2011 Annual
Enhanced Smoke Management Plan
Open Burns & Air Quality Report

Prepared by
Department of Environmental Conservation
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2011 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 managed / prescribed burns received and approved by DEC for 2011. Also included is air quality data representing the number and locations of monitored particulate matter ($PM_{2.5}$) exceedances due to wildland fire smoke occurring during the 2011 summer wildfire season. This report, in conjunction with the wildland fire emissions inventory for 2011 (October 2012), presents an air quality view of the 2011 wildland fire season. Summaries of 2006-2010 are included as comparisons.

Resource Management Burns

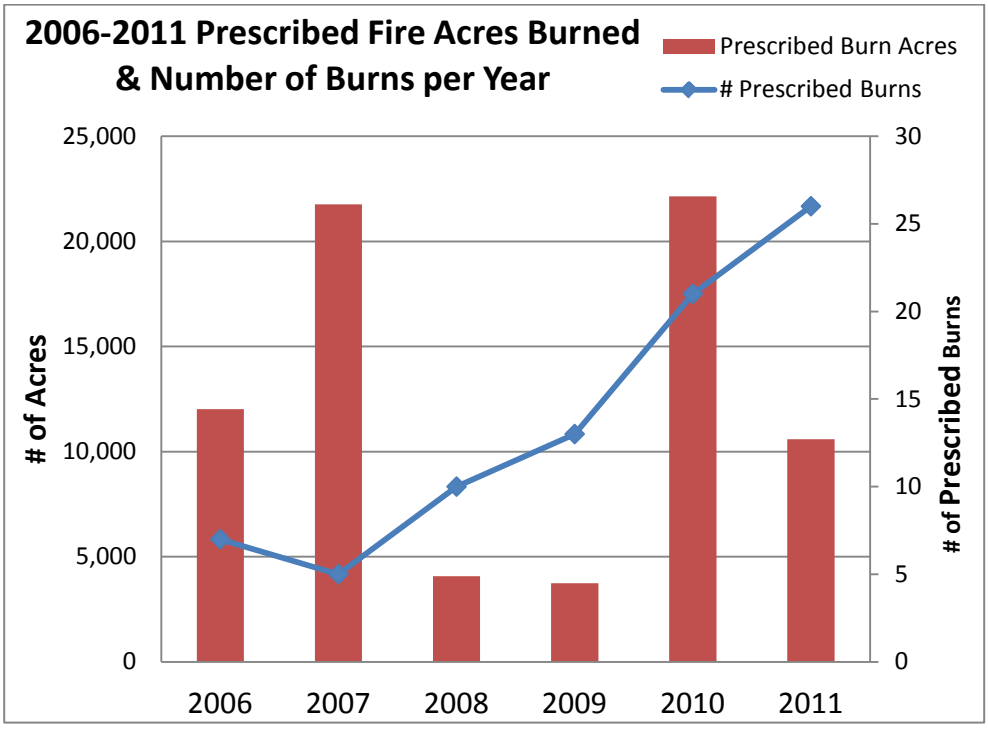
During 2011, DEC Air Quality received 18 open burn applications and 16 were approved. DEC open burn permit approvals include prescribed fires of 40 acres and over, either cleared and burned or burned, during 2011. Nine prescribed burns of less than 40 acres are not included in the application numbers, but were included in the Alaska Interagency Coordination Center situation reports. The DEC approved applications were classified as follows:

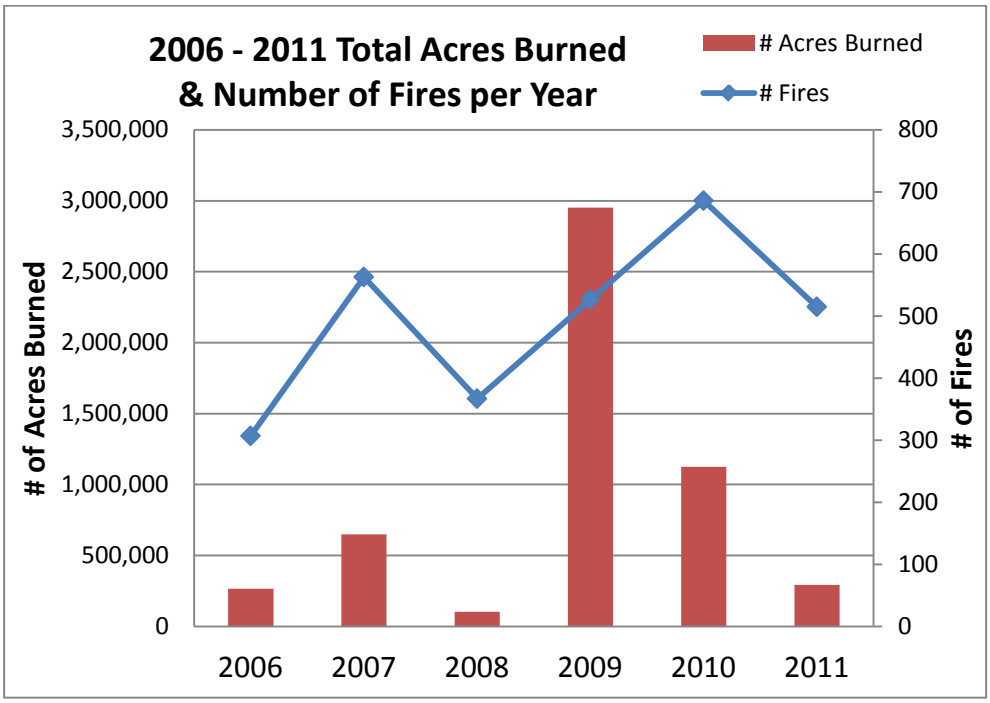
3 fire training, fuel / black smoke
3 fire training, structure (2 of the 5 applications were denied due to smoke/health concerns)
12 resource management (1 applicant did not report activity)

DEC approved 63,266 acres for resource management burns, however only 8,341 acres (13.2%) were actually burned during 2011. The majority of open burns, permitted by DEC or not, occurred in May; the rest were conducted April through November; none were conducted in July. No complaints were received by applicants or DEC. There were no reported adverse affects on Class 1 Areas or Sensitive Areas. During 2011, DEC had no enforcement actions in response to permitted burn activity.

The figure on the right shows the 2006 through 2011 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.



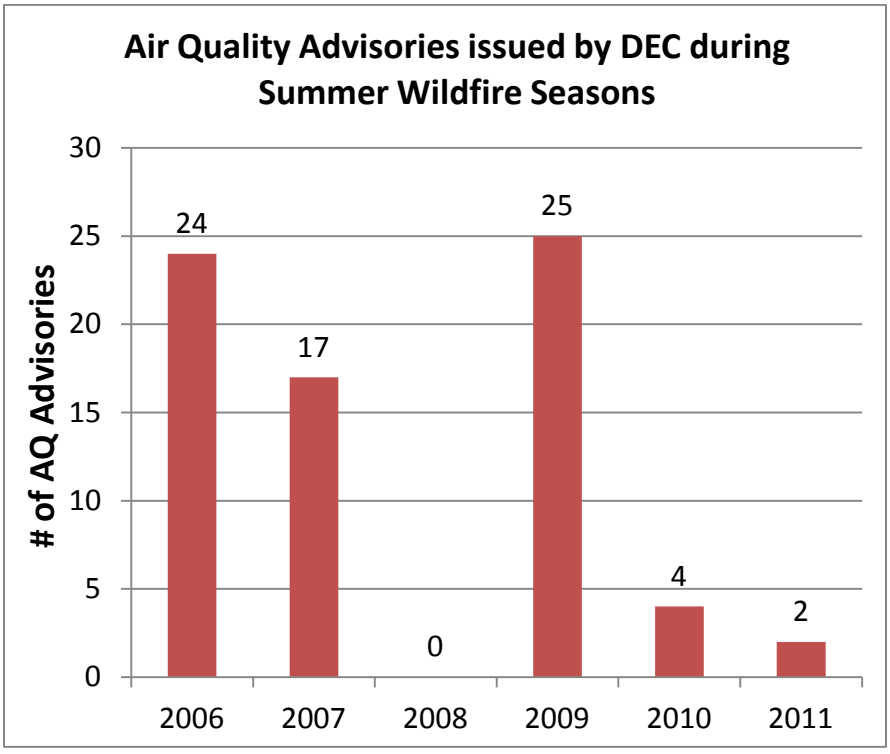


The graph on the left shows the comparison between the total number of wildland fire acres burned per year and the number of wildland fires for 2006 through 2011.

A larger number of fires in 2010 and 2011 as compared to acreage burned is indicative of many small fires in 2010 and 2011.

DEC Air Quality Advisories

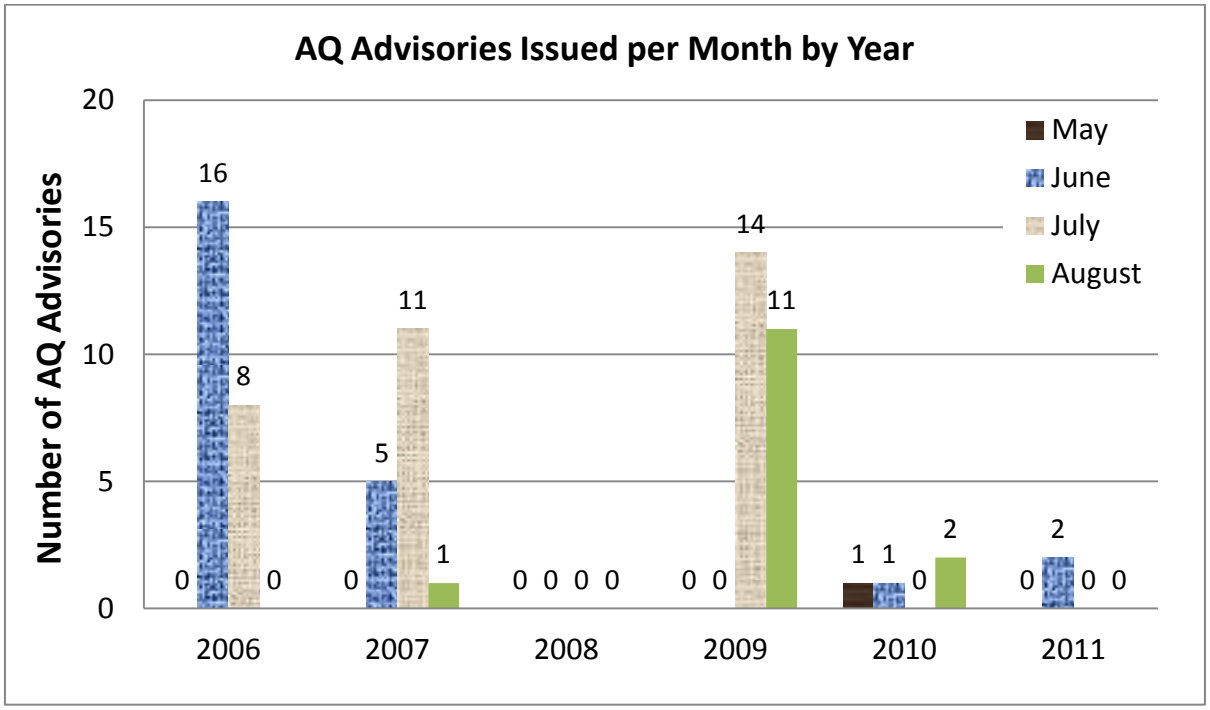
The Department of Environmental Conservation issues air quality (AQ) health advisories during times of widespread wildland fire smoke, windblown dust, volcanic ash, and high levels of wintertime particulate matter. The graph to the right portrays DEC AQ advisories issued for wildfire smoke during the 2006 through 2011 summer wildland fire seasons.



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

For the past 4 years, the acres burned appears correlated to the number of AQ advisories issued, i.e., less acreage burned led to fewer AQ advisories being issued. However, 2006 and 2007, with their lower burned acreages, indicate fire location, intensity, and wind direction also affect the need for AQ advisories.

Sometimes multiple air quality advisories may be issued on the same day for different areas of the state, and sometimes advisories are 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. Also, 2009 had four days when there were two advisories issued for different parts of the state, and three days when three separate advisories were issued compared to just one day of double issuance in 2006. In 2011, two AQ advisories were issued on two separate days during the summer wildfire season.



The above graph shows the number of air quality advisories issued by DEC per summer month. It can be seen that June 2006 was much smokier than June 2007 through 2011. Wildfire smoke advisories are most common from June through August, however early fire seasons do occur and can impact public health. In May 2010, a wildfire smoke AQ advisory was issued for the first, and so far only time.

The table below shows the estimated $PM_{2.5}$ emissions for the 2006 through 2011 willdfire 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

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 standard value of 35 $\mu g/m^3$ $PM_{2.5}$. In Alaska, fine particulate matter is measured with various monitors in the major cities of the state. Until 2009, most monitors ran on a 3-day schedule, i.e., the first day of the month, the 4th day of the month, the 7th day, etc., but in 2009, most of the monitoring sites had continous $PM_{2.5}$ monitors in place. The data in the chart below is from the 3-day data for 2006-2008, and the daily $PM_{2.5}$ data for 2009 through 2011. The data from 2009-2010 may show more exceedances of the $PM_{2.5}$ standard since every day was 'measured'. During the 2006–2008 seasons, using the data reported, only every 3rd day was 'measured' and it is possible some exceedances were missed.

The following chart shows the number of exceedances of the $PM_{2.5}$ standard as monitored in different areas of the state during the summer 2006 through 2011 wildfire seasons. Since most of the wildfires occur in the Interior, most of the exceedances also occur there.

$PM_{2.5}$ exceedances during the summer wildland fire season

May through September, FRM[1] $PM_{2.5}$, every 3-day data

			Air Quality Index (AQI) Categories[2]			
Year	$PM_{2.5}$ Monitor Location	# Exceedances	# Unhealthy for Sensitive Groups	# Unhealthy	# Very Unhealthy	# Hazardous
2006	Fairbanks	0	0	0	0	0
2006	Anchorage	0	0	0	0	0
2006	Butte	1	1	0	0	0
2006	Juneau	0	0	0	0	0
	Totals	1	1	0	0	0
2007	All	0	0	0	0	0
2008	All	0	0	0	0	0
2009[3]	Fairbanks	17	5	9	2	1
2009	Anchorage	0	0	0	0	0
2009	Wasilla	0	0	0	0	0
2009	Palmer	1	1	0	0	0
2009	Butte	1	1	0	0	0
2009	Juneau[4]	0	0	0	0	0
	Totals	19	7	9	2	1
2010	Fairbanks	2	2	0	0	0
2010	Other	0	0	0	0	0
	Totals	2	2	0	0	0
2011	All	0	0	0	0	0

[1] *Federal reference method (FRM)* means a method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in an appendix to 40 CFR Part 50

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

[3] Note: daily $PM_{2.5}$ data is shown for 2009, 2010, and 2011

[4] Juneau sampler not in operation during July 2009 and the first half of August 2009

The previous chart also shows the number of days an Air Quality Index Category was reported. The information below explains the Air Quality Index and describes its reporting categories.

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

The AQI tells how clean or polluted the air is, and what associated health effects might be a concern. The AQI focuses on health effects likelly 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.[5]

In Alaska, the primary pollutant of concern with wildfires is Particulate Matter (PM). Fine particulate matter ($PM_{2.5}$) 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 Fairbanks North Star Borough website, which relates the AQI Categories and Cautionary Statements to actual levels of $PM_{2.5}$.[6]

Air Quality Index (AQI) information; particulate levels from the Fairbanks North Star Borough chart.

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 15.4
Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	15.5 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 250.5

[5] EPA website: http://www.airnow.gov/index.cfm?action=aqibasics.aqi
[6] Fairbanks North Star Borough website: http://co.fairbanks.ak.us/airquality/