

# WILDFIRE – RESTORATION OR DEVASTATION?

## PART I – HEALTH HAZARDS

There is a flip side to every coin. There are beneficial outcomes from wildfire. We are hearing a flood of commentaries from the environmental industry about these benefits. The mantra most often heard is that fire is a “natural” occurrence and that these ecosystems have evolved with fire. Hearing only this one side of the story you might think that our forests and wildlife will all die if we fight these fires.

Cancer is a “natural” occurrence as well. All humane societies do everything they can to fight cancer. When the battle is lost we mourn. But with the similarly destructive natural occurrence of stand replacing large acre fire we are doing less and less to fight it and the environmentalists are rejoicing when the battle is lost.

While small, low to moderate intensity fires may have a beneficial role to play in our forests, *Montanans For Multiple Use* believes that the large, forest consuming fires that we have seen lately are mostly destructive.

And here is why we believe that.

### DANGEROUS EMISSIONS FROM WILDLAND FIRES

Wildfire smoke contains a number of atmospheric pollutants that can damage human health. Some of the pollutants that National Center for Atmospheric Research (NCAR) scientists have found include:

- **Carbon monoxide**, a toxic gas that is also an ozone precursor. An urban area downwind of a wildfire might see levels of carbon monoxide that exceed the Environmental Protection Agency's standards.
- **Atmospheric mercury**, which can fall or rain out after a wildfire and enter watersheds, where interaction with microbes converts it into methyl mercury, a neurotoxin.
- **Ozone**, which inflames and impairs lungs and can trigger asthma attacks. It also damages plants and materials and influences climate.
- **Volatile organic compounds (VOCs)**, composed of hydrocarbons and partially oxidized compounds that, when mixed with some types of industrial pollution, make smog worse.
- **Fine particulate matter** (particles of soot and ash) that is too small for the human respiratory system to filter out. Its effects range from irritation to an increased risk of cancer.<sup>1</sup>

Scientists believe that the PM2.5 particulate matter is the most dangerous wildfire pollutant for human health.<sup>2</sup> Needless to say wildlife suffer equally as much from this pollutant.

*“Coarse particles about 5 to 10 microns in diameter deposit in the upper respiratory system. Fine particles less than 2.5 microns in diameter can penetrate much deeper into the lungs. These fine particles deposit in the alveoli where the body's defense mechanisms are ineffective in removing them. People with heart or lung disease, children, and the elderly are considered sensitive to exposure to particulate matter. The effects of breathing wildland fire smoke include eye and throat irritation, shortness of breath, headaches, dizziness, and nausea. Public exposure to smoke is a concern because eighty to ninety percent of wildland fire smoke (by mass) is within the fine particle size class (PM-2.5).”<sup>3</sup>*

There is no doubt that wildfire smoke can have immediate and very serious effects on firefighters as well as members of the public who live, work or play within 50 miles of the fire. People close to the fire with asthma, bronchitis, other lung diseases or heart disease will experience effects from noticeable but not alarming to life threatening. We have heard reports of deaths attributed to inhalation of wildfire smoke in persons with impaired lung function. ***“Levels of pollutants that may not affect healthy people may cause breathing difficulties for people with asthma, COPD, or other chronic lung diseases.”***<sup>4</sup> Asthma attacks are often fatal.

A very informative report on the health hazards of wildfire smoke was produced as a collaborative effort between health officials from the states of Washington, California, and Montana and the US Environmental Protection Agency titled Wildfire Smoke A Guide for Public Health Officials<sup>5</sup>. Here are some excerpts from that report.

“The effects of smoke range from eye and respiratory tract irritation to more serious disorders, including reduced lung function, bronchitis, exacerbation of asthma, and premature death. Studies have found that fine particles are linked (alone or with other pollutants) with increased mortality and aggravation of pre-existing respiratory and cardiovascular disease.”

“Particles can also affect healthy people, causing respiratory symptoms, transient reductions in lung function, and pulmonary inflammation. Particulate matter can also affect the body’s immune system and the physiological mechanisms that remove inhaled foreign materials from the lungs, such as pollen and bacteria.”

“Individuals who may experience health effects from lower levels of CO are those who have cardiovascular disease: they may experience chest pain and cardiac arrhythmias.”

