Comox Valley REGIONAL DISTRICT

Staff Report

DATE: May 4, 2022

FILE: 5280-15

TO: Chair and Directors
Regional District Board

Supported by Russell Dyson
Chief Administrative Officer

R. Dyson

FROM: Russell Dyson
Chief Administrative Officer

RE: **Wood Smoke Reduction Strategy**

Purpose

To present to the Wood Smoke Reduction Strategy developed through the Airshed Roundtable process and to recommend implementation of the Strategy.

Recommendation from the Chief Administrative Officer:

THAT the Comox Valley Regional District Board send letters to the member municipalities encouraging them to utilize the Comox Valley Wood Smoke Reduction Strategy, attached as Appendix A to report dated May 4, 2022, as a resource to guide local government action on reducing fine particulate matter ($PM_{2.5}$) generated through wood burning;

AND FURTHER THAT the Comox Valley Regional District Board authorize staff to begin the implementation of actions related to Goal 3 of the Wood Smoke Reduction Strategy, attached as Appendix A to report dated May 4, 2022, to Educate and involve the community in understanding and reducing the impact of wood smoke starting with development of a public webinar series;

AND FINALLY THAT staff be authorized to continue collaboration with the member municipalities to identify opportunities for coordinated action to reduce fine particulate matter generated through wood burning.

Executive Summary

- The Wood Smoke Reduction Strategy (Strategy) attached as Appendix A, was developed by staff working with the Steering Committee and Airshed Roundtable (Roundtable) following a two year process. The Roundtable did not achieve consensus on the Strategy, however, staff suggests that the document provides foundational direction for local initiatives to improve air quality by reducing wood smoke. Wood smoke emerged as the main focus area for the Roundtable (e.g. versus other sources of fine particulate matter).
- The Strategy recommends six main actions that will help focus local government resources to reduce wood smoke and its negative health impacts in the Comox Valley.
- Staff is proposing the implementation of actions related to Goal 3 of the Strategy to: Educate and involve the community in understanding the impacts of wood smoke as listed in the Background Section A, including a Kick-Off Public Webinar in June 2022.

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Government and Community Interests Distribution (Upon Agenda Publication)

City of Courtenay	✔
Town of Comox	✔
Village of Cumberland	✔
K'ómoks First Nation	✔
Airshed Roundtable	✔

Background/Current Situation

The Board identified improving air quality as a strategic priority and as a key initiative under the Regional Growth Strategy (RGS) Service. The Wood Smoke Reduction Strategy was developed through the engagement of the Regional Airshed Roundtable. The Roundtable was envisioned as a three-year collaborative approach established following the direction of the board to tackle regional air quality. The intent was to bring together a range of perspectives with the hope that through facilitation and by establishing a clear purpose (i.e. reduce fine particulate matter), trust would be fostered and collaboration among the Roundtable members could occur to help chart a strategy or plan for action. As such, the Roundtable is broadly represented by community members, non-profit organizations and local industry. The Steering Committee (also members of the Roundtable) was convened as an expert panel to lend support to the collaborative process. The initial Roundtable meetings focused on local air quality issues and the development of the Vision and three Goals that provided a foundation for the Action Plan. Subsequent meetings mostly made of smaller working groups identified many of the actions that developed the Action Plan of the Strategy.

The key themes that emerged through the Roundtable process were concern for wood smoke pollution and a need for education. Wood smoke was identified as the main source and pollutant of concern affecting the health of residents. Also the need for public awareness and clarity on local air quality issues (e.g. jurisdiction and tools) and initiatives (e.g. wood stove rebate program) became clear in discussion with the Roundtable. Air quality remains a challenging issue, with divergent, often competing opinions on how to address the behavioral changes that are necessary to reduce $PM_{2.5}$ from wood burning. The Roundtable process did not resolve the contention nor did it result in moving all participants away from deeply entrenched positions. Staff suggests that this shows that there is no "one size fits all" solution to reduce $PM_{2.5}$ across the region, rather approaches should aim to be collaborative, supporting behavior change over time versus actions that may be regarded as punitive. Staff further suggest that a reliance on good data, public health policy, and education are key ingredients to reduce $PM_{2.5}$ in the Comox Valley. This latter idea emerged from the Roundtable working groups. Three different working groups met three times to explore actions to implement Goal 1, being:

Achieve measurable reductions in $PM_{2.5}$ to protect public health. The three working groups explored the following areas:

- Working Group 1: Reduce emissions from existing residential wood burning appliances.
- Working Group 2: Transition away from biomass systems in populated areas
- Working Group 3: Eliminate the burning of yard waste in residential neighbourhoods

The Strategy incorporates suggested actions to help improve regional air quality primarily focused on reducing wood smoke. Reduction of other air pollutants could be the subject of future work, in partnership with Steering Committee representatives. Staff have summarized and prioritized key actions to provide implementation focus for local governments and partnerships addressing community wood smoke pollution. The key prioritized actions are:

- Action 1B: Develop targeted strategies to enhance cleaner burning education.
- Action 3E: Develop educational materials and messages to minimize smoke for recreational fires.
- Action 6A: Align education and communication initiatives from the Wood Smoke Reduction Program with the Action Plan.
- Action 6B: Identify and incorporate creative and collaborative educational campaigns.
- Action 6C: Plan and implement educational events, courses and webinars.

Options

The following options are available to the board:

1. Proceed with staff recommendations to begin the implementation of the Strategy by undertaking the actions that support Goal 3 to educate and involve the community in understanding and reducing the impact of air pollution.
2. Provide staff with alternate directions for implementation of the Strategy.

Staff recommends option 1.

Financial Factors

The Wood Smoke Reduction Strategy was developed through the Airshed Roundtable project. The project is housed under the RGS service. Undertaking the work within the RGS service has enabled a regional approach to a regional issue. To date, the project has been funded through RGS tax requisition ($30,000 in each of 2020, 2021 and 2022) and grant funding from Island Health's Community Wellness program ($20,000 in 2021). This funding has covered the costs of the air quality coordinator (Years 1 and 2) and the preparation of the Strategy. The 2022 RGS budget includes funding for implementation. Staff suggests that some implementation actions can be reasonably undertaken within the RGS service (e.g. actions focused on data collection, community outreach, and regional policy development); other actions may require a specific jurisdictional focus (e.g. regulatory bylaw development).

Strategic Considerations: Strategic Drivers and Regional Growth Strategy

CVRD Board Strategic Drivers:							
Fiscal Responsibility		Climate Crisis and Environmental Stewardship and Protection	✔	Community Partnerships	✔	Indigenous Relations	

Air Quality was identified as a Strategic Priority in 2019 which formed the basis for the development of the Roundtable. The Strategy responds to the CVRD Strategic Drivers by improving air quality through community partnerships for the health and well-being of community members.

CVRD Regional Growth Strategy Goals:							
Housing	✔	Ecosystems, Natural Areas and Parks	✔	Local economic development		Transportation	

Infrastructure	✔	Food Systems		Public Health & Safety	✔	Climate Change	

Clean air is fundamental to human life and healthy ecosystems. The RGS vision statement is impossible to achieve without clean air:

"…As stewards of the environment, local governments, the K'ómoks First Nation, public agencies, residents, businesses and community and non-governmental organizations will work collaboratively to conserve and enhance land, water and energy resources and ensure a vibrant local economy and productive working landscapes."

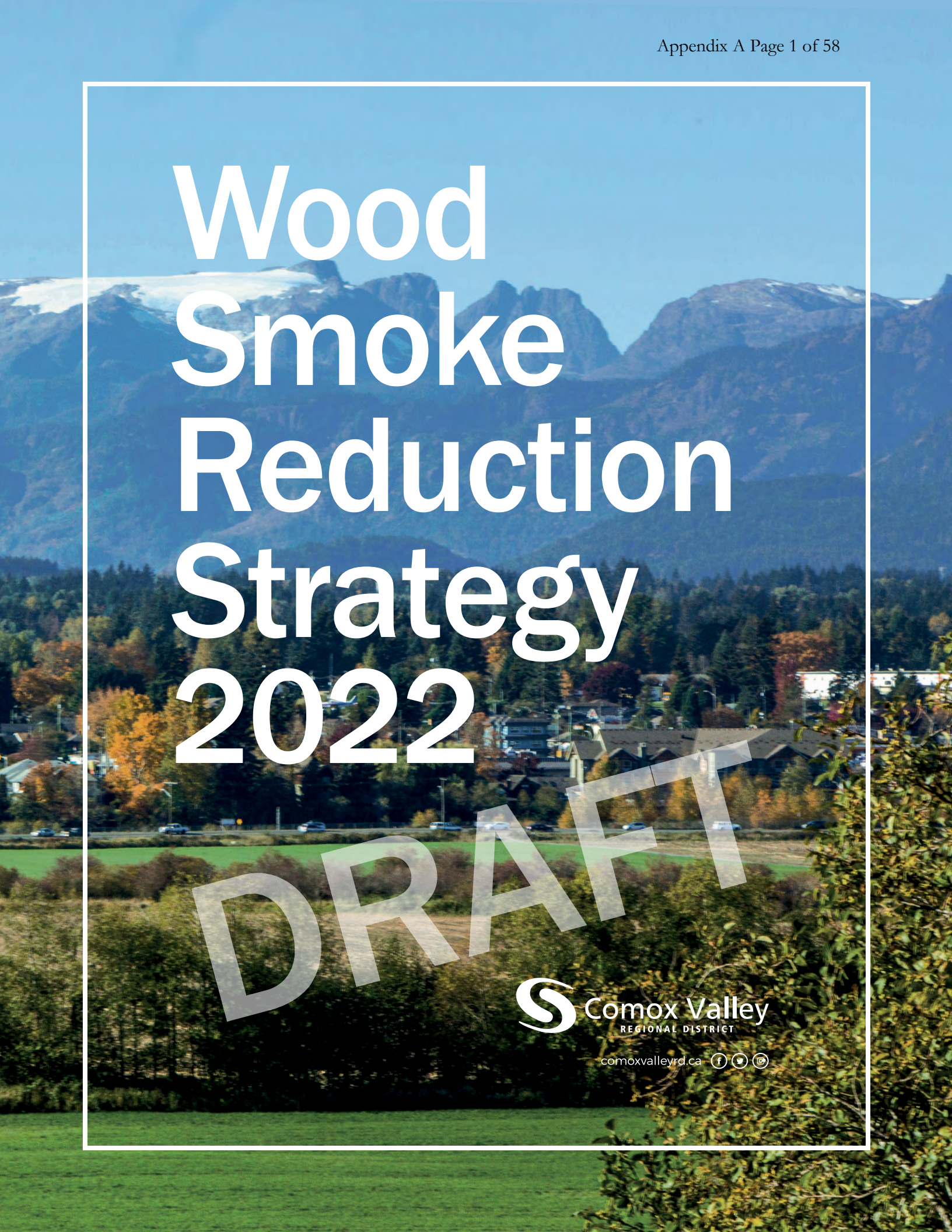
Clean air also relates to supporting a high quality of life through the protection and enhancement of community health, safety and well-being (Goal 7: Public Health and Safety) and protecting, stewarding and enhancing the natural environment and ecological connections and systems (Goal 2: Ecosystems, Natural Areas, and Parks).

Intergovernmental Factors
The Strategy was developed through the Roundtable process and is a regional initiative. CVRD staff convened the process, with facilitation by the air quality coordinator. The membership of the Steering Committee and Roundtable includes local government staff and representatives of provincial agencies and ministries such as Island Health, the Ministry of Environment and Climate Change Strategy, and the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (now the Ministry of Forests and the Ministry of Land, Water and Resource Stewardship). The proposed webinar series (discussed further below) will seek continued participation of these agencies and ministries as subject matter experts on topics such as public health and air quality monitoring

Citizen/Public Relations
The Roundtable membership includes members of the general public appointed by the board (three electoral area residents and three municipal residents). To date, consultation efforts have focused on the Roundtable. If the board supports staff's recommendation to begin implementation of the Strategy, staff proposes to kick off its introduction to the broad public with a webinar series, the first webinar proposed for late June 2022. The webinar series will be outlined in a comprehensive communications plan focused on Goal 3: "Educate and involve the community in understanding and reducing the impacts of air pollution". Staff will enlist the support of the Steering Committee to design webinar content. For example, staff has confirmed Island Health staff's support for a "wood smoke and health impacts" focused session in Fall 2022. The webinar series will land primarily on the 'inform' end of the IAP2 spectrum of engagement as staff seek to help residents understand the health impacts of wood burning, options for 'smarter' burning, as well as alternatives (i.e. cross promotion with Clean BC rebates). Information about the webinar series will be posted to the CVRD website, e-mailed to the Roundtable, and advertised in the newspaper.

The Roundtable project was developed as a three year initiative. 2022 is year three and is intended to focus on implementation. Staff do not propose any further engagement with the broader Roundtable membership and will close out the process with members. All material produced and considered by the Roundtable, as well as related staff reports, are included on the CVRD's Airshed Roundtable webpage. As discussed above, staff will continue to engage the Steering Committee as needed to help implement the Strategy.

Attachment: Appendix A – Draft Wood Smoke Reduction Strategy 2022



Wood Smoke Reduction Strategy 2022

DRAFT

Comox Valley
REGIONAL DISTRICT

comoxvalleyrd.ca

Acknowledgements

The Wood Smoke Reduction Strategy (Strategy) was developed by the Comox Valley Regional District with the support of member municipalities. The Strategy was developed to provide direction on actions to reduce the impacts of wood smoke in the region. The Comox Valley Regional Airshed Roundtable was engaged to develop a shared understanding of the air quality issue and help identify areas of prioritization. There were various areas of agreement as well as strongly held positions by the Roundtable members. Not all actions were unanimously supported by the Roundtable, however the Strategy reflects various contributions from the Roundtable process and provides direction for many groups and individuals to be a part of reducing wood smoke. The development of this Strategy would not have been possible without the time of representatives from member municipalities, the Airshed Roundtable and Roundtable Steering Committee.

Steering Committee (Also Roundtable Members)

- *Island Health*
- *Vancouver Island University*
- *Ministry of Forests, Lands, Natural Resource Operations and Rural Development*
- *City of Courtenay*
- *Village of Cumberland*
- *Town of Comox*
- *BC Ministry of Environment and Climate Change Strategy (BC ENV)*

Roundtable Members

- *Comox Valley Chamber of Commerce*
- *Elemental Energy Assessment*
- *Elemental Energy Advisors*
- *Focused Energy Assessment*
- *Comox Valley Farmers Institute*
- *Breathe Clean Air Comox Valley*
- *Mid Island Farmers Institute*
- *Hearth Patio and Barbeque Association*
- *Cumberland Community Forest Society*
- *Comox Valley Nurses for Health and the Environment*
- *Manulife Investment Management*
- *Comox Valley Community Health Network*
- *Residents from each municipality and electoral area*

Executive Summary

The *Wood Smoke Reduction Strategy (Strategy)* was developed by the Comox Valley Regional District through the engagement of the Regional Airshed Roundtable (Roundtable). The Strategy provides a foundation for actions that can be undertaken to reduce community wood smoke impacts. The Roundtable was established following the direction of the Comox Valley Regional District Board (CVRD) to create a collaborative framework for improving air quality in the region. The Roundtable was engaged between 2020 and 2021 to provide a shared understanding of addressing air quality in the valley and the complexity involved. The Roundtable meetings were coordinated by Pinna Sustainability and a key finding in this engagement was the prioritization and focus on wood smoke pollution in the region.

Wood Smoke in the Comox Valley

Fine particulate matter ($PM_{2.5}$) has been identified as the pollutant with the greatest cause of concern for human health in the Comox Valley. The largest source of $PM_{2.5}$ in the Comox Valley is wood burning (indoor and outdoor). Reducing $PM_{2.5}$ is the most effective way to address the health impacts from air pollution in the Comox Valley. There is no safe level of $PM_{2.5}$ and wood burning has tragic implications on health.

Air quality in the Comox Valley is concerning especially during the fall and winter seasons when $PM_{2.5}$ levels regularly exceed provincial and national standards. Local efforts to reduce wood smoke have been spearheaded by the province, health authority, local governments and community groups. Efforts to date include bylaw amendments, incentive programs, education and outreach. Despite these efforts, the Comox Valley remains one of the lowest ranked communities for air quality in the Province.

> "The issue of how to improve air quality in the Comox Valley is a complex one. It is for this reason that the CVRD brought together a large diversity of voices to the Roundtable."
>
> – **Roundtable Member**

The Roundtable is a recent initiative tackling the issue of regional air quality through the development of this strategy. The guiding principles, vision and goals developed through the Roundtable are summarized in the following section.

Vision

The Comox Valley has clean and healthy air all year round, for current and future generations.

Guiding Principles

Health Protection: Work together to ensure the best air possible for all residents in all areas of the Valley.

Accessibility: Improve access to actions, programs and investments that help clean our air.

Innovative and evidence-based approaches: Use the best available science, evidence and practice to implement innovative approaches to achieve our vision. Continually assess the effectiveness of these approaches.

Minimizing contributions to climate change: Climate change is linked to air quality and the health and well-being of the region. Focus on minimizing both air pollution and greenhouse gas emissions where possible, to support our regional targets to reduce GHG emissions.

Goals

1. **Achieve measureable reductions** in fine particulate matter levels to protect public health.
2. **Continually improve** and expand knowledge of sources and impacts of air pollution.
3. **Educate and involve** the community in understanding and reducing the impacts of air pollution and the links to climate change.

The Strategy's Action Plan consists of the following six main actions.

1	**Reduce emissions from existing wood burning appliances**
2	**Transition away from using wood burning appliances, prioritizing densely populated areas**
3	**Reduce emissions from recreational fires and eliminate yard waste burning**
4	**Promote and advocate for alternatives to non-residential open burning**
5	**Expand $PM_{2.5}$ data research and collection to inform actions**
6	**Expand wood smoke education programs**

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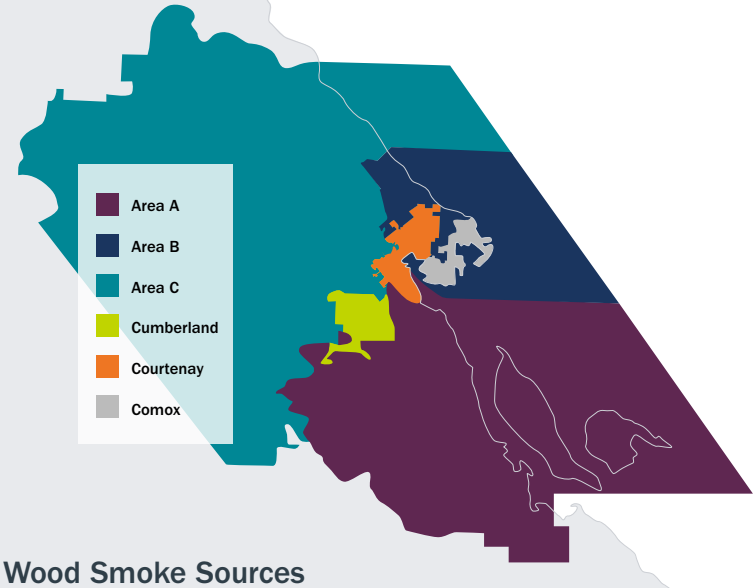
Wood Smoke Impacts in the Comox Valley

The Comox Valley

The Comox Valley is located on the traditional, unceded territory of the K'ómoks First Nation.

Home to over 72,000 residents, the Comox Valley offers a diversity of urban and rural areas surrounded by mountains, beaches, and rivers where residents and visitors enjoy a multitude of outdoor activities and vibrant communities. The Comox Valley Regional District (CVRD) is a federation of three municipalities (Comox, Courtenay and Cumberland) and three electoral areas (A (Baynes Sound-Denman/Hornby Islands), B (Lazo North) and C (Puntledge Black Creek).

The Comox Valley has access to areas of natural heritage and beauty such as the Beaufort Mountains and Strathcona Park. Just as the locational beauty and resources are shared by the Comox Valley communities, so is the air which is breathed. Pollution from wood smoke is an air quality issue in the Comox Valley.

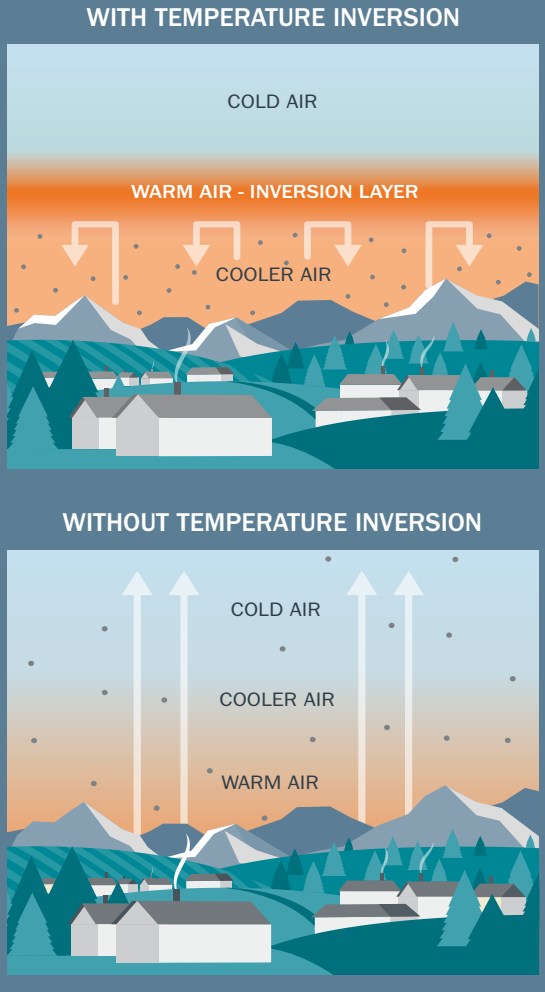


Wood Smoke Sources

Wood Smoke has various environmental and health impacts. Wood smoke is emitted from natural and man-made causes. Sources of wood smoke include indoor wood burning appliances and outdoor burning (backyard burning, recreational burning, land clearing and fire abatement). In the Comox Valley wood as a fuel source is prevalent and common due to its relative affordability, reliability and availability.

Topographical and Meteorological Factors

Wood burning causes pollution and may impact our health at any time, this pollution can be further exacerbated by the topographic and meteorological conditions of the Comox Valley. During the cold season, valley locations are frequently subject to poor ventilation and temperature inversions, which reduce the ability of the atmosphere to disperse pollutants. Inversions occur when temperature increases with the height above the ground, causing colder-denser air to be 'trapped' under a layer of warmer-lighter air with little vertical mixing. In addition to temperature inversions, colder air from the surrounding mountains often flows down to the valley bottom, and such 'drainage flows' can further trap colder air in the valley. Therefore, all these conditions can lead to confining smoke emissions near the ground, thereby prolonging air pollution and PM2.5 exposure to residents. As a result, $PM_{2.5}$ levels in the Comox Valley – mainly from wood smoke – are often elevated during the cold season and may even exceed the provincial and federal acceptable limits.[1]



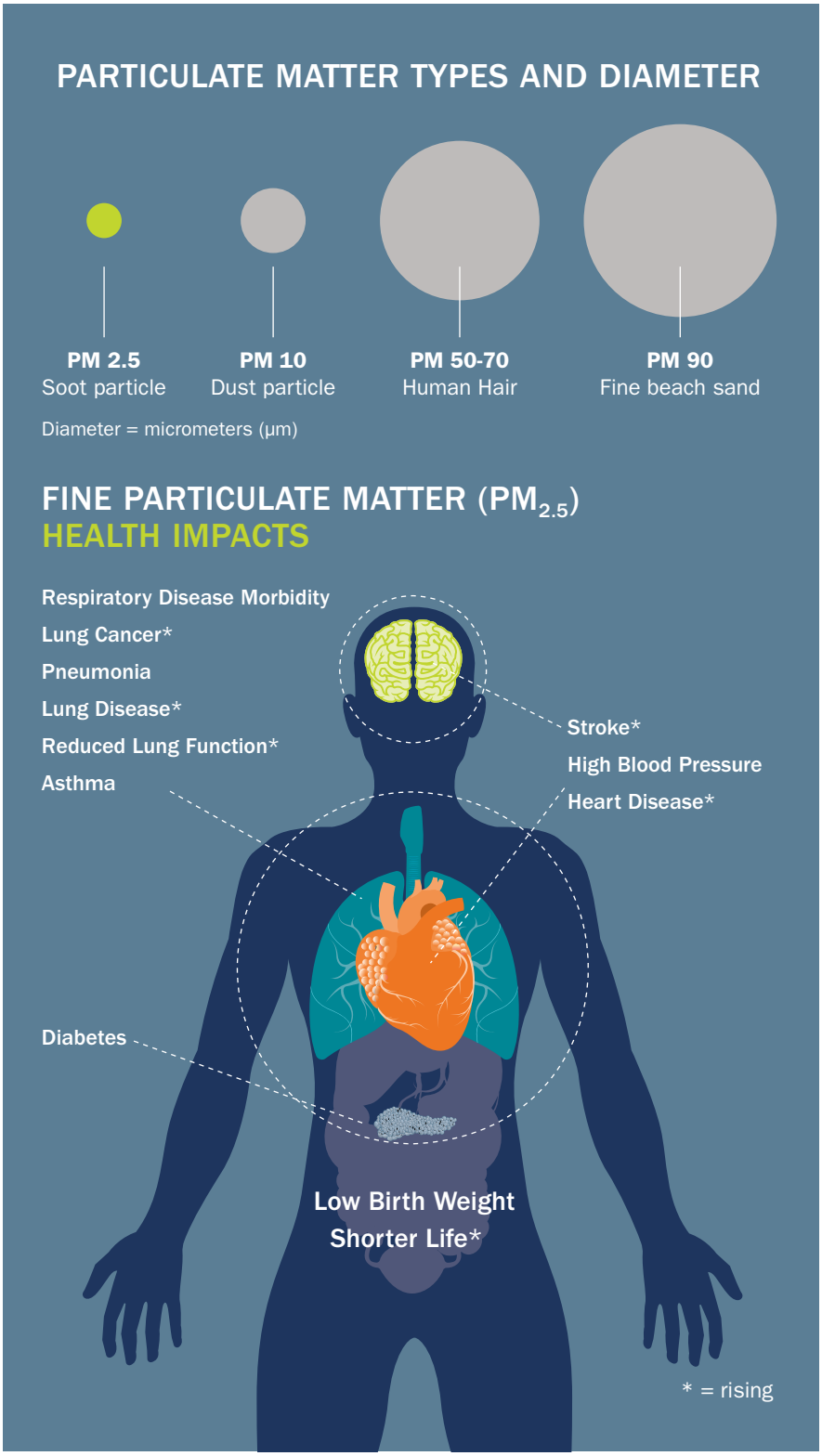
$PM_{2.5}$ Health Impacts

$PM_{2.5}$

$PM_{2.5}$ is a pollutant with particulate matter that is 2.5 microns wide or smaller. Particulate matter consists of tiny particles suspended in the air. $PM_{2.5}$ particles are small enough to penetrate into the lungs and the bloodstream, causing health problems. $PM_{2.5}$ is directly emitted from combustion (e.g. forest fires, wood burning, vehicle engines, debris burning), and can also form when other pollutants in the air undergo chemical reactions.

$PM_{2.5}$ Health Impacts

$PM_{2.5}$ particles in wood smoke pose a health risk to all people and disproportionately impact children, the elderly and people with asthma and other lung disease or heart conditions. Health Canada estimates that 1,200 British Columbians die prematurely every year due to air pollution from $PM_{2.5}$, nitrogen dioxide and ozone.[2] $PM_{2.5}$ affects multiple organs and causes both acute and chronic health effects. Exposure to $PM_{2.5}$ can lead to asthma attacks, chronic bronchitis and heart attacks. The long-term health impacts are significant and concerning and they affect the lungs and cardiovascular health. Furthermore there are many other emerging and rising health effects.



Comox Valley $PM_{2.5}$ Levels

Several provincial and local government research and monitoring initiatives have contributed to the weight of evidence on $PM_{2.5}$ levels and impacts in the Comox Valley. These include, stationary monitoring, mobile monitoring and a particulate matter inventory. Stationary monitoring contributes continuous data that is useful for identifying trends. Mobile monitoring has been valuable for the identification of $PM_{2.5}$ concentrations and hotspot locations. The particulate matter emissions inventory provided a holistic overview of $PM_{2.5}$ sources. These various monitoring methods present data for research to better understand the public health and environmental impacts of $PM_{2.5}$.

The provincial Ministry of Environment and Climate Change Strategy (BC ENV) measures ambient air and monitors $PM_{2.5}$ and meteorology at the Courtenay ambient air station under its commitments to protect the health of communities. Monitoring shows that the Comox Valley has consistently exceeded Canadian Ambient Air Quality Standards (CAAQS) and BC Air Quality Objectives (AQOs). These acceptable limits are expressed as $PM_{2.5}$ concentrations in micrograms per cubic metre (µg/m3) averaged over a 24 hour period or annually.[3]

Air quality reports and real-time data from the Courtenay monitoring station are available on the BC Ministry's website and in the Georgia Strait Air Zone Reports.[4] Real-time data is used to inform air quality advisories and the Air Quality Health Index (AQHI). Since 2012, the Comox Valley has mostly exceeded the BC annual AQOs for $PM_{2.5}$ every year except for 2016 and 2019 (see appendix A). The Comox Valley $PM_{2.5}$ annual levels have also exceeded the BC 24-hour AQO every year except for 2019.

$PM_{2.5}$ Research & Monitoring Timeline

2009

Mobile Nephelometer Study in the Comox Valley[5]

Conducted by Poplawski. K, Setton. E (University of Victoria), Vancouver Island Health and MOE

- Mobile Monitoring campaigns 2008 – 2009
- Wood Heating identified as primary source
- Recommended permanent monitoring location
- See Appendix B: Map 4

2011

Ambient Air Quality Monitoring Station[6]

- Station installed by BC ENV
- Reports meteorological data (wind, temperature and humidity)
- Determines weather conditions that coincide with poor air quality

2017

Patterns of Air Quality and Meteorology in Courtenay Study[7]

Study by Plaine. E (BC ENV)

- Study on ambient air quality patterns between 2011 and 2016
- Highest $PM_{2.5}$ levels are in winter evenings
- $PM_{2.5}$ patterns consistent with wood burning

2017

Biomass Burning Pollution & Acute Myocardial Infarction Study[8]

Study by Scott Weichenthal et.al.

- Crossover study of myocardial infarction (MI) hospitalizations (heart attacks) and ambient $PM_{2.5}$
- $PM_{2.5}$ levels related to increased risk of MI in elderly 2008 - 2015

2018

Mobile Monitoring Study[9]

Study by Matthew Wagstaff (UBC)

- Spatial resolution identified $PM_{2.5}$ hot spot areas
- Identified residential wood heating as primary pollution source. See Appendix B: 2018 Mobile Monitoring Study Maps

2021

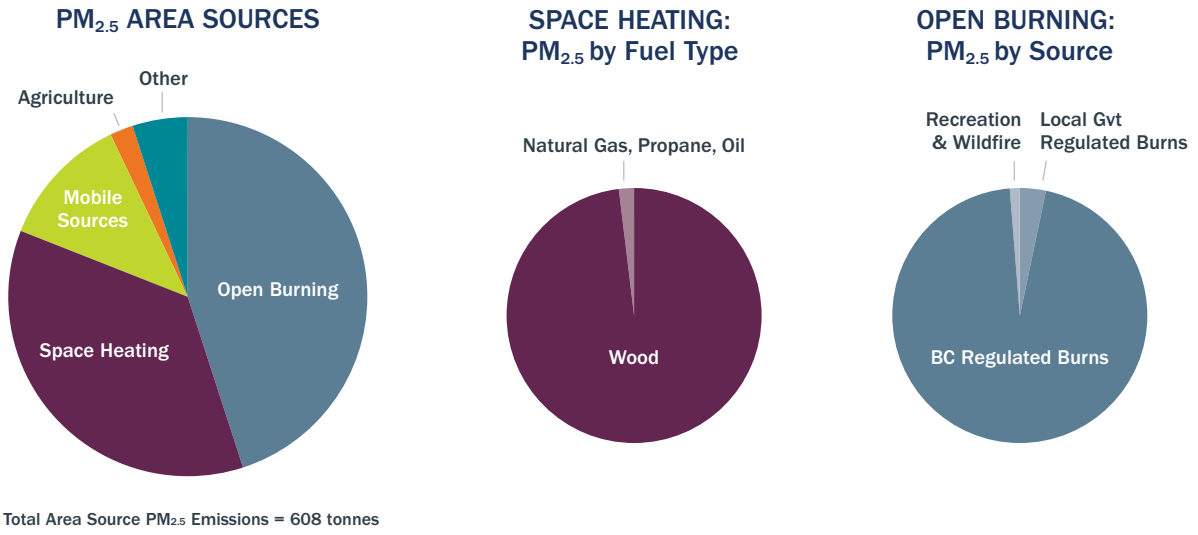
Air Pollution & Retinal Vessel Diameter & Blood Pressure in School-Aged Children in a Region Impacted by Residential Biomass Burning[10]

Report by Korsiak. J et.al.

- Evaluated associations between $PM_{2.5}$ and retinal vessel diameter blood pressure impacted by biomass burning (Cumberland and Courtenay)
- Shows that short-term and sub chronic exposures to air pollution (including $PM_{2.5}$) impact the retinal microvasculature and blood pressure of children
- Important interactions between air pollutants and cardiovascular health impacts

Comox Valley Particulate Matter Emissions Inventory

$PM_{2.5}$ Areas Sources



The BC ENV established a Particulate Matter Emissions Inventory using 2015 as the base year for the Comox Valley (City of Courtney, the Town of Comox, Village of Cumberland, CVRD Electoral Areas A, B and C and the K'ómoks First Nation). The inventory identified open burning and space heating as the top two dominant sources of area source $PM_{2.5}$. The Inventory developed particulate matter emissions for particulate matter 10 microns and smaller and particulate matter 2.5 microns and smaller. The Inventory developed robust estimates for wood combustion including residential woodstoves for space heating, residential yard waste, land clearing and forest harvesting slash burning.[11]

Space heating contributed **36%** of $PM_{2.5}$ pollution, 35% which was from wood burning in homes, and less than 1% from natural gas, propane and heating oil.

Open burning accounted for **45%** of the total $PM_{2.5}$ emissions. Provincially-regulated pile and area burns contributed 41.5%. Municipally-regulated backyard burns and pile burns accounted for 3.5%, and less than 1% was from recreation and wildfires.

Uncaptured $PM_{2.5}$ Impacts

The inventory provides the total amount of $PM_{2.5}$ emissions in 2015 and the distribution between the area sources. Uncaptured emissions, environmental and health impacts can be reported further in specific research and monitoring initiatives. These include spatial context, timing, weather and meteorological conditions.

- **Spatial Context** - $PM_{2.5}$ pollution occurs in various spatial contexts and health impacts increase when emissions are concentrated and close to populated areas. Backyard burning is a smaller source of $PM_{2.5}$ in the inventory, however backyard burning may have greater health impacts due to residential population proximity.

- **Timing** - There are also higher concentrations of $PM_{2.5}$ associated with time of day and season. Winter months and evenings have higher levels of $PM_{2.5}$ from indoor wood heating in residential areas, this has greater health impacts on larger populations.
- **Weather and Local Meteorological Conditions** - Winds, temperatures, humidity and atmospheric conditions can affect the dispersement of pollution and there is more $PM_{2.5}$ accumulation with stagnant air. The venting index estimates how well the air disperses smoke and how well it will mix into the air. Unregulated backyard burning and pile burns are difficult to monitor, and are not fully captured in the emissions inventory and may not consider the venting index. Although forestry burn sites are a large source of $PM_{2.5}$ from open burning, they are often remotely located and occur under stringent conditions. These conditions ensure that smoke from fire hazard abatement does not impact communities, public health and safety. Industrial burning from forestry occurs for two months of the year and only when the venting index is at acceptable levels to disperse $PM_{2.5}$.

Air Quality and Wood Smoke Management

Planning and Tools

Managing air quality is a multi-jurisdictional challenge: wood smoke emissions can be managed through regulations, standards and initiatives set by various levels of government and authorities. Additionally, there are education and outreach initiatives by regional and local group collaborations.

Air Quality Authority

The *Canadian Environmental Protection Act* (CEPA) coordinates the National Air Quality Management System (AQMS), which establishes limits on air pollutants for the protection of human health and the environment through the Canadian Ambient Air Quality Standards (CAAQS). CAAQS are set to keep air pollutants below the identified levels. When pollutants near or surpass standards, governments act to reduce those pollutant levels.

The primary authority for air management is the **BC Government** through the Environment Management Act (EMA). The EMA is key legislation in regards to wood smoke and includes the following regulations:

- *Open Burning Smoke Control Regulation* (OBSCR)[12]: Makes provisions for burning to reduce impacts.
- *Solid Fuel Burning Domestic Appliance Regulation* (SFBDAR): Regulates burning appliance requirements.

The *Wildfire Act and Regulation* is also key legislation that relates to open air burning as it specifies rules and regulations around fire use, fire prevention and wildfire control.

Local government air quality bylaws can be enacted under provisions of the Local Government Act or the Community Charter. Local governments can also address air quality through land use planning and environmental policies and programs.

Measuring and Monitoring $PM_{2.5}$

In addition to the air quality research and studies, consistent and reliable monitoring is key to reducing emissions and the evaluation of performance and initiatives. The Courtenay monitoring station provides reliable real-time data that can be compared to CAAQS and BC AQO. The Comox Valley had been identified as a ‘red zone’ in all the Georgia Strait Air Zone Reports since 2012, and as an ‘orange zone’ in the latest reported period (2017–2019). ‘Red zone’ communities are those that exceed CAAQS and ‘orange zone’ communities are those where action is still needed to prevent CAAQS exceedance.

With the Comox Valley currently considered as an ‘orange zone’ community by the Province, it is therefore pertinent to continue to reduce $PM_{2.5}$ levels. Additionally, the Comox Valley remains one of the top communities with the highest $PM_{2.5}$ levels in the Georgia Strait Air Zone.

In the 2017–2019 Georgia Strait Air Zone Report, the Comox Valley was recorded as the community with the highest $PM_{2.5}$ hour metric and the second-highest $PM_{2.5}$ annual metric.

Although the Courtenay monitoring station provides reliable data it does not capture the spatial variations of $PM_{2.5}$ pollution such as the hot spot areas identified in past mobile monitoring studies.

Partnerships

- Island Health has partnered with local governments for educational initiatives and provided resources, grants and support for programs such as the Wood Smoke Reduction Program.
- The Airshed Roundtable is also supported by members from local health authorities.
- The Ministry of Environment and Climate Change Strategy (BC ENV) and the BC Lung Foundation support the CVRD's Wood Smoke Reduction Program by providing grant funding through the B.C. Wood Stove Exchange Program. The BC ENV is also represented by Roundtable members.
- Municipal partners (the Village of Cumberland, Town of Comox and the City of Courtenay) continue to support regional air quality initiatives and are also represented on the Airshed Roundtable.

Local Regulations

- Local governments in the Comox Valley have adopted wood burning appliance regulations and bylaws that prohibit the installation of wood burning appliances in new buildings. These are listed in Appendix B.
- Open burning bylaws for fire service areas are mainly intended for reducing the risk of fire and resulting property damage. There is a multitude of fire service areas in the region, which creates challenges for regulating open burning on a regional level as seen in Appendix B.

Education

- Education and outreach initiatives have been undertaken by the CVRD and local community groups. The Wood Smoke Reduction Program aims to increase awareness of wood smoke impacts and incentivize and encourage the removal of wood burning appliances.

The Wood Smoke Reduction Program is offered through funding from the Provincial Wood Stove Exchange Program. The program aims to reduce wood smoke pollution by providing rebate incentives, education and outreach. Increased rebate amounts have been offered from additional grants from Island Health. Rebates are provided for switching out 5+ year old appliances with electric heat pumps. Enhanced rebates have been provided for hot spot areas (areas that were identified as having higher concentrations of wood smoke). The program includes educational campaigns on available rebates and smart burning tips.[13]

Reducing Wood Smoke

Challenges and Opportunities

The Roundtable explored and identified a core set of challenges and opportunities for the effective improvement of air quality in the Comox Valley. These were analyzed further by the working groups that were formed in the Roundtable process. This analysis was foundational in the development of targeted and appropriate actions.

Challenges

Awareness: Lack of public awareness on local wood smoke conditions and impacts. This includes health impacts, spatial conditions, existing bylaw details and wood smoke reduction initiatives and programs. This makes outreach and behavioural change challenging.

Acceptance: Existing strong cultural practices of burning will take time to change. Burning has been linked to social connections and the value of self-reliance.

Access: Lack of access to or knowledge of available alternatives such as heat pump installation requirements, accessing seasoned, dry wood and alternative yard waste disposal locations.

Economic: High upfront heating system replacement costs can be a barrier for low income households. Education required on the health impact costs of wood burning appliance use.

Regulatory: A complex regulatory landscape that lacks clarity on local government's authorities in some areas. Also effective enforcement of bylaws can be resource intensive.

Data: Limitations to available data, particularly regarding air pollution distribution levels over time. Only one permanent air quality monitor exists in the Comox Valley. There is a lack of information about the number and types of wood burning appliances currently in use.

Opportunities

Policy Potential: Regional policy support and alignment potential on air quality initiatives. For example, through the Regional Growth Strategy and Official Community Plan policies.

Previous Studies: Existing studies and research on the Comox Valley Air Quality provide a strong foundation for understanding the regional air quality issue.

Active Community Groups: Grassroots community groups in the Comox Valley provide and run active local programs.

Air Quality Improvements: There are general improvements in $PM_{2.5}$ levels in the recent years as demonstrated in the 2017-2019 Georgia Strait Air Zone Report.

Increased Public Interest: Public interest in the air quality problem and exploring solutions to reduce $PM_{2.5}$ levels has increased.

Alternative Heating Options: Increased options for wood burning appliance switches and success stories of exchanges to cleaner heating appliances exist.

The Airshed Roundtable

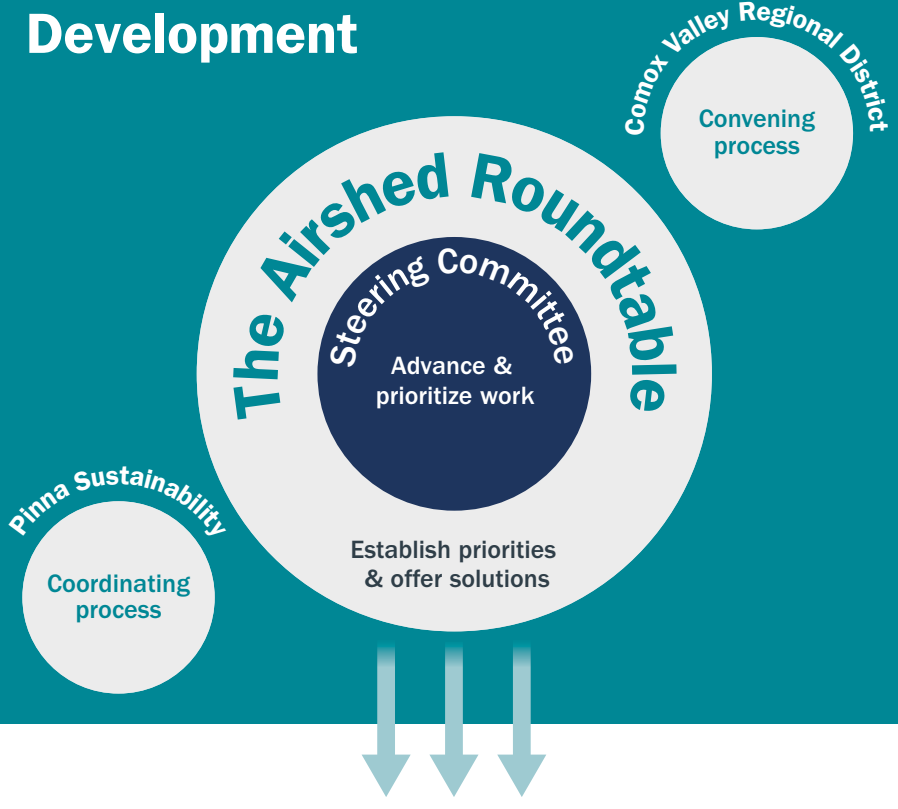
The CVRD launched the Airshed Roundtable initiative in Spring 2020 as a collaborative approach to tackle regional air quality. This was, in part, an effort to recognize the complexity of managing air quality in a community with divergent experiences and opinions about the role of wood burning. The Roundtable, appointed by the CVRD Board, is broadly represented by community members, non-profit organizations, and local industry. These members provided input and expertise on their understanding of the air quality issues in the Comox Valley, and pathways to improve air quality. The Roundtable primarily focused its understanding on the wood smoke issue and on $PM_{2.5}$ pollution for air quality improvement in the Comox Valley. The Roundtable was supported by a steering committee comprised of air quality and public health experts and local government staff, who provided direction and leadership to support strategic planning.[14]

The **Wood Smoke Reduction Strategy** was developed by the CVRD with the support of member municipalities through the Airshed Roundtable process. The Strategy is the culmination of the efforts of various organizations and individuals from the Comox Valley who came together to define a vision, goals and possible actions to reduce wood smoke. The Strategy is **a resource to guide local government action** on reducing PM2.5 generated through wood burning. Although divergent options remain, the Strategy provides direction on actions to reduce the impacts of PM2.5 from wood smoke for clean and healthy air for everyone in the region.

The Process

Substantial input from the Roundtable in 2020 and 2021 developed the Wood Smoke Reduction Strategy. The initial engagement focused on local air quality issues and the development of the Vision and Goals. Subsequent Roundtable meetings focused on smaller Working Groups that identified actions to achieve Goal 1. The Roundtable later convened to review the Working Group's outcomes considering Goal 2 and Goal 3. This engagement informed the Action Plan. Although the Action Plan focuses on $PM_{2.5}$, linkages to Climate Action will be part of Future Work.

The Airshed Roundtable Process in the Strategy Development



Vision

The Comox Valley has clean and healthy air, all year round for current and future generations

Working Group 1

Reduce emissions from existing residential wood burning appliances

Working Group 2

Transition away from biomass systems in populated areas

Working Group 3

Eliminate the burning of yard waste in residential neighbourhoods

Goals

1. Achieve measurable reductions in $PM_{2.5}$ to protect public health
2. Continually improve and expand knowledge of sources and impact of air pollution
3. Educate and involve the community in understanding and reducing the impacts of air pollution and the links to climate change

Future Work

Action Plan

1. Reduce emissions from existing wood burning appliances
2. Transition away from using wood burning appliances, prioritizing densely populated areas
3. Eliminate biomass burning of yard waste and reduce emissions from recreational fires
4. Promote and advocate for alternatives to non-residential open burning
5. Expand air quality data collection and research to inform actions
6. Expand wood smoke education programs

Vision

The Comox Valley has clean and healthy air all year round, for current and future generations.

Vision Statement

Currently, areas in the Comox Valley experience recurring episodes of poor air quality that negatively affect the health of our residents. Our actions need to be effective in order to **continually improve air quality** while reducing greenhouse gas emissions to mitigate climate change where possible. Our initial focus is on **reducing fine particulate matter** – the air pollutant of greatest concern to the health of our Comox Valley residents. Achieving this vision is complex and will require **working together** and coordinating efforts across several governments, organizations, industry, and community members. **Engaging and involving community members** will be instrumental to our success.

Goals

1. **Achieve measureable reductions** in fine particulate matter levels to protect public health.
2. **Continually improve** and expand knowledge of sources and impacts of air pollution.
3. **Educate and involve** the community in understanding and reducing the impact of air pollution and the links to climate change.

The three overarching goals were developed to support the vision and are foundational to guiding the actions. However, most of the actions fleshed out in the working groups were developed from **Goal 1**.

Goals 2 and 3 will be accomplished by some of the 6 proposed actions. Additionally, Goals 2 and 3 will also require further expansion and exploration.

The Roundtable demonstrated the need to focus on $PM_{2.5}$ and the working groups were established from Goal 1: Achieve measurable reductions in fine particulate matter to protect public health.

The Wood Smoke Reduction Action Plan

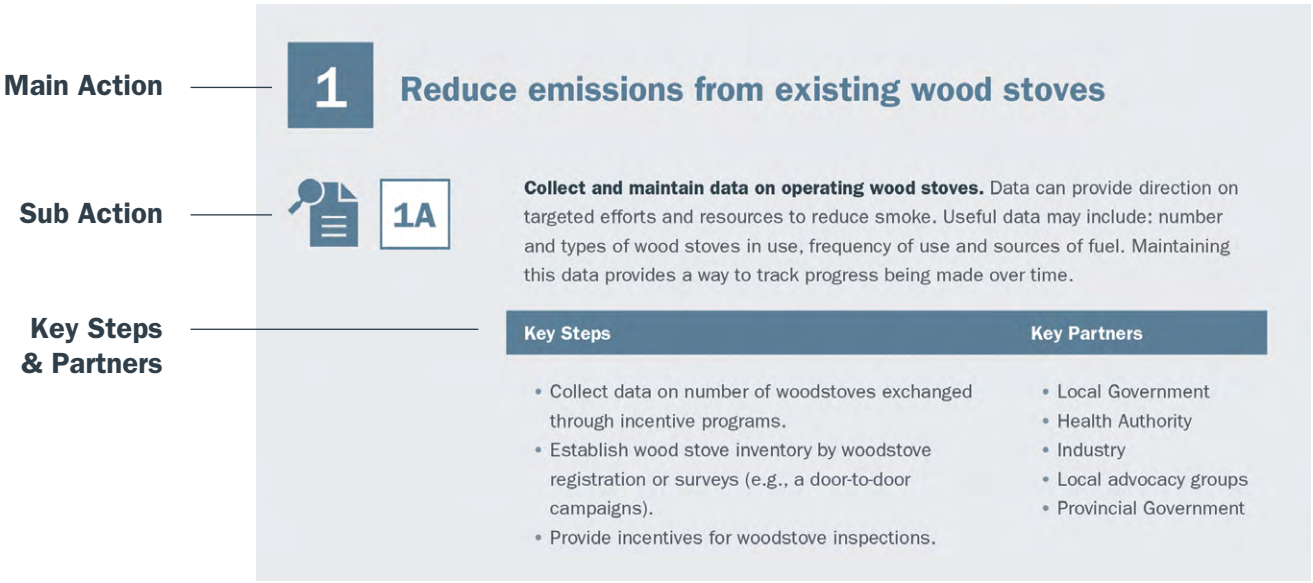
Based on the input of the Airshed Roundtable, its working groups, and the Steering Committee, an action plan was developed. This action plan is intended to coordinate efforts and highlight actionable steps to reduce wood smoke and, in turn, $PM_{2.5}$ in the Comox Valley.

Reading the Action Plan

This **Wood Smoke Reduction Strategy Action Plan** contains six main actions (numbered 1 - 6) to improve air quality through wood smoke reduction. These main actions include a list of sub actions numbered alphabetically. The sub actions are also analysed through the most or all or the following topics: **Key Steps**, **Current Initiatives**, **Similar Initiatives** and **Key Partners**. See example.

Furthermore the following graphics help identify the type of work required using categories utilized in working group sessions and are represented by the following icons:

Example



Action Plan Overview

1	Reduce emissions from existing wood burning appliances
2	Transition away from using wood burning appliances, prioritizing densely populated areas
3	Reduce emissions from recreational fires and eliminate yard waste burning
4	Promote and advocate for alternatives to non-residential open burning
5	Expand $PM_{2.5}$ data research and collection to inform actions
6	Expand wood smoke education programs

1 Reduce Emissions from Existing Wood Burning Appliances

Wood burning appliances are a source of heat for many homes in the Comox Valley. Based on a home heating survey conducted by the CVRD, 38% of respondents use wood burning appliances, and 75% of those would like to change their heating source. The CVRD's Wood Smoke Reduction Program has been working to reduce emissions from existing residential wood burning appliances through education and awareness, and by offering incentives to replace old wood burning appliances with non-wood-burning heating appliances – which has directly led to the replacement of 225 old wood burning appliances in the region since 2016. Wood burning appliances are not permitted in new residential buildings in three of the four municipalities as shown in the bylaw table in Table 2 in Appendix B. Wood burning appliances are allowed in new buildings in the electoral areas and must meet CSA or US EPA certification.

1A

Collect and maintain data on operating wood burning appliances. Data can provide direction on targeted efforts and resources to reduce smoke. Useful data may include: number and types of wood burning appliances in use, frequency of use and sources of fuel. Maintaining this data provides a way to track progress being made over time.

Key Steps	Key Partners
• Collect data on number of wood burning appliances exchanged through incentive programs. • Establish wood burning appliance inventory by wood burning appliance registration or surveys (e.g., a door-to-door campaign). • Provide incentives for wood burning appliance inspections. • Create targeted education and incentives from collected data.	• Local Government • Health Authority • Provincial Government

Similar Initiatives:

- Alberni Air Quality Council (AQC) and Alberni Air Quality Society.[15]

1B

Develop targeted strategies to enhance cleaner burning education. Recognizing that some wood burning appliances will continue to operate, it is important to reach people with wood burning appliances to improve their burning practices.

Key Steps	Key Partners
• Leverage existing resources from the wood smoke reduction program for creative smart burning campaigns. • Disseminate updated information through retailers to clientele. • Incorporate additional education methods such as collaborative education campaigns, courses and themed webinars.	• Local Government • Health Authority • Industry • Provincial Government

Similar Initiatives:

- CVRD's Wood Smoke Reduction Program - Moisture meter campaign distributes moisture meters with smart burning tip brochures.[16]
- Healthier Home Heating: Clear the Air Cowichan - Air quality education campaign (Cowichan Valley Regional District, Island Health and BC ENV).[17]

1C

Identify, evaluate and update local bylaws related to indoor burning. This includes the consideration of local bylaws and enforcement mechanisms such as plume visibility and opacity limits, no burn days during periods of poor air quality, wood burning appliance registration and complaint mechanisms.

Key Steps	Key Partners
• Collaborate with local governments to identify potential bylaw mechanisms, effectiveness and areas of alignment.	• Local Governments • Provincial Government
• Identify resource and enforcement requirements and feasibility for potential bylaws.	

Similar Initiatives:

- Metro Vancouver Regional District Bylaw regulates the discharge of air contaminants from residential indoor wood burning appliances, controls burning times, requires registration of wood burning appliances and permits for operation. Metro Vancouver users of residential indoor wood burning appliances are required to submit a declaration of compliance with best burning practices in Metro Vancouver.[18]
- District of Saanich Fire Prevention Bylaw No. 8807 - Includes opacity regulation.[19]
- Port Alberni Bylaw No. 4802 - Prohibits the installation of uncertified wood burning appliances (CAN/CSAA-B415.1). Only wood pellets or untreated, non-contaminated, and seasoned wood with a moisture content of 20% or less shall be burned in a wood burning appliance or fireplace.[20]
- Regional District of Alberni-Clayoquot Bylaw No. R1030 - Regulates solid fuel burning appliance emissions. Appliances must comply with CSA Standards. Non-compliant appliances are permitted to remain in service until July 1, 2024.[21]

2 Transition Away from Using Wood Burning Appliances, Prioritizing Densely Populated Areas

Wood burning appliances in densely populated areas result in higher smoke concentrations that impact larger numbers of the population. Prioritizing populated areas will likely impact more people as compared to rural areas. Core settlement areas can provide initial areas of focus (see Appendix B: Core Settlement Areas Map). Core settlement areas are used in the Regional Growth Strategy to define areas where the existing population density is, and where the most significant growth is planned for the region.

2A

Collect, review and publish data comparing space heating options. Various space heating options are available such as heat pumps. Incentivizing alternate heating options must consider the added benefits and consequences of these alternatives such as cost, equity, health and climate impacts.

Key Steps	Key Partners
• Update and compile information on appliance emissions, functionality, cost and health impacts. • Partner with academic institutions and organizations link to and build knowledge and resources such as the Residential Retrofit Acceleration Strategy.	• Local Governments • Provincial Government • Academic Institutions

Current Initiative:

Transition 2050 Residential Retrofit Acceleration Strategy

The CVRD Regional Growth Strategy and Comox Valley Sustainability Strategy have adopted targets to reduce GHG emissions. The CVRD provides incentive support and promotion of CleanBC programs that improve home efficiency and support the transition to heat pumps.[22]

2B

Assess the societal costs of wood burning appliance smoke. Societal costs of wood smoke can inform public policy on wood smoke particularly in relation to health care costs.

Key Steps	Key Partners
• Partner with local health institutions, local municipalities and academic institutions to coordinate and conduct research on health impacts and costs.	• Local Governments • Provincial Government • Health Authorities

Similar Initiatives:

- Health and Economic Impact Study on Residential Wood Burning in Metro Vancouver.

2C

Expand financial support for wood burning appliance removals. Financial incentives encourage switches to healthier sources of heat, however low-income homes in particular face additional barriers to changing heat sources. Current incentive programs can be expanded to increase targeted areas, support low income residents and to align with climate related programs.

Key Steps	Key Partners
• Increase targeted incentives for homes in hotspot areas. • Explore the establishment of no- or low-interest loans to ease transitions to new heat sources. • Align with CleanBC and other climate action incentives and low-income support programs for heat pumps. • Provide supports for rental properties using wood burning appliances. Consider alignment with initiatives such as the CVRD's Poverty Reduction Strategy.	• Local Governments • Provincial Government • Health Authorities

Similar Initiatives:

- CVRD Wood Smoke Reduction Program hotspot rebates.
- A 2017 study conducted in Metro Vancouver highlighted that significant benefits can be realized from regulatory measures to reduce residential wood smoke emissions – these should be considered within an equity lens (Health and Economic Impacts of Residential Burning in Metro Vancouver, 2017).[23]

2D

Develop local bylaws to phase out use of wood burning appliances in densely populated areas. Air quality data and studies in the Comox Valley demonstrate high levels of wood burning appliance pollution linked to health impacts. Developing bylaws to phase out wood burning appliances is an effective step in reducing wood burning appliance smoke.

Key Steps	Key Partners
• Build on action 1.C above, incorporate bylaws that phase out the use of wood burning appliances.	• Local Governments • Provincial Government

Initiatives:

- Town of Comox, Village of Cumberland and City of Courtenay have “no new installation bylaws” to prevent the increase in wood burning appliances in their communities.
- The Wood Smoke Reduction program is a non-regulatory means to support the transition to cleaner heating appliances. In partnership with the BC Ministry of Environment, BC Lung Association and Island Health, the 2021 Wood Smoke Reduction Program offered Hotspot areas up to $3,500 in rebates to eligible residents who remove their 5+ year wood-burning appliance used for home heating and replace it with an electric heat pump.

Similar Initiatives:

- Metro Vancouver Regional District Residential Indoor Wood Burning Emission Regulation Bylaw No. 1303 - Requires the registration of wood burning appliances in urban containment areas. Registered appliances must meet required emission standards and non registered appliances will be restricted in September 2025.

3 Reduce Emissions from Recreational Fires and Eliminate Yard Waste Burning

Recreational fires: Small recreational fires are allowed in the Comox Valley under various conditions outlined in the associated bylaws. The bylaws include permit requirements, size of fire, location and time. Locational restrictions include commercial, industrial and comprehensive development areas, and in some areas recreational fires are only allowed in designated campgrounds and tourist parks. Recognizing the cultural and social aspect of occasional small recreational campfires and cooking fires where permitted, smoke from recreational fires must be minimized. Smart burning tips and adherence to recreational fire bylaws or regulations require ongoing education and emphasis.

Yard waste: Yard waste burning for the CVRD Electoral Areas is specified in the Fire Service Area Bylaws (see Appendix B: Table 4). These outline yard burning conditions including permit requirements, season, time and fire size. Comox, Cumberland and Courtenay have curbside collection programs where yard waste can be picked up. The CVRD Electoral Areas do not have yard waste pick up. Therefore residents are responsible for managing their yard waste by either backyard composting or burning, or by taking their waste to a composting facility. Landilling of yard waste is not allowed under Bylaw No. 170. Results from a survey by the CVRD in 2020 showed residents managed yard waste as follows: 49% personal composting, 28% burn when they are allowed, 11% take waste to the landfill, and 5% to private facilities.[24]

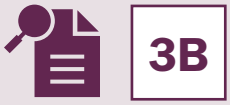
3A

Identify the needs, options and alternatives for debris disposal for all areas. Understanding the alternatives to burning yard debris in serviced areas is required to support program expansion.

Key Steps	Key Partners
• Identify the population without a pickup program or backyard composting capabilities and also identify the biomass types managed by residents. • Use information collected to inform the program and bylaw updates.	• Local Government

Similar Initiatives:

- Central Okanagan Clean Air Strategy
- Comox and Cumberland: Municipal pilot to produce and sell compost.
- Comox Valley Waste Management Centre produces SkyRocket (Net zero compost made from food scraps and yard waste.)



3B

Provide outreach and education on composting, chipping and other alternatives to burning. Raise awareness of the alternative options to burning yard waste and wood smoke impacts from yard waste management on neighbours.

Key Steps	Key Partners
• Provide education on alternatives to burning. • Educate and provide outreach for "no burn days" and air quality venting index.	• Local Government

3C

Expand current chipping program to include smoke control measures and consider the establishment of a permanent program. In 2020, the CVRD delivered the pilot curbside yard-waste chipper program funded by the provincial Community Resiliency Investment (CRI) grant. The program provided residents with an alternative to burning yard waste. Yard waste was collected and chipped curbside by mobile chippers and delivered to CVRD composting facilities. Approximately 65 tonnes of yard waste was removed from 485 properties in 2020. This reduced wood smoke and lessened wildfire fuel load and subsequent hazard. Although the program benefits included wood smoke reduction, the program was intended to reduce the risk of wildfires and mitigate their community impacts.

Key Steps	Key Partners
• Identify an alternate authority to operate the chipping program, and expand the program to include areas identified in action 3A. • Explore expansion of chipping program with smoke control measures. • Establish initiatives that allow mulching on property for yard work purposes, and exchange incentives for participation such as bonus composted material. These must align with other CVRD initiatives such as the "FireSmart" best practices.[25]	• Local Governments

Similar Initiatives:

- Community Resiliency Investment Funding Program. The 2020 program removed ~65 tonnes of wood chips from ~485 residential properties.

3D

Review and identify opportunities to update local outdoor burning bylaws. Electoral areas and improvement districts each have separate and unique regulations. The intent of these bylaws are for fire safety under the jurisdiction of the fire departments and not for air quality.

Key Steps	Key Partners
• Create local government group to review current bylaws. • Develop guidelines and potential bylaw amendments for alignment. • Identify feasibility, enforceability and promoting compliance with permits and regulations.	• Local Governments • Provincial Government

3E

Develop educational materials and messages to minimize smoke from recreational fires. Where recreation fires are permitted awareness and education on minimizing smoke, venting index and weather conditions must be communicated continually.

Key Steps	Key Partners
• Develop creative ways for education and information dissemination. • Establish smart burning tip campaign customized for recreational fire burning.	• Local Governments • Provincial Government

4 Promote and Advocate for Alternatives to Non-Residential Open Burning

Open burning outside of residential properties occurs for land clearing, agricultural waste burning, and fire abatement (prevention) in woodlots and large forest operations. The management, potential alternatives, materials and applicable regulations differ. Air quality for all open burning activities within the CVRD is regulated by the OBSCR. The large forest operations in the region are signatories to the *West Coast Fuel-Smoke Management Plan* which outlines additional air quality best management practices that are to be followed. In Courtenay, Comox and Cumberland, fire safety for non-residential open burning (agricultural land and privately managed forests) is regulated by the local government's fire prevention and protection bylaws (see Appendix B: Table 3). In the CVRD Electoral Areas, open burning is regulated by the Fire Protection Service Area bylaws. For areas where there is no Fire Protection Service Area bylaw then the Wildfire Act and Regulation apply (see Appendix B: Table 4). Recent and updated fire safety laws and information are available through local fire departments.

4A

Identify and assess sources and quantity of material that could be diverted to compost facilities. Understanding the region's capacity for managing organic debris from more sources will aid the development of a targeted response to non-residential open burning. This includes the capacity of local facility debris management. Wood chips need further management and time for safe composting.

Key Steps	Key Partners
• Review of local capacity to manage organic material. • Review the amount and type of material requiring management. • Acquire data via surveys, local burn permit records or academic research initiative.	• Local Governments • Provincial Government

4B

Identify and research fuel abatement opportunities for non-harvested lands and communicate results. Major forestry land owners are mandated for debris management best practices in operations. Other land owners, such as woodlots, do not have similar mandates and may benefit from information on how to manage debris using alternatives to burning or using practices that minimize smoke from burