2013 Annual
Enhanced Smoke Management Plan
Open Burns & Air Quality Report

Prepared by the
Department of Environmental Conservation
Division of Air Quality
for the Air Quality & Smoke Management Committee
of the Alaska Wildland Fire Coordinating Group

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2013 Annual Report - Enhanced Smoke Management Plan
Report for Open Burns & Air Quality

This report fulfills the Alaska Enhanced Management Plan yearly report requirements. It provides information about the Department of Environmental Conservation (DEC) Open Burn Applications for prescribed or land clearing burns received and approved by DEC for 2013. Also included is air quality data representing the number and locations of monitored fine particulate matter ($PM_{2.5}$) exceedances due to wildland fire smoke occurring during the 2013 summer wildfire season. This report, in conjunction with the wildland fire emissions inventory for 2013 (draft June 2014), presents an air quality view of the 2013 wildland fire season. Summaries of 2006 through 2013 data are included as comparisons.

Resource Management Burns

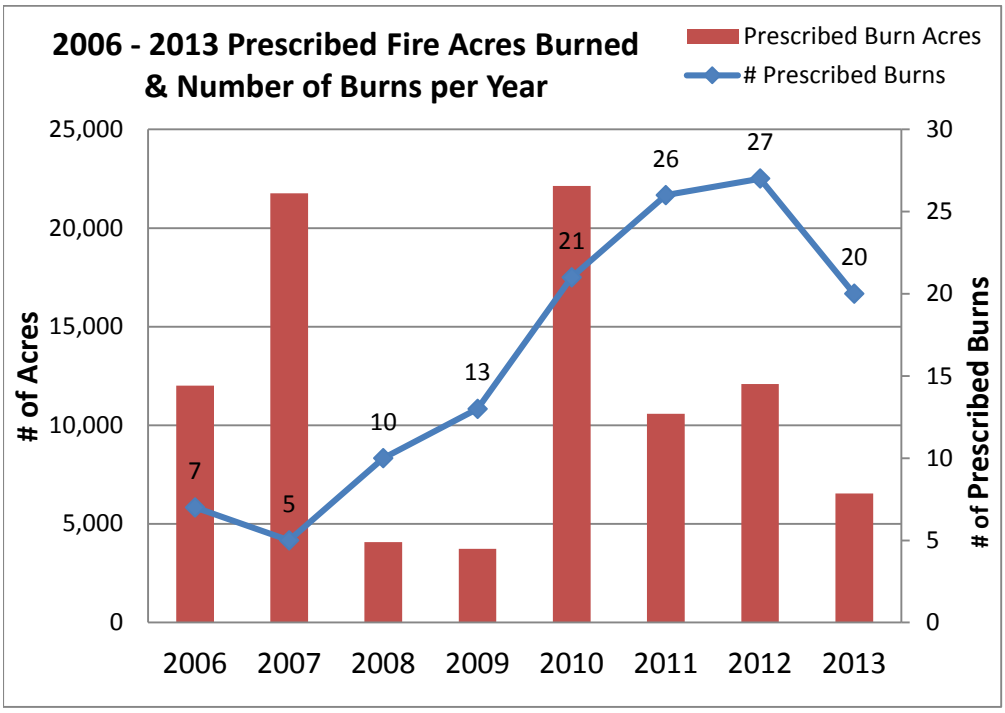
DEC Air Quality open burn permit approvals include prescribed fires of 40 acres and over, either cleared and burned, or burned. During 2013, DEC received 31 open burn applications plus 2 received in late 2012; 30 were approved; two did not require a permit, and one was withdrawn. Three of the DEC permit approvals contained multiple burn areas which were counted as 11 separate burns in the Alaska Interagency Coordination Center (AICC) data. Ten prescribed burns of less than 40 acres are not included in the DEC application numbers, but were included in the AICC situation reports. The 30 DEC permit approvals were classified as follows:

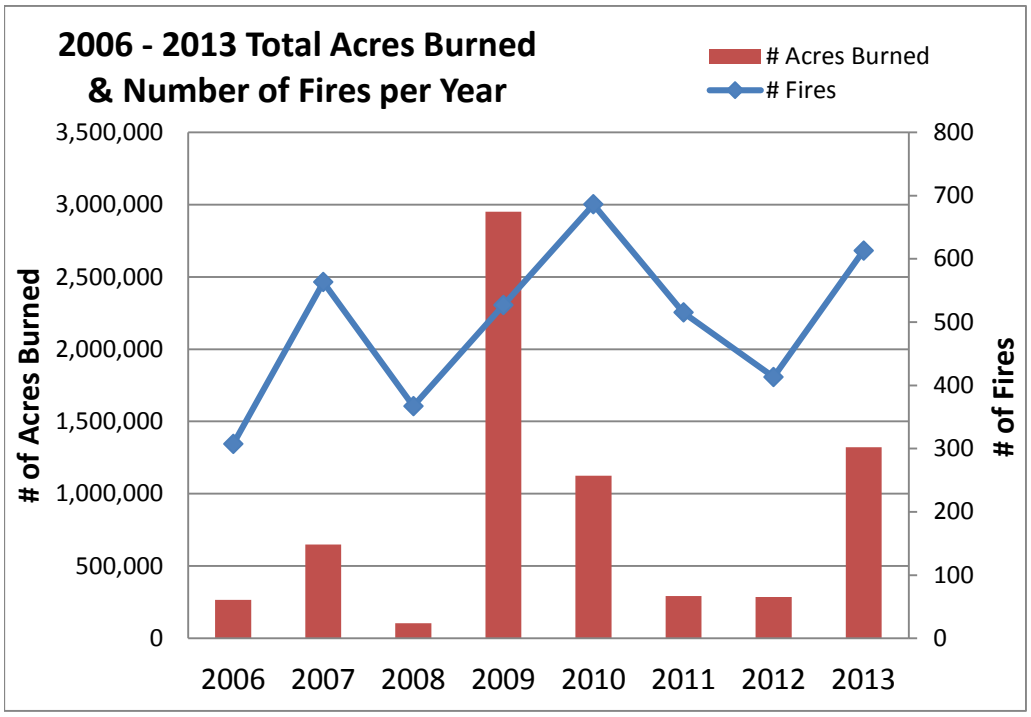
11 fire fighter training, fuel / black smoke (two not conducted)
2 fire fighter training, structures
17 resource management (11 applicants did not report activity)

DEC approved 63,389 acres for resource management burns, however only 5624 acres (8.9%) were reported burned during 2013. The majority of open burns, permitted by DEC or not, occurred in May; the rest were conducted June through November; one occurred in January, and none in August. A complaint was received by DEC for one of the 'no permit required' approvals. Appropriate action was taken to obtain compliance. There were no reported adverse effects on Class 1 Areas or Sensitive Areas.

The figure on the right shows the 2006 through 2013 resource management acres burned and the total number of those burns occurring per year.

There does not appear to be a correlation between the number of prescribed burns and the acreage burned.



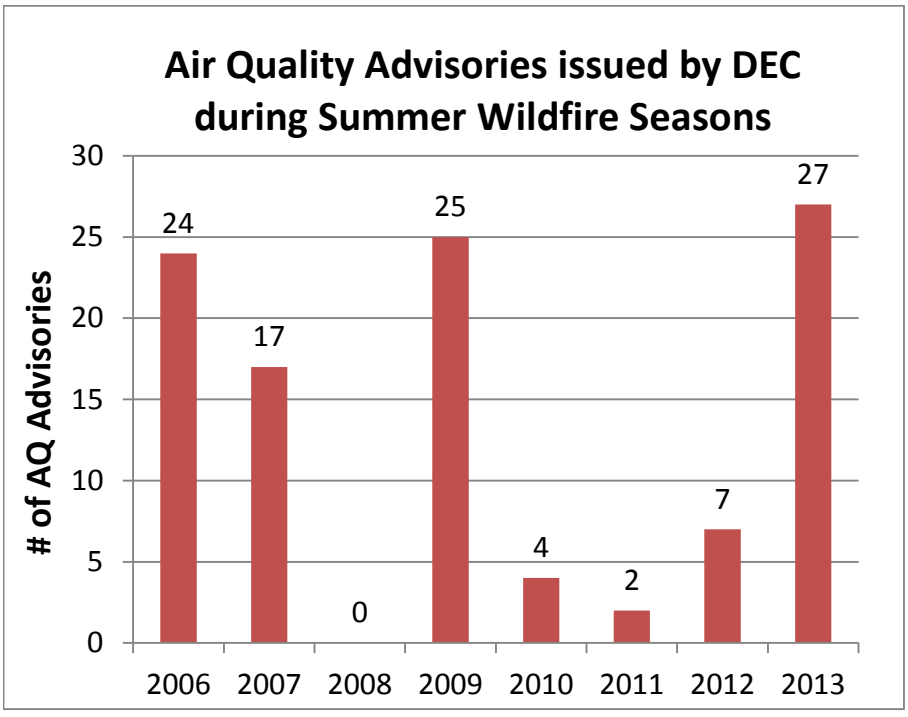


The graph on the left shows the comparison between the total number of wildland fire acres burned per year and the number of wildland fires for 2006 through 2013.

A larger number of fires in 2010 and 2013 as compared to acreage burned is indicative of many small fires in 2010 and 2013.

DEC Air Quality Advisories

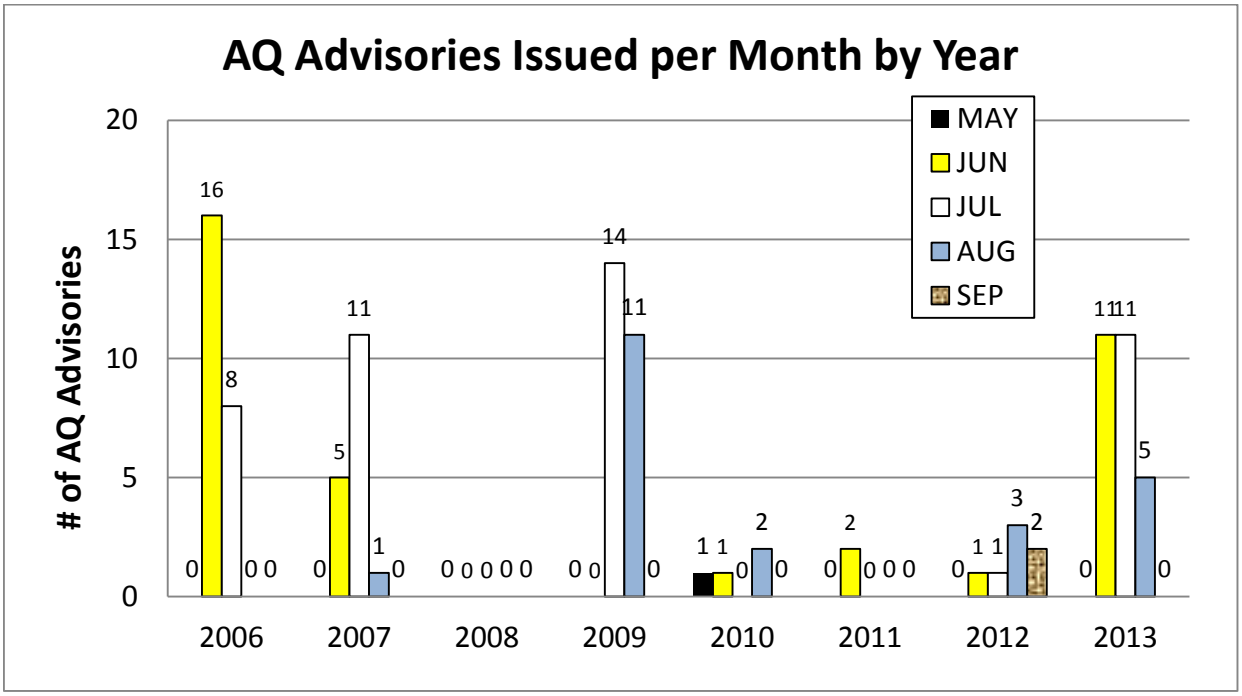
The Department of Environmental Conservation issues air quality (AQ) health advisories during times of widespread wildland fire smoke, windblown dust, volcanic ash, and high levels of wintertime particulate matter. The graph to the right portrays DEC AQ advisories issued for wildfire smoke during the 2006 through 2013 summer wildland fire seasons.



The advisories are issued for portions of Alaska that may be affected by wildfire smoke.

For some years it appeared the less acreage burned led to fewer AQ advisories being issued. However, 2006 and 2007, with lower burned acreages, indicate fire location, intensity, and wind direction also affect the need for AQ advisories.

Multiple air quality advisories may be issued on the same day for different areas of the state, and may be issued for multiple days, not just for 24 hours. Although there were about the same number of advisories issued during 2006 and 2009, there were many more multiple day advisories issued in 2009 than in 2006. In 2013, there were 27 air quality advisories issued: 3 days of triple issuance and 1 day of double issuance in different parts of the state; the other 16 days, advisories were issued for just one portion of the state.



The above graph shows the number of air quality advisories issued by DEC per summer month. It can be seen that June 2006 and 2013 were much smokier than June 2007 through 2012. Wildfire smoke advisories are most common from June through August, however early and late fire seasons do occur and can impact public health. In 2010, a wildfire smoke AQ advisory was issued in May for the first time. In 2012, there were two AQ advisories issued in September for the first time for late season fires.

The table below shows the estimated $PM_{2.5}$ emissions for the 2006 through 2013 wildfire seasons and includes the emissions from wildland fire, wildland fire use (2006-08), and controlled burn / prescribed fires. Roughly, the more yearly acreage burned, the greater the $PM_{2.5}$ emissions for that year.

$PM_{2.5}$ Fire Emissions

Year	$PM_{2.5}$ Emissions
2006	96,391 tons
2007	269,928 tons
2008	63,330 tons
2009	1,597,321 tons
2010	549,721 tons
2011	181,165 tons
2012	89,753 tons
2013	581,306 tons

Air Quality Standards

An "exceedance" of the $PM_{2.5}$ ambient air quality standard occurs when the 24-hour average concentration, measured in micrograms per cubic meter ($\mu g/m^3$), exceeds the regulatory health standard of 35 $\mu g/m^3$ $PM_{2.5}$. In Alaska, fine particulate matter is measured in the major population areas. Federal Reference Method (FRM) monitors for regulatory compliance run on a 3-day schedule, i.e., the 1st, 4th, 7th, etc., day of the month.

In 2009, continuous $PM_{2.5}$ monitors were added in most locations. These continuous monitors provide close to real time data and assist the state and local jurisdictions in issuing air quality advisories. During the wildland fire season it is probable there were days when the $PM_{2.5}$ levels exceeded the standard but were not captured due to the 3-day FRM monitoring schedule. For example, in Fairbanks in 2009, on 17 summer days the continuous monitors recorded $PM_{2.5}$ measurements over the standard, while the regulatory (FRM) monitors captured 7 exceedances during the same time period. Because the regulatory instrument does not operate every day, it is assumed under this method that the one sampling day also represents one day on either side of the sampled day, 3 days in all. The regulatory method cannot address rapid changes due to weather changes, but conservatively represents air quality for an airshed. It is also possible there were $PM_{2.5}$ exceedances in areas of the state where monitoring equipment was not available.

The following chart shows the number of FRM exceedances of the $PM_{2.5}$ standard as monitored in different areas of the state during the 2006 through 2013 wildfire seasons. Since most of the wildfires occur in the Interior, most of the exceedances also occur there.

FRM $PM_{2.5}$ exceedances during the summer wildland fire season
May through September

Year	$PM_{2.5}$ Monitor Location	# Exceedances	Air Quality Index (AQI) Categories[1]			
			# Unhealthy for Sensitive Groups	# Unhealthy	# Very Unhealthy	# Hazardous
2006	MATSU/Butte	1	1	0	0	0
2007-08	Statewide	0	0	0	0	0
2009	Fairbanks	7	2	4	1	0
2009	MATSU/Butte	1	1	0	0	0
	Totals	8	3	4	1	0
2010	Fairbanks	1	1	0	0	0
2011-12	Statewide	0	0	0	0	0
2013	Fairbanks	1	1	0	0	0

The above chart also shows the Air Quality Index Category for the reported FRM exceedances. The information on the next page explains the Air Quality Index and describes its reporting categories.

[1] See the next page for descriptions of the AQI and AQI Category descriptions

The Air Quality Index (AQI) is an index for reporting daily air quality.

The AQI tells how clean or polluted the air is, what associated health effects might be a concern, and recommends actions the public can take to protect themselves. The AQI focuses on health effects likely to be experienced within a few hours or days after breathing polluted air. The U.S. Environmental Protection Agency (EPA) calculates the AQI for five major air pollutants regulated by the Clean Air Act: EPA has established national ambient air quality standards for ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country;[2] however, in Alaska, ozone is seldom a concern.

In Alaska, the primary pollutant of concern with wildfires is Particulate Matter (PM). Fine particulate matter is less than 2.5 micrometers in diameter. It is a product of combustion, primarily caused by burning fuels. Examples of $PM_{2.5}$ sources include power plants, vehicles, wood burning stoves, and wildland fires. These particles can be inhaled deep in the lungs, causing future cardiovascular and respiratory health risks. The following table is from the EPA website, which relates the AQI Categories and Cautionary Statements to actual levels of $PM_{2.5}$.[3] For further information, see EPA's Air Quality Guide for Particle Pollution at: http://www.epa.gov/airnow/air-quality-guide_pm_2013.pdf.

Air Quality Index (AQI) information:

Air Quality Index Categories	Air Quality Index Cautionary Statements	24 Hour Particulate Levels $\mu g /m^3$ $PM_{2.5}$
Good	None	0.0 to 12.0
Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	12.1 to 35.4
Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly, and children should limit prolonged exertion.	35.5 to 55.4
Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	55.5 to 150.4
Very Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.	150.5 to 250.4
Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly, and children should remain indoors.	greater than 250.4

[2] EPA website: http://www.airnow.gov/index.cfm?action=aqibasics.aqi

[3] http://www.epa.gov/airquality/particlepollution/2012/decfsstandards.pdf