“Wildfire smoke also contains significant quantities of respiratory irritants, which can act in concert to produce eye and respiratory irritation and potentially exacerbate asthma.”

**“Individuals with asthma and other respiratory diseases.** Levels of pollutants that may not affect healthy people may cause breathing difficulties for people with asthma, COPD, or other chronic lung diseases.”

“Because children’s airways are narrower than those of adults, irritation that might create minor problems for an adult may result in significant obstruction in the airways of a young child(*with asthma*).”

“Individuals with COPD, which is generally considered to encompass emphysema and chronic bronchitis, may also experience worsening of their conditions because of exposure to wildfire smoke.”

“However, because their lung capacity has typically been seriously compromised, additional constriction of the airways in individuals with COPD may result in symptoms requiring medical attention. Researchers have reported that individuals with COPD run an increased risk of requiring emergency medical care after exposure to particulate matter or forest fire smoke. Exposure to smoke may also depress the lung’s ability to fight infection. People with COPD may develop lower respiratory infections after exposure to wildfire smoke, which may require urgent medical care as well. “

**Heart Disease** “Studies have linked urban particulate matter to increased risks of heart attacks, cardiac arrhythmias, and other adverse effects in those with cardiovascular disease.

Chemical messengers released into the blood because of particle-related lung inflammation may increase the risk of blood clot formation, angina episodes, heart attacks, and strokes.”

**“The elderly.** Researchers have estimated that tens of thousands of elderly people die prematurely each year from exposure to particulate air pollution, as older adults are more likely to have pre-existing lung and heart diseases, and therefore are more susceptible to particle-associated effects..”

**“Children.** Children, even those without any pre-existing illness or chronic conditions, are considered a sensitive population because their lungs are still developing, making them more susceptible to air pollution than healthy adults. Several factors lead to increased exposure in children compared with adults: they tend to spend more time outside; they engage in more vigorous activity; and they inhale more air (and therefore more smoke constituents) per pound of body weight. These are all reasons to try to limit children’s vigorous outdoor activities during smoky conditions. Studies have shown that particle pollution is associated with increased respiratory symptoms and decreased lung function in children,...”

**“Pregnant women.** While there have not been studies of the effects of exposure to wildfire smoke on pregnancy outcomes, there is substantial evidence of adverse effects of repeated exposures to cigarette smoke, including both active and passive smoking. Wildfire smoke contains many of the same compounds as cigarette smoke.”

Most people who live west of the continental divide live in valleys where smoke often accumulates resulting in exposure levels similar to firefighters and others who live or

work in close proximity to the fire. Inversions and other weather conditions increase this accumulation.

Health Care specialists have developed a rating system for particulates in the air we breathe.

|                                       |                                                                                                                                                                                                      |                                                                                                                                                       |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Very Unhealthy</b>                 | Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant risk of respiratory effects in the general population. | People with respiratory or heart disease, the elderly, and children should avoid any outdoor activity; everyone else should avoid prolonged exertion. |
| <b>Unhealthy</b>                      | Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in the general population.             | People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.   |
| <b>Unhealthy for Sensitive Groups</b> | Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.        | People with respiratory or heart disease, the elderly and children should limit prolonged exertion.                                                   |

The Montana Dept of Environmental Quality monitors and keeps records of air quality all across Montana. During the fires of 2007 Western Montana was rated at or above “Unhealthy for Sensitive” from the end of July through at least the middle of September. We tabulated the ratings for the Flathead Valley, which received smoke from the Chippy and Brush Creek fires as well as some from fires in Idaho and SW Montana. The Flathead experienced ratings at or above “Unhealthy for Sensitive” for 40 out of 44 reporting days from 7/30 to 9/18 after which there are no more reports posted. On September 12 Kalispell had a “Very Unhealthy” smoke day. The Flathead experienced unhealthy smoke conditions for 9 straight days before and including 9/18 when the reports end so it is logical to assume that some of the following days were also “unhealthy”. In addition, there were 7 days during that period when there were no reports or technical difficulties prevented an assessment.<sup>6</sup> Consequently we feel sure that the Flathead had many more than the reported 40 days of unhealthy air due to smoke.

The conditions in the Flathead during the summer of 2007 are typical of conditions in many western states during recent fire seasons.

MFMU was unable to find any studies on the long term, cumulative effects on humans of year after year of severe fire seasons. We believe this study is needed because we think the effects may be serious especially since the smoke plumes from large fires can extend for hundreds even thousands of miles as they did during the massive fires in Russia and China in 1987 (over 12 million acres) and the Indonesian fires of 1997 & 1998

But we do know that nationwide dangerous particulates from wildfire smoke are increasing.

***“New modeling efforts by the National Oceanic and Atmospheric Administration reveal that each year wildfires emit more PM<sub>2.5</sub> (1.5 to 2.5 million tons) than do the traditional sources that EPA monitors and regulates: fuel combustion (700,000 tons), industrial processes (900,000 tons), and transportation (400,000 tons).”<sup>7</sup>***

Most of that particulate comes from the western states.<sup>8</sup>

There are carcinogens in wildfire smoke but most researchers we reviewed seemed to think the risk from short-term exposure was small. We do wonder though, what the cumulative cancer risk might be from repeated short-term exposures which many in the western US have been experiencing in the last two decades or more.

Christine Wiedinmyer, who has also researched wildfire CO<sub>2</sub> emissions for the National Center for Atmospheric Research (NCAR), reports that, ***“Recent studies have shown that emissions of mercury (Hg), a hazardous air pollutant, from fires can be significant. However, to date, these emissions have not been well-quantified for the entire United States. Daily emissions of Hg from fires in the lower 48 states of the United States (LOWER48) and in Alaska were estimated for 2002-2006 using a simple fire emissions model. Emission factors of Hg from fires in different ecosystems were compiled from published plume studies and from soil-based assessments. Annual averaged emissions of Hg from fires in the LOWER48 and Alaska were 44 (20-65) metric tons yr(-1), equivalent to approximately 30% of the U.S. EPA 2002 National Emissions Inventory for Hg.”<sup>9</sup>***

In addition to human health hazards, wildfire, especially the large forest consuming type of fire that we are having lately, has severe destructive consequences for the environment.

- Spews tons of green house gases into the atmosphere
- Releases gases that attack the ozone layer
- Soot from fires that lands on glaciers and ice packs increases melting
- Kills wildlife and stresses whole species.
- Destroys wildlife habitat
- Fire caused erosion washes mega-tons of sediment into streams which effects water quality and fish survival

- Chemical changes in the soil which release green house gases, affect vegetation growth and leach into the water supply
- Organic material and bacteria necessary for plant growth are baked out of the soil
- Destroys homes, outbuildings, power lines and other developments
- Disrupts the lives of families in the way of the fires
- Blocks trails with dead trees and reduces fishable water along lake and stream banks with a tangle of fallen trees
- Disrupts tourism and other economic activities
- Ruins the view
- Provides fuel for the next fire unless it is salvaged
- The half-hearted attempts to “manage” wildfire cost billions of taxpayer dollars

We will discuss these wildfire outcomes in Part II

In Part III we will explore ways through proper management to enjoy the benefits of fires without the destructive outcomes of large fires.

The full report will be posted soon on our website at [www.mtmultipleuse.org/FIRE](http://www.mtmultipleuse.org/FIRE)

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<sup>1</sup> <http://www.ucar.edu/news/features/wildfires/>

<sup>2</sup> <http://www.fs.fed.us/air/smoke.htm>

<sup>3</sup> *ibid*

<sup>4</sup> <http://www.arb.ca.gov/smp/progdev/pubeduc/wfgv8.pdf>

<sup>5</sup> *ibid*

<sup>6</sup> <http://www.deq.mt.gov/FireUpdates/2007/2007index.asp>

<sup>7</sup> <http://www.forestry.org/pdf/march07.pdf>    ***“Carbon and Forest Management: Markets, Wildfires, and Air Quality”***

<sup>8</sup> [http://www.wrapair.org/forums/fejf/documents/task7/InterRPO\\_02WildFire\\_EI/Inter-RPO\\_2002\\_WF\\_EI%20Report\\_rev\\_20070515.pdf](http://www.wrapair.org/forums/fejf/documents/task7/InterRPO_02WildFire_EI/Inter-RPO_2002_WF_EI%20Report_rev_20070515.pdf)

<sup>9</sup> <http://lib.bioinfo.pl/pmid:18186342>