, site preparation/hazard reduction) and the spring (site preparation/hazard reduction). Broadcast and understory burning would be accomplished as much as practical when site conditions are less conducive to total consumption of duff and heavy fuels. Scheduling prescribed fires for these moisture conditions helps reduce emissions, as will grapple piling those acres selected for grapple piling as burning slash in clean piles rather than broadcast burns reduces emissions by 25-50% (Radke and Ward 1991).

Proposed activities may temporarily affect air quality in the St. Regis area, the only residential area likely to be affected. Effects would be from the down- canyon winds at night bringing smoke into the area until daytime lifting of the smoke occurs. Forest visitors to the developed and undeveloped campgrounds along the St. Joe River corridor may experience pooling of smoke affecting these sites. Smoke produced from prescribed fire would be dispersed generally to the northeast by prevailing winds over unpopulated forest lands. The smoke that reaches other populated areas to the northeast would be lifted high in elevation and would primarily contribute to general regional haze.

Cumulative Effects

Idaho's Department of Environmental Quality and the Montana/Idaho Airshed Group monitor air pollutants and issue guidance that is intended to minimize burning during times when such activities would result in violations of the State standards, including unacceptable impacts to non-attainment areas. The Forest Service, as a participating partner of the Montana/Idaho Airshed Group, voluntarily ceases burning operations to avoid violations of State standards whenever such guidance is provided by local air quality regulators.

Broadcast burning of activity-created fuels would occur either in early spring when regional smoke production from all wildland sources has been historically low, or during selected fall periods when on-site conditions are less conducive to smoldering and consumption of large fuels. Piles would be burned from late fall to early winter. Smoke and particulate matter would flow to the northeast and would dissipate rapidly during good to excellent dispersion days.

Prescribed fire from both inside and outside the project area has generated smoke during the spring and fall months. Agricultural burning restrictions applied to agricultural areas to the west have reduced levels of regional haze since restrictions were implemented.

Past, present, and reasonably foreseeable future activities considered for cumulative effects are shown in the table below.

Action	Past	Present	Future	May Have Cumulative Effects	Explanation
Timber Harvest	X			NO	
Tree Planting	X			NO	
Precommercial Timber Stand Improvement	X			NO	
Mechanical or Manual Site Preparation & Fuels Treatment	X			NO	
Prescribed Burning for Site Preparation & Fuels Treatment	X			NO	
Prescribed Burning for Wildlife Habitat Improvement	X			NO	
Wildfires	X		unknown	NO	
Fire Suppression	X	X	X	NO	May have short-term effect on air quality but no cumulative effect.
Clearing Brush and Trees to Maintain Helispots	X	X	X	NO	
Road Construction	X			NO	
Road Decommissioning	X			NO	
Road Maintenance	X	X	X	NO	May have short-term effect on air quality but no cumulative effect.
Conrad Campground	X	X	X	NO	May have short-term effect on air quality but no cumulative effect.
Public Activities: firewood cutting, driving roads, camping, snowmobiling, hunting, hiking, berry picking, fishing, Christmas tree cutting	X	X	X	NO	May have short-term effect on air quality but no cumulative effect.
Trail Construction	X			NO	
Trail Maintenance	X	X	X	NO	
Fisheries Habitat Improvement Projects	X			NO	
Spraying Herbicides to Control and Prevent Noxious Weeds Under the St. Joe Noxious Weed EIS	X	X	X	NO	May have short-term effect on air quality but no cumulative effect.
Outfitter and Guide Uses	X	X	X	NO	
Large woody debris removal from Bruin Creek	X			NO	
Flood damage & repair on Bruin Creek Road in 1997	X			NO	
Eureka Mine hard rock mining	X			NO	
Installing bat-friendly barrier on Eureka Mine adit to block human access for safety			X	NO	

Pollution from vehicle exhaust, camp fires, and road dust in the area are low.

Wildfires from outside, as well as those from inside the project area generate smoke during the summer months. Wildfire smoke has been reduced in the Fallen Bear Area during the fire suppression era where fires were kept small and quickly extinguished.

Noxious weed spraying would have a short-term, localized effect in the area of spraying. The area may be sprayed for noxious weeds according to the St. Joe Noxious Weed Control Environmental Impact Statement. The impact from spraying would be very minimal to the air quality in the project area. The proposed weed treatment would have short-term, localized impact on air quality because of the drift of spray particles. Generally the greatest part of this drift would settle within 25 feet of the site, although small amounts could carry greater distances (USDA Forest Service 1993). The smell of chemicals such as 2, 4-D may also persist at a spray site for several days following spraying. Human inhalation environmental exposures would be less than occupational exposures since spray operators, involved with activities on the spray units, are more likely to be subject to spray mist than is a casual visitor. A forest visitor should be expected to receive inhalation exposure orders of magnitude less than that of a backpack sprayer (USDA Forest Service 1984).

Consistency with the Forest Plan and Regulatory Framework

An implemented alternative would be monitored and controlled by airshed regulations to avoid violation of air quality standards, in compliance with the North Idaho Smoke Management Plan, as directed in the Idaho Panhandle Forest Plan.

Requirements of the North Idaho/Montana State Airshed Group (notification of planned burning one day in advance) allows the Idaho Department of Environmental Quality to place restrictions on or prevent burning if it determines that air quality standards can not be met, which meets the Clean Air Act.

The annual production of $PM_{2.5}$ and PM_{10} for the Fallen Bear project is expected to be less than 100 tons, and the project is expected to meet the Clean Air Act.

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