

Appendix 4: Smoke Communications Strategy

Prescribed fires and managed wildland fire activities play an essential role in park and wilderness management. The Sierra Nevada ecosystem evolved with fire and has an abundance of fire dependant species. The fire regime for lower elevation areas where mixed conifer vegetation dominates is characterized by short fire return intervals and surface burning fires with very little active crown fire. This regime has been replaced over the years, mostly due to the exclusion of fire because of aggressive fire suppression. Now fires tend to be much more destructive, exhibiting a greater tendency to spread through crowning. The objectives of land and fire managers are to return the landscape to the surface burning fire regime using prescribed fire as the primary tool and vegetation removal where needed. To pursue this objective more burning needs to be done; more burning will create more smoke. Plans for smoke management and for communication with the public about smoke events are an important part of any wildland fire.

Pursuant to Title 17 of the California Health and Safety Code (as revised), a smoke management plan will be submitted for each proposed prescribed fire and developed for each managed wildland fire incident. In the smoke management plan, areas are identified that may be impacted by the fire, and mitigations are established to deal with potential problems. Ways to control or lessen the effects of smoke include burning only with a certain wind direction, burning only a certain number of acres per day, or not burning an area and instead removing fuels by alternative means such as chipping or mechanical removal. In high visitor use areas, limiting the adverse affects of smoke may mean waiting until a time when visitation is at its lowest. Whatever the mitigation, notification of the publics involved will be a priority during preparation for a burn. Who gets notified is different depending on the location of the burn.

Yosemite has managed a fire program for over 30 years and has dealt with smoke issues for much of that time. Evolution of the program has led to development of a notification strategy. The Wildland Fire Use program often results in smoke settling into populated areas, in part because it cannot be planned like prescribed fire. A managed wildland fire incident is normally managed in wilderness where fire is a natural process—these fires are managed and allowed to burn for ecosystem restoration and maintenance. Through naturally occurring fire, forests are naturally thinned, nutrients are recycled, fuels are reduced, and the fire regime continues to function as it always has. Fire effects are varied throughout the area that experiences a wildland fire and diverse and significant vegetative mosaics are established as the fire burns through its different phases, where different levels of fuel are consumed or left untouched. These fires also allow critical fire fighting resources to remain available for unwanted fires that burn in suppression areas, especially near communities where threats to life, property and resources are paramount.

About 10% of wildland fires can and do burn over large areas by the end of the season. Such fires tend to experience rapid growth at some period. During these periods of activity the fire may produce enough smoke to adversely affect air quality in a populated area. When a fire grows by more than 100 acres or makes sustained runs over a period of days and the atmosphere is stable, smoke tends to settle into valleys and drainages causing some degree of reduced visibility and air quality. In the evenings, as air cools, smoke will also settle into drainages. Under stable conditions this situation will persist and clearing during the day may be poor. If the atmosphere is unstable the

smoke will likely disperse into higher elevations. Smoke rising into a transport wind may eventually leave the area, however, it may cause problems outside the park.

Smoke management can be even more difficult when additional unwanted wildland fires are burning around the region. During big fire years, when numerous unwanted fires are burning, smoke tends to persist throughout the region. Persistent smoke from wildland fires is quite common during summers in the California foothills. Relief only comes when the fires are suppressed and/or high pressure moves out of the area, permitting better mixing in the atmosphere. Because of this, prescribed burning is closely monitored and coordination is necessary between the Air Quality Districts, the California Air Resources Board (CARB), and land management agencies which conduct prescribed burns. Meteorologists from CARB and the Interagency Fire Forecast and Warning Units (IFFWU) in Redding and Riverside provide forecasting specific to smoke mixing transport winds when requested and also coordinate with the National Weather Service.

Smoke Notification Process

A process Yosemite National Park first developed in 1994 for the Horizon Fire and later used during the Hoover Fire of 2001 involved notifying visitors, residents, and surrounding publics that smoke from the fires would often be persistent and may be quite thick at times. This communication process is ever evolving to educate people about the need for wildland fires and to communicate about health concerns the park has for residents and visitors. The park uses the media (through press releases), public information handouts, educational displays, and internet website postings. Different handouts are prepared and posted to provide information in the local area as the potential for a smoke event increases and, eventually, as the smoke persists.

Communication about a particular incident is done in a three stage process that is stepped up as the level of smoke increases. Based on an Air Quality Index, which relies on sophisticated particulate monitoring equipment, the public is kept informed of the level of exposure to particulate matter. The park also informs people about alternative places to visit during different times of day and keeps visitors informed of fire and smoke conditions and expectations.

Established by the Environmental Protection Agency and adopted by each state, the Air Quality Index (AQI) is a tool for reporting daily air quality conditions. Using numeric information from sensors (e.g., particulate monitors), the AQI provides information about how clean or polluted the air is and the associated health concerns for each level of emissions. The AQI focuses on health problems that can happen within a few hours or even days after breathing, in this case, smoke filled air. The AQI can be thought of as a yardstick that runs from 0 to 500. The higher the AQI value, the greater the level of air emissions and the greater the health danger. The Index identifies six conditions: good (0 to 50), moderate (51 to 100), unhealthy for sensitive groups (101 to 150), unhealthy (151 to 200), very unhealthy (201 to 300), and hazardous (over 300).

In the first stage the park releases an **Air Quality Advisory Notice**. Park staff might also contact visitors directly and may put out a press release about the wildland fires and fire season. Visitors would also be advised of the significance of natural fires in wilderness. At times the park requests that campers voluntarily limit their use of recreational fires in Yosemite Valley. This notice can precede the first significant activity that would generate enough smoke to be evident. Interpreters might also discuss the role of fire and the problem of smoke on nature walks. At this stage the AQI would be increasing but still be in the good to moderate range (<100).

The second stage in the smoke communication strategy would include the issuance of an **Air Quality Alert Notice** which would be directed towards the health effects of prolonged exposure to smoke. This notice would explain that particulate levels could be unhealthy to certain at risk people and suggest options for reducing exposure to smoke. Normally particulate levels would be high in the morning hours but clear up by mid-afternoon. Management actions might include discussions of banning campfire use in certain areas. In the early hours of the day, the AQI would possibly be in the unhealthy range for sensitive groups but in the moderate range in the afternoon. Twenty-four-hour National Ambient Air Quality Standards (NAAQS) for particulate matter (established by the EPA) would be less than 150 at this stage. The park might begin to hold public meetings at this stage.

An **Air Quality Warning Notice** would be issued when the particulate concentrations are at levels where the AQI stays in the unhealthy range day and night. Campfires would be banned in areas of the highest concentrations and visitors would be advised of the potential unhealthy effects of the particulate concentrations. Alternate work schedules may be established for employees, to reduce exposure. Actions would likely be taken to reduce emissions from wildland fires. National Ambient Air Quality Standards for the 24-hour particulate matter concentrations would have exceeded 150 one or more times. Public meetings would be arranged to inform people of monitoring results, management concerns, and actions being taken.

Smoke Monitoring

The park currently has a State-owned Hi-Vol PM-10 sampler which collects a 24 hour sample every 6 days, and a Beta Attenuation Monitor (BAM) which samples PM_{2.5} and runs continuously and provides hourly updates. These are both located near the Yosemite Valley Visitor Center. As part of the IMPROVE (Interagency Monitoring of Protected Visual Environments) network, there is a transmissometer which measures light extinction and a four-module aerosol sampler; both are located on Turtleback Dome. Portable monitors include another BAM, a DataRam, and cameras set on timers. The park also has ozone samplers in several areas.

While smoke monitoring has been part of the program for several years it continues to be a fragmented collection of data with the exception of the state Hi-Vol sampler on the visitor center which sends the filters to the State for archiving data. Problems identified in the program relate to lack of dedicated personnel to collect and manage data specific to smoke management. Data has often been collected by seasonal employees and, due to the high turn-over in personnel, there has been a lack of continuity for data management. Recent discussions at the South Sierra Fire Managers meetings have considered the possibility of pooling resources to allow better collection of smoke data for the area represented by this group.

Smoke Talking Points

In addition to formal notices and general fire messages/information, the following examples of talking points on smoke would be included in public information. Each talking point includes an example of language that might be used in updates, press releases, articles, presentations, et cetera. The talking points are organized in groups according to trigger points (i.e. specific time periods in an incident):

Year-round

Early Fire Season

Beginning of Incident

Air Quality Index (AQI) exceeds 75 for PM10

AQI exceeds 150 for PM10

Year-round

Wildland fire smoke fits into a larger regional air quality situation.

Example: “The scenic vistas in the parks, especially in the summer, are highly obscured by regional haze. Haze is caused when sunlight encounters tiny particles in the air. These particles may be the result of either natural events or human activities. According to the local Air District, over 95% of the particulate pollution in our area originates from Central Valley sources (i.e. motor vehicles, industrial fuel burning, manufacturing, and agriculture). Less than 5% comes from wildland fire in the Sierra Nevada” (NPS n.d.c).

Smoke, like fire, is a natural ecosystem component.

Example: “A Breath of Fresh Air: Is there a bright side to all this talk about smoke? While it is a health concern for humans, plants have adapted to live with smoke just as they have many other natural elements of the environment. Scientists are discovering that some plants might even depend on smoke for their survival. A recent study looked specifically at the low elevation chapparral plant communities. In the laboratory, scientists exposed various seeds to heat and charring, as in a fire, and certain species remained dormant. When the same seeds were exposed to smoke, germination occurred. While some plants, like the giant sequoia, use heat from fires for seed dispersal, it now appears that other plants rely on smoke for germination.” (NPS n.d.c)

Example: “Research has shown that smoke reduces the growth of mistletoe, which can damage black oaks.”

Early Fire Season

Use general fire messages and:

Park managers are sensitive to smoke impacts for visitors and employees.

Example: “The Yosemite fire program is committed to balancing the needs of park resources and people. While fire has always been a natural part of this ecosystem, our current society presents unique conditions. Today, there are more people than ever living in or visiting Yosemite National Park. Every fire management action considers this fact when determining incident objectives.”

Beginning of Incident

Use the talking points above and:

The park has the ability to monitor particulate levels in Yosemite National Park during smoke events.

Example: “In addition to weekly monitoring, as soon as the park anticipates a smoke event from a wildland fire, air quality technicians begin operating additional Smoke Monitoring Equipment on a more frequent basis. These stationary and mobile units measure particulate levels in the air. Particulates are solid particles produced by things like vehicle emissions, agricultural activities, and fires. The equipment records levels every hour and then computes a 24-hour average which correlates to the National Ambient Air Quality Standards (NAAQS) established by the Environmental Protection Agency (EPA). During extreme smoke conditions, technicians retrieve data from the module daily.”

Some characteristics of smoke accumulation are predictable because they are based on daytime and nighttime winds.

Example: “Up-slope or up-canyon breezes occur during the day which will often take smoke into higher elevations. At night, these winds change direction and bring smoke down-slope to the lower elevations.”

Some characteristics of smoke accumulation are not predictable since they are dependent on atmospheric conditions.

Example: “With unstable atmospheric conditions, smoke from wildland fires is mostly lofted up to very high elevations where it disperses. When atmospheric conditions are stable, perhaps with an inversion layer, smoke can be trapped at lower elevations.

For prescribed fires include:

Due to the deliberate nature of prescribed fire, audiences can be notified prior to the smoke event about what to expect.

Example: “During the week of ignition, visitors traveling through the area will smell and possibly see smoke. Smoke will likely be visible from [specific location]. The smoke will most likely settle in lower elevations during the early morning.”

During prescribed burns, fire managers utilize smoke management techniques.

Example: “The entire burn segment is 925 acres, but is split into two sections for smoke management reasons. A fire line has been constructed inside the segment where the fire can be held if smoke production is a problem. The burn boss plans to ignite 30-40 acres per day to minimize smoke output. This will increase the duration of the smoke event but will decrease the ambient level of smoke at any one time.”

For Fire Use include:

Small natural fires have the potential to become large fires.

Example: “Burning in heavy mixed conifer fuels, the newly discovered [Name] Fire has the potential to expand across hundreds of acres over the next several months. This fire was naturally-caused and will be naturally-extinguished with rain or snow. A “season-ending event” bringing more than ½-inch of rain over a 3-day period usually occurs in October.”

There are ways of minimizing smoke output in a fire use project without suppressing the fire.

Example: “While the park hopes to maximize resource benefits by allowing this fire to spread naturally, managers have at least two ways of reducing smoke in special situations. Hand crews can install fire line in strategic locations to contain certain areas of the fire. For example, keeping fire out of the lower Illilouette drainage would reduce smoke in Yosemite Valley. In extreme smoke situations, fire managers can drop water on hotspots. Unlike water drops in suppression actions, these drops are not meant to halt fire movement, but slow it down and reduce smoke.”

Example: “With a naturally ignited fire already burning in one of the tributaries draining into a sensitive area fire managers will now be suppressing new ignitions that would impact the same area to reduce additional smoke impacts to this sensitive area.

When AQI Exceeds 75 for PM10

Use the talking points above and:

There are ways for park residents and neighbors to reduce their exposure to smoke.

Example: “Smoke concentrations can be avoided by planning morning activities away from Yosemite Valley and afternoon activities away from higher elevation areas, such as Tuolumne Meadows. Close windows, doors, and outside vents when it is smoky to prevent accumulations indoors. Run your air conditioner, if you have one. Keep the fresh air intake closed and keep the filter clean. Ventilate your home and work place during periods of little smoke. Avoid physical activities while smoke is dense. Paper masks are designed to trap large dust particles, not the tiny particles found in smoke. These masks generally will not protect your lungs from wildland fire smoke.”

Example: “Residents of communities affected by smoke from wildland fires and prescribed fires are encouraged to practice the recommended health habits. A healthy immune system is the best protection against the effects of smoke. Immune function is enhanced with regular moderate physical activity, good nutrition, hydration, and adequate rest.” (USFS 2001b)

Breathing smoke is not healthy for anyone, but some people are at greater risk.

Example: “People with heart or lung disease, such as congestive heart disease, chronic obstructive pulmonary disease, emphysema or asthma are at greater risk. Children and the elderly are also more susceptible to smoke. These people are advised to use caution and avoid physical activity while heavy smoke is present.”

Example: “The risks of occasional exposure to fine particulate and other components of vegetative smoke are minimal for healthy individuals. However, elevated levels of smoke that persist for months or years increase the risk of heart and respiratory disease, especially among the elderly and individuals with pre-existing respiratory or cardiovascular illness.” (USFS 2001b)

AQI exceeds 150 for PM10

Use all of the talking points above and hold an open house/meeting to respond to community, public, and employee needs.

TALKING POINTS AT-A-GLANCE

The detailed talking points outlined earlier are indicated below with their corresponding numbers. When incorporating these messages into materials, refer back to the text examples.

**Table A4-1
Talking Points at a Glance**

Year-round	Early Fire Season	Beginning of Incident	AQI exceeds 75 for PM10	AQI exceeds 150 for PM10
1. Wildland fire smoke fits into a larger regional air quality situation.	3. Park managers are sensitive to smoke impacts for visitors and employees.	4. The park has the ability to monitor particulate levels in Yosemite National Park during smoke events.	11. There are ways for park residents and neighbors to reduce their exposure to smoke.	Use all of the talking points hold an open house/meeting to respond to community, public, and employee needs.
2. Smoke, like fire, is a natural ecosystem component.		5. Some characteristics of smoke accumulation are predictable because they are based on daytime and nighttime winds.	12. Breathing smoke is not healthy for anyone, but some people are at greater risk.	
		6. Some characteristics of smoke accumulation are not predictable since they are dependent on atmospheric conditions.	13. The <i>Air Quality Index</i> (AQI) is one tool that helps the park, visitors, and employees quantify daily air quality conditions.	
		PRESCRIBED FIRE 7. Due to the deliberate nature of prescribed fire, audiences can be notified prior to the smoke event about what to expect.		
		8. During prescribed burns, fire managers utilize smoke management techniques.		
		FIRE USE 9. Small natural fires have the potential to become large fires.		
		10. There are ways of minimizing smoke output in a fire use project without suppressing the fire.		