

Air Quality, Smoke and Particulate Matter in the Cowichan Valley

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Outline

- Background on Fine Particulates
 - What are they?
- Sources of Fine Particulate air pollution
- Health impacts
- Existing air and health monitoring in the airshed
- Tools for air quality improvement
- Questions

Relationship Between Air Quality and Health Outcomes

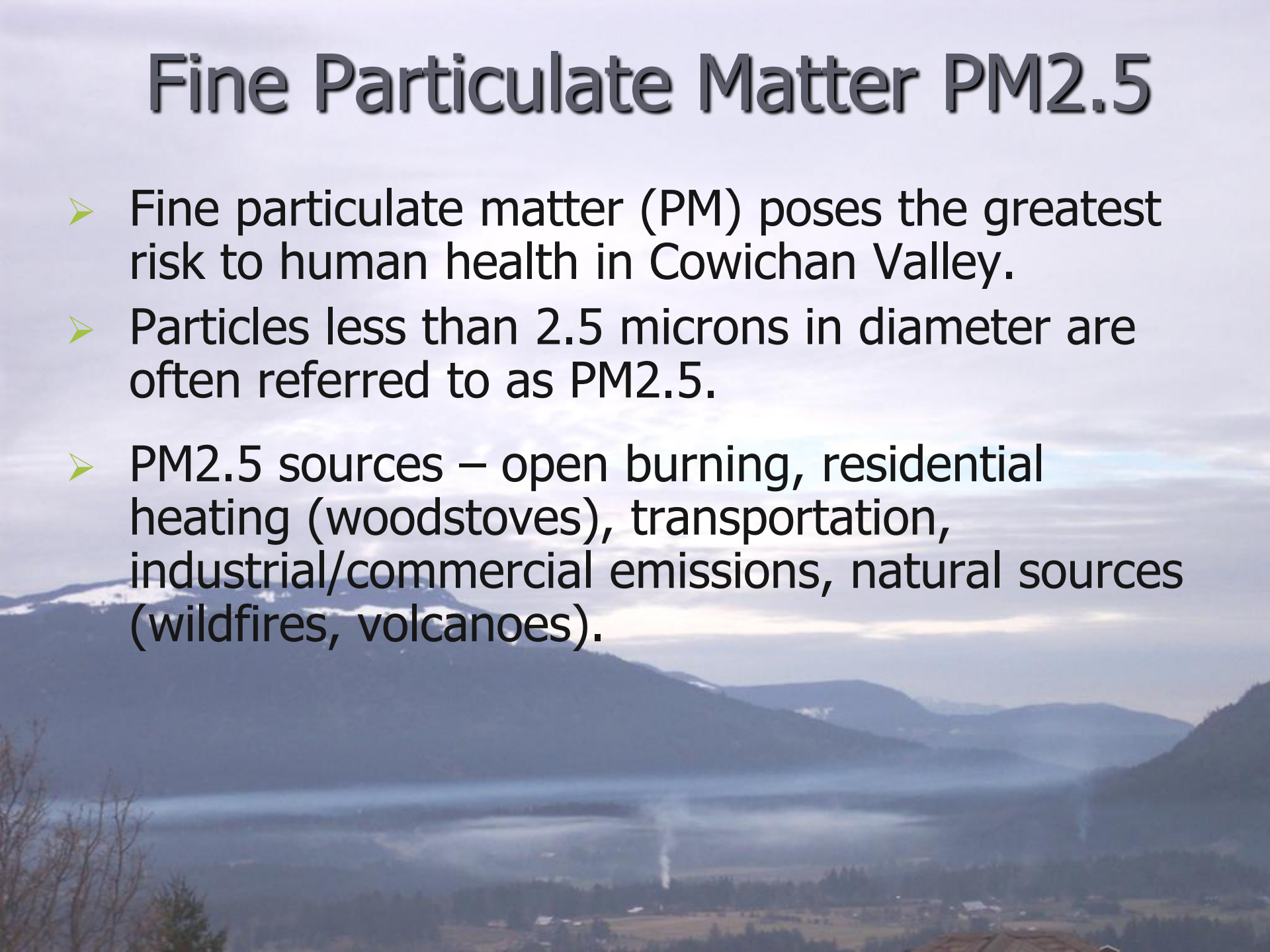
Health Outcomes



Air Quality Units

Fine Particulate Matter PM_{2.5}

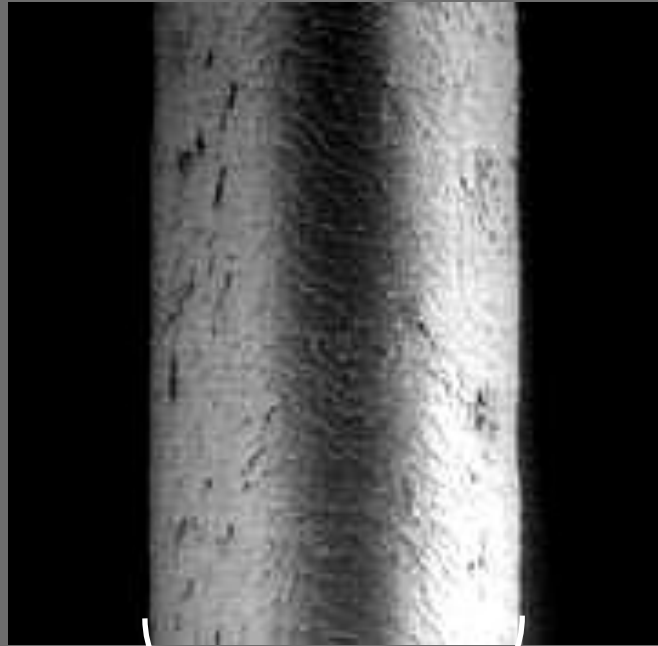
- Fine particulate matter (PM) poses the greatest risk to human health in Cowichan Valley.
- Particles less than 2.5 microns in diameter are often referred to as PM_{2.5}.
- PM_{2.5} sources – open burning, residential heating (woodstoves), transportation, industrial/commercial emissions, natural sources (wildfires, volcanoes).



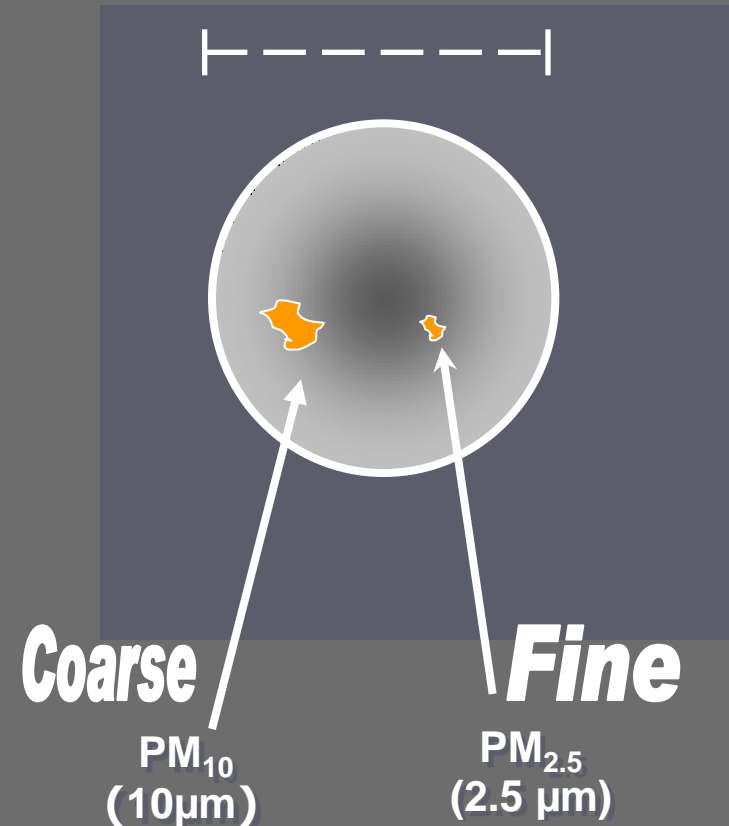
What are Fine Particulates and how big are they?

Particulate Matter, PM are a complex mixture of extremely small solids and liquid droplets

Hair cross section ($70\text{ }\mu\text{m}$)



Human Hair ($70\text{ }\mu\text{m}$ diameter)





Neighbourhood Level PM

- Where a pollutant is released is as important as how much is released
- Cumulative impacts
- Smoke from back-yard burning and wood stoves is released right where people live, work and play.

Health Impact Synopsis

- Air pollution causes both short term and long term affects to health.
- Most studies have looked at short term impacts.
- Long term impacts may be even greater.
- While toxicology looks at single pollutant impacts, real life effects involve exposure to multiple pollutants at the same time.

Major Health Impacts

- Heart problems
 - Half of air pollution deaths are due to cardiac problems – the hidden killer.
 - Increased heart attacks, angina, heart failure, cardiac arrhythmias.
- Breathing problems
 - Worsening of COPD.
 - Exacerbation of asthma.
 - Reduced lung function.
 - Children's and adult respiratory hospital admissions.

Other Health Impacts

- Associated increases in:
 - Lung cancer
 - Chronic heart disease
 - Atherosclerosis (hardening of the arteries)
 - Lung function
 - Development of asthma in children
 - Low birth weight babies
 - Ear infections
 - Increased respiratory and cardiac medication use

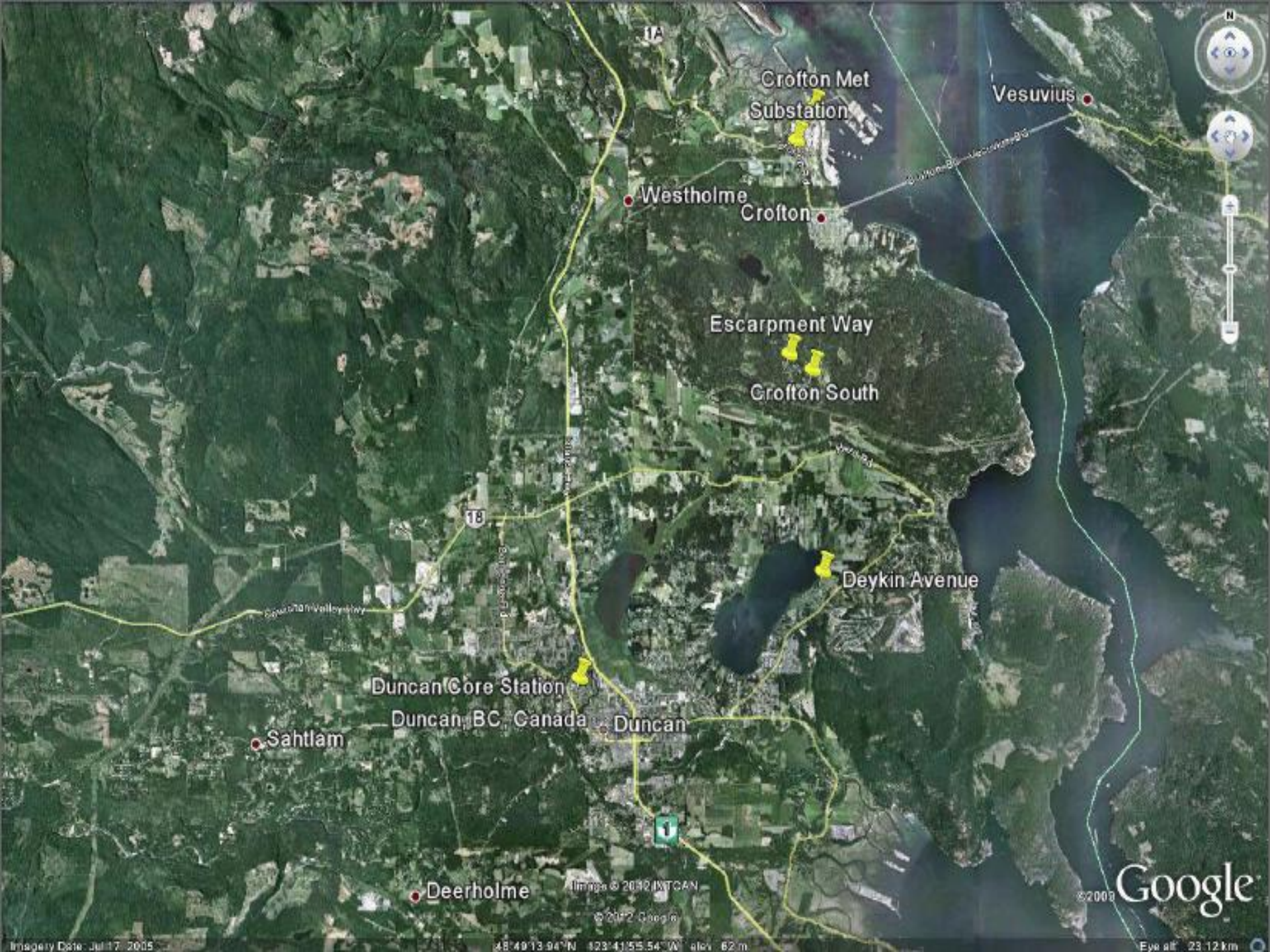
Health Effects of Smoke

- Eye and respiratory tract irritation.
- Reduced lung function, bronchitis, exacerbation of asthma and premature death.
- Increased mortality and aggravation of pre-existing respiratory and cardiovascular disease.
- As respiratory irritants can cause persistent cough, phlegm, wheezing and difficulty breathing.
- In healthy people respiratory symptoms, transient reductions in lung function and pulmonary inflammation.
- Affect the body's immune system and the physiological mechanisms that remove inhaled foreign materials from the lungs, such as pollen and bacteria.

Who Is At Greatest Risk?

- All persons may develop symptoms with exposure
- 40% of the population are considered at increased risk.
 - Unborn fetuses
 - Pre-pubescent youth, the younger the more sensitive
 - Persons over 65
 - Persons with chronic heart and lung disease
 - Up to 14% of population have asthma
 - Smokers
 - Persons living in lower quality housing conditions
 - Proximity to industry, poorer indoor air quality
 - Some chronic diseases: diabetes, rheumatoid illnesses

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Crofton Met
Substation

Vesuvius

Westholme

Crofton

Escarpment Way

Crofton South

Deykin Avenue

Duncan Core Station

Duncan BC Canada
Duncan

Sahtlam

Deerholme

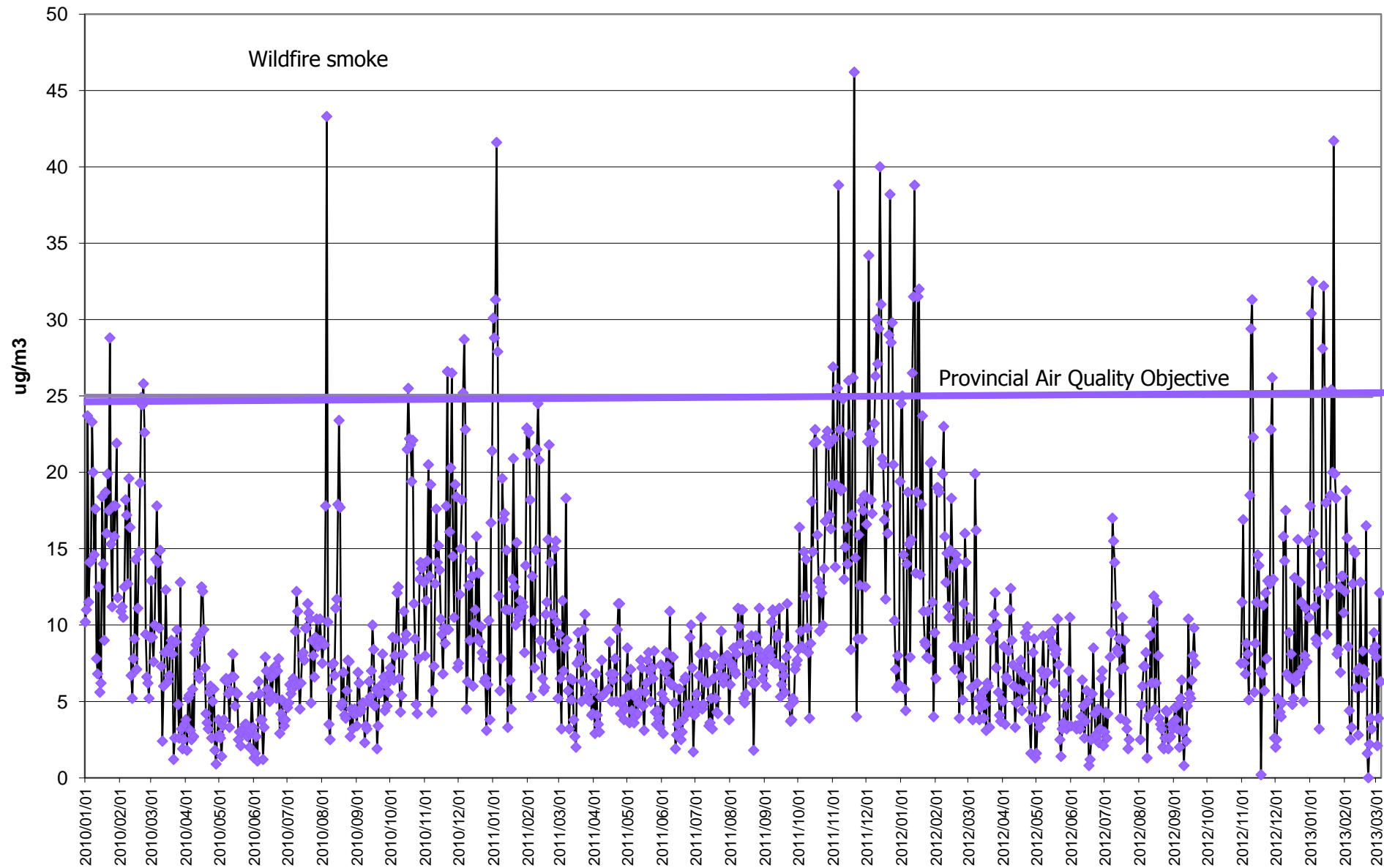
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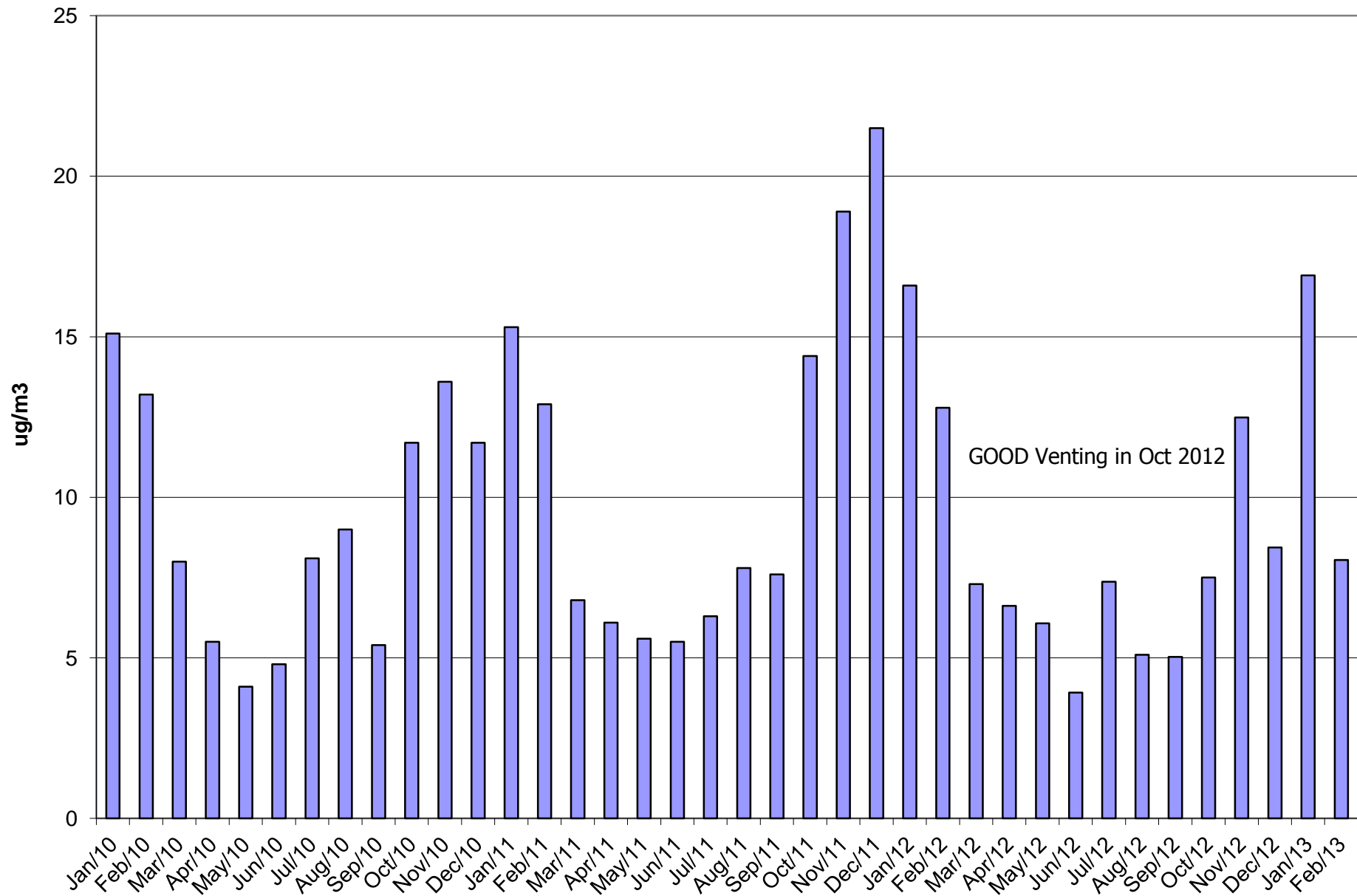


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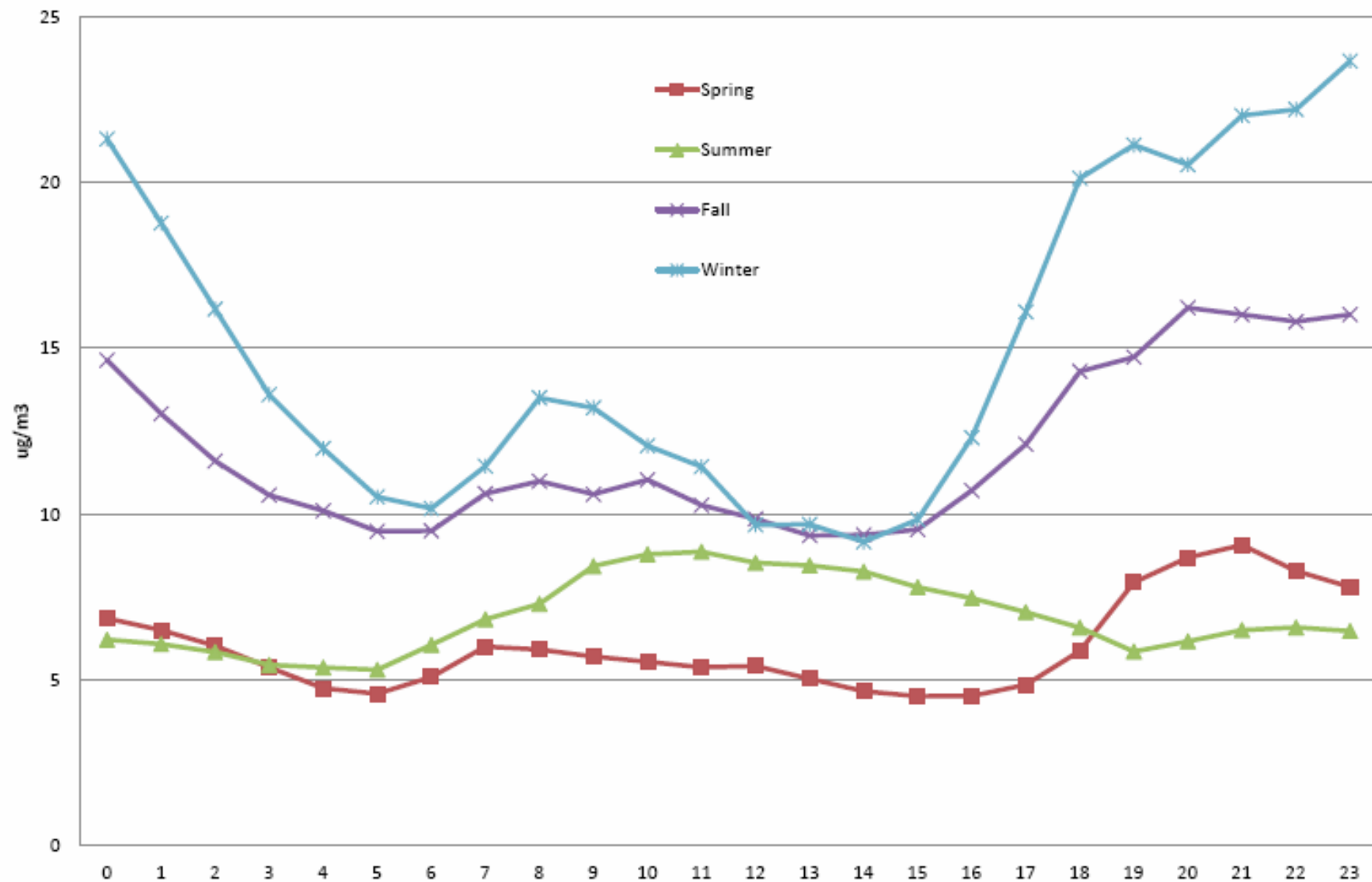
Daily PM2.5 Concentrations at Duncan Cairnsmore January 2010 - February 2013



Monthly Average PM2.5 from Duncan Cairnsmore 2010 - 2013



Hour of Day PM2.5 Concentrations by Season for 2010 & 2011 Data at Duncan Cairnsmore









Annual Data Summary Duncan Cairnsmore

Year	Annual Average	Annual 98th Percentile of Daily Values	Max Daily Value	Daily Values >25ug/m3	% of Time >25 ug/m3
2010	9.2 ug/m3	25.1 ug/m3	43.3 ug/m3	8	2.2
2011	10.8 ug/m3	30.8 ug/m3	46.2 ug/m3	22	6.1
2012	8.5 ug/m3	26.4 ug/m3	38.8 ug/m3	8	2.6

Provincial Air Quality Objectives for PM2.5:

- 8 ug/m3 – Annual
- 6 ug/m3 – Annual Planning Goal
- 25 ug/m3 – 98th percentile annually

Smoke as a Proportion of Fine Particle Emissions

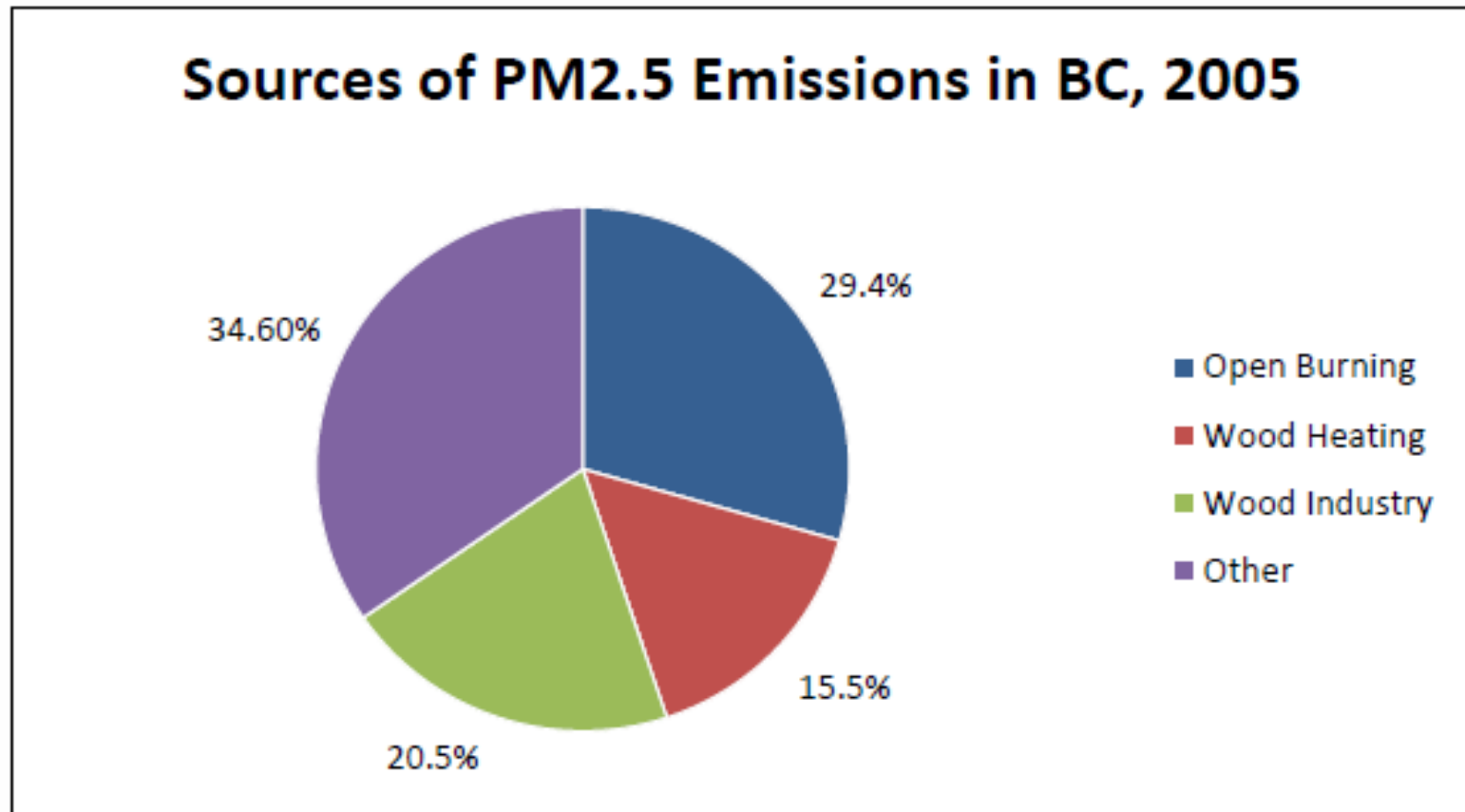


Figure 1: Percentage contribution to PM_{2.5} emissions from different sources in BC in 2005. Percentage contributions exclude natural sources and road dust. (Source: BC Ministry of Healthy Living and Sport, Population and Public Health, 2009)

Measuring the Impact



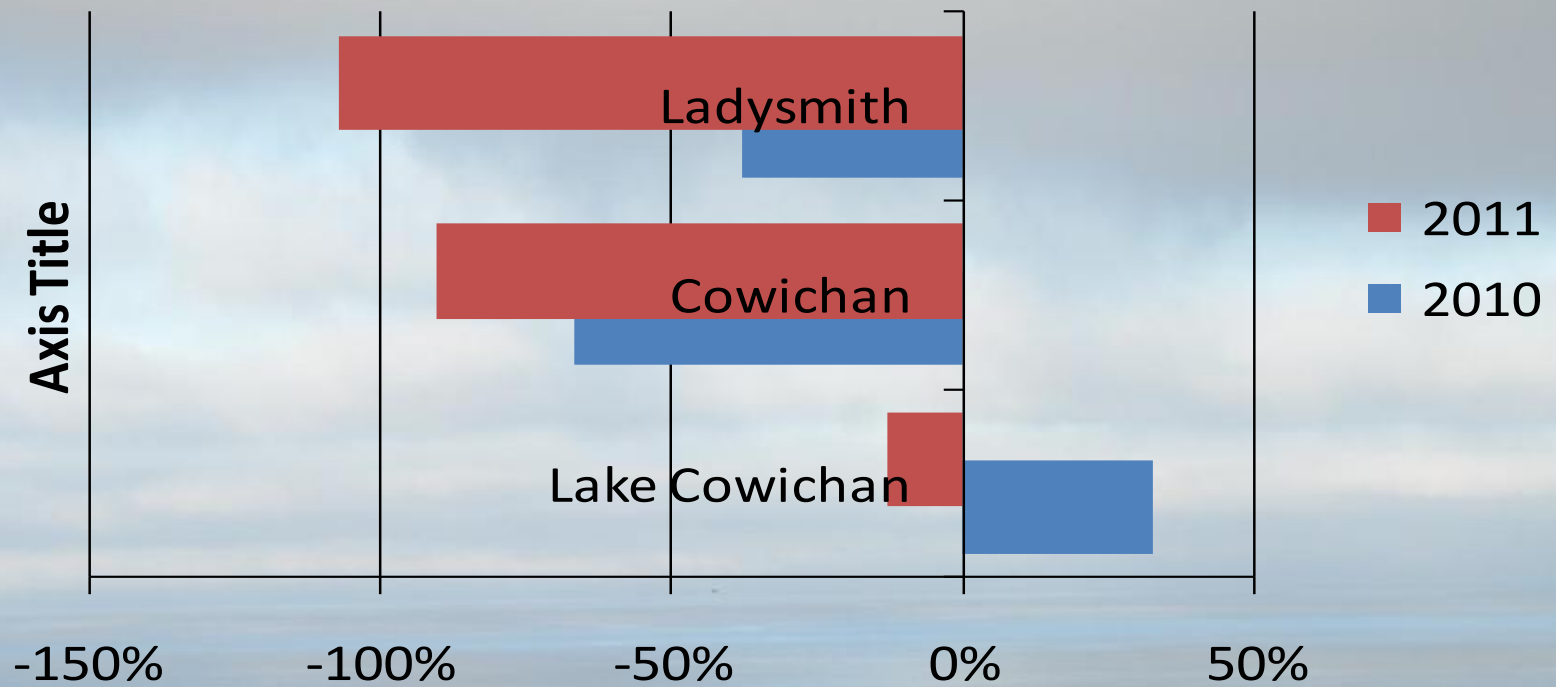
- The past decade has seen a plethora of new scientific studies that confirm and build on the health impacts of smoke, fine particulates and cumulative air pollution.
- Event based monitoring of smoke events has occurred relative to large exposure scenarios – there is a need to have a large population exposed and trackable health outcomes.
- Measuring impacts at small population levels or short time durations is difficult.

Cowichan Valley Respiratory Indicators

- COPD in the community
 - 2723 persons
 - 3.3% of the population
- COPD as driver on hospital services
 - 209 cases admitted, 1.4% of admissions
 - 1786 hospital days, 3.1% of hospital days

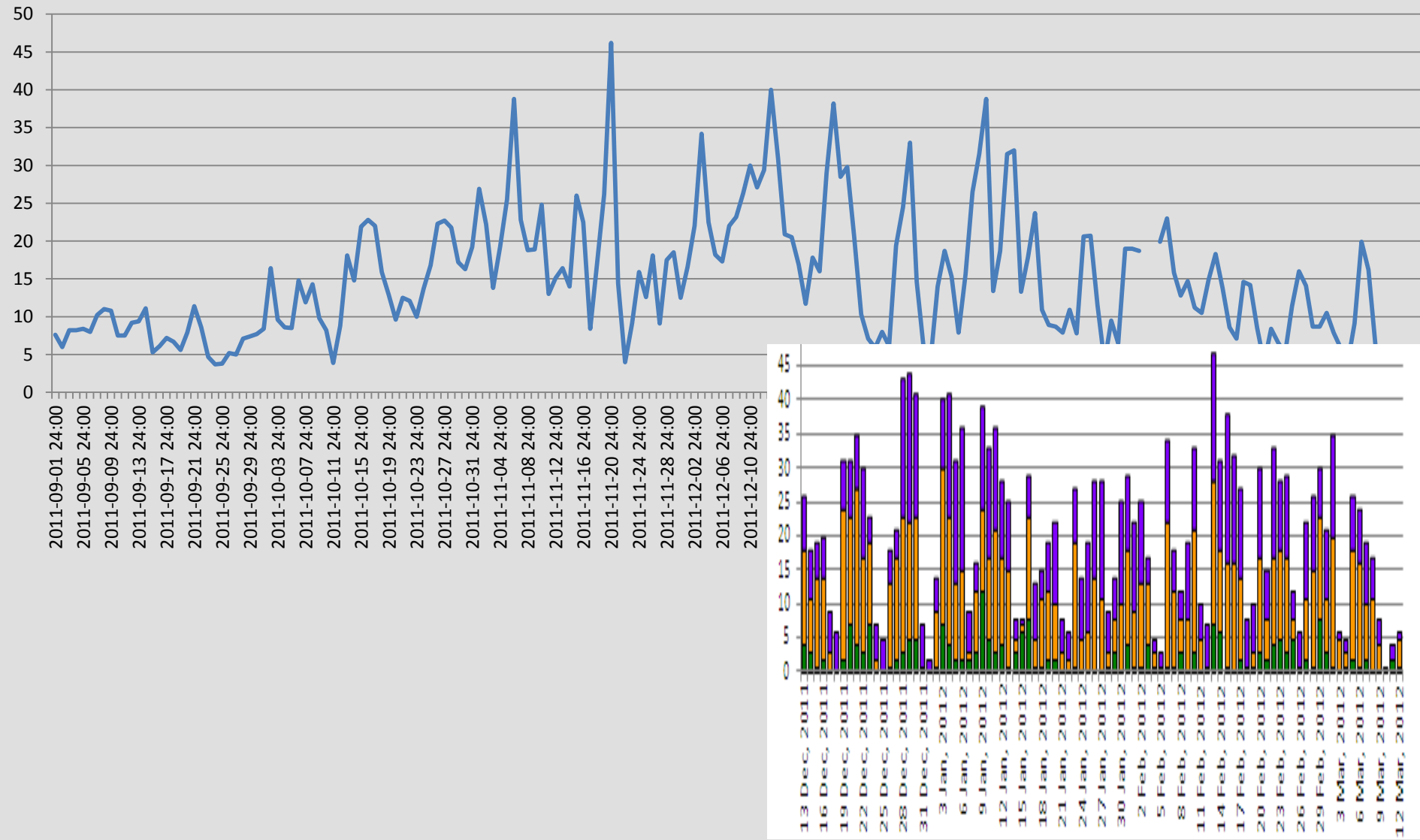
Child Respiratory Disease Admissions

(per 1000 children 0-14)



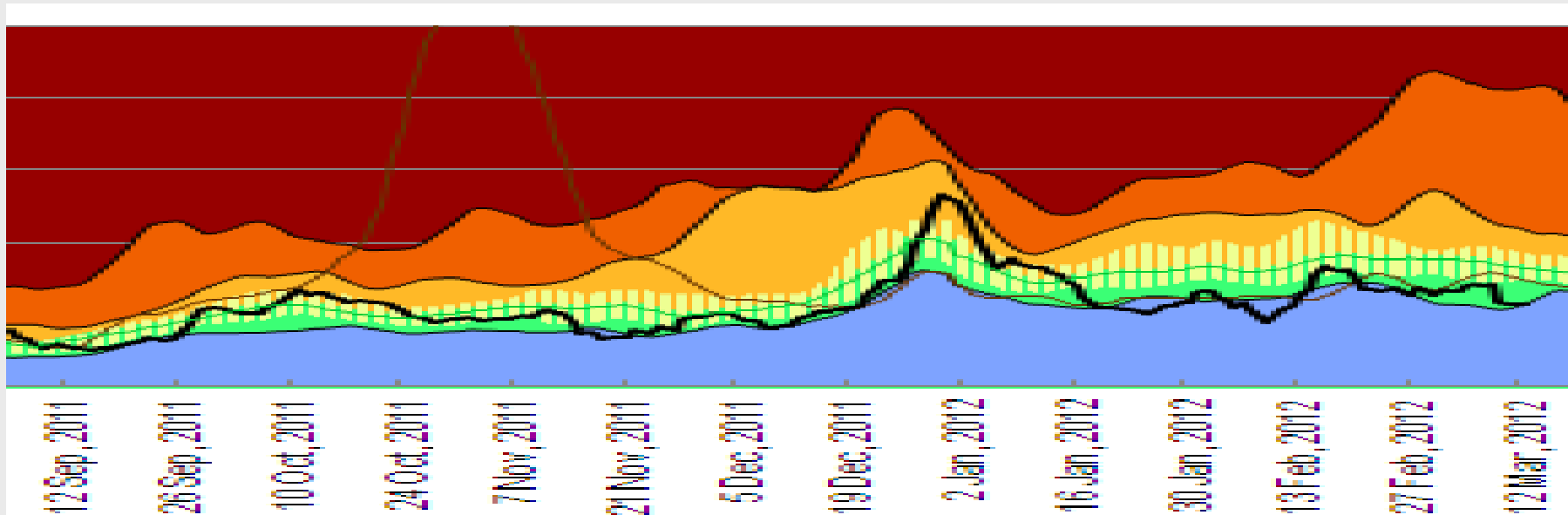
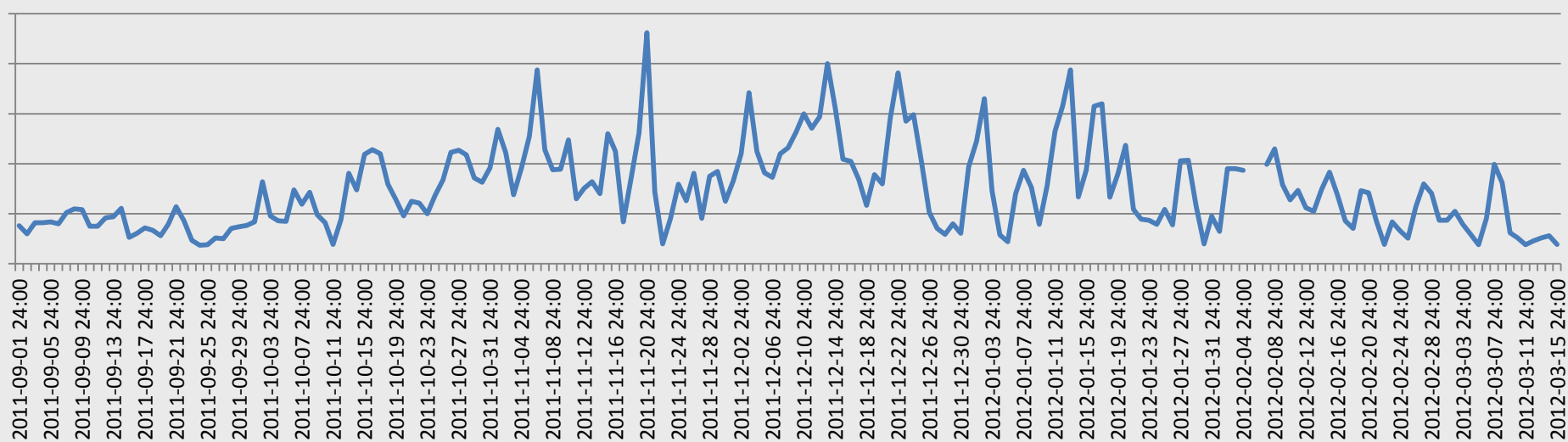
Cowichan Valley Specific Information – Winter 2011-2012

Cowichan PM Daily Maximum



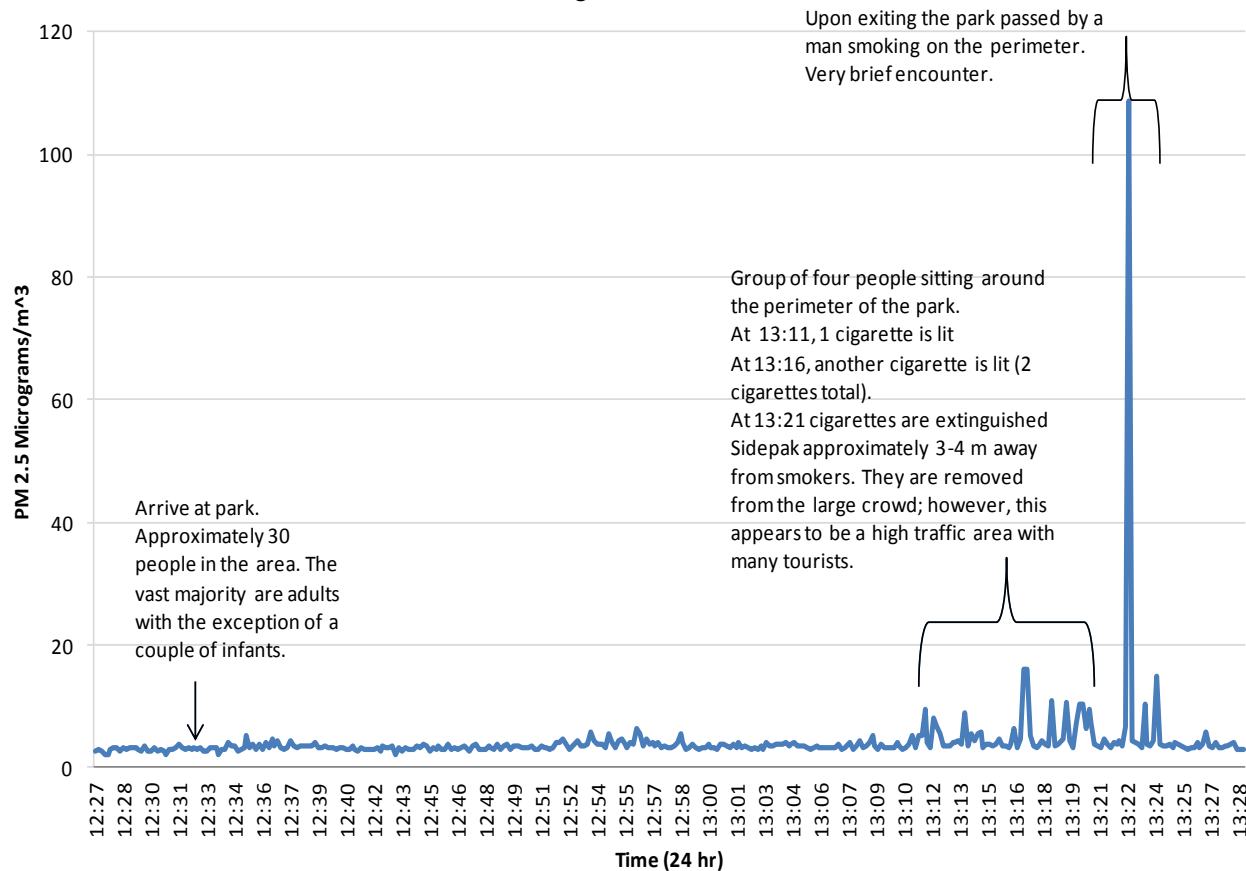
Cowichan Valley Specific Information – Winter 2011-2012

Proportion of all Medical Service Planning Billing
Cowichan PM Daily Maximum



Charles Hoey Park, Duncan

Levels of PM 2.5 at Charles Hoey Park, Duncan
August 2, 2012



Temperature (°C)	Wind Speed (Km/hr)	Average PM2.5 (µg/m ³)	Peak PM2.5 (µg/m ³)
23.4	9	4.1	108.8

Summary

- The better the air quality, the fewer the health problems both in the short term and long term.
- Cowichan has exceeded provincial air quality objectives for both daily maximums and annual average for past 3 years.
- Outdoor burning and wood heating contribute ~45% of the fine particles generated in the province.
- Better air quality is a continuous improvement activity and incremental steps should be supported.

Local Government Air Quality Actions

- Airshed Management Planning
- Provincial Wood-stove Exchange program
- Public Education (A Healthier You, www.airqualitybc.ca, link with bylaw changes)
- Access to organic disposal through chipping or composting.
- Curbside pick up or free drop off of backyard wastes.
- Absolute preclusion on burning of garbage
- Policies to limit burning of organic material
 - Provincial regulation changes OBSCR – will not address backyard burning.
- Policies to limit transportation related emissions
 - Idling reduction, drive throughs, public transportation, planning decisions.

A Healthier You



Family Meals
Help Children
Succeed p27

VING



When Seniors
Need Help p23

Nurse Practitioner
A Growing Force p20

Meet V.I.H.A. Staffer
Steve Sowithul' baw p4



Air Quality and Your Health: Making the Air We Breathe as Clean as Possible

We often take the air we breathe for granted. We're fortunate to have mostly good air quality across V.I.H.A.'s region. As air quality improves, health problems decrease. And while we have seen progress in improving air quality, more can still be done.

Poor air quality is associated with making asthma worse and causing eye and throat irritation. People with breath-

ing problems like chronic obstructive pulmonary disease (COPD) may find their symptoms worsen. Poor air quality also causes heart problems along with a number of other short- and long-term health issues.

Large industrial smokestacks are often thought of as the most obvious source of pollutants. However, we are increasingly challenged by other sources. These sources of pollution are often caused by us as individuals, usually through transportation and burning.

Burning waste (whether garbage or tree, yard, garden or agricultural waste) produces considerable smoke that can cause health problems. Wood used for cooking and heating, if not properly dried and then burned in a modern emissions certified device, contributes to poor air quality in some parts of our region. There are times when the impact of so many people burning for heat or waste disposal reduces the air quality to the point where it doesn't meet B.C. air quality objectives.

Vehicle use (land, water or air) also adds to local and regional air quality degradation. While you might think that what you do doesn't make much of a difference, the total impact of our increasing population is leading to problems. The solution lies in the actions of both the individual and the community. Here's what you can do:

Think about ways to reduce vehicle use (land, water or air) also adds to local and regional air quality degradation. While you might think that what you do doesn't make much of a difference, the total impact of our increasing population is leading to problems. The solution lies in the actions of both the individual and the community. Here's what you can do:

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As air quality improves health problems decrease.

Addressing Burning Specifically

- Bylaw development for Wood-burning appliances and for back-yard burning.
 - Model bylaw available from MOE
 - AQ bylaw inventory available for Province and for Vancouver Island.
- Eliminate or limit residential backyard burning
- Healthy best practice policy for agricultural burning – link to OBSCR enactment
- Best practice adoption for woodburning appliances
- Reducing outdoor exposure to tobacco smoke



← Less of this

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Discussion/Questions?

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More of this! →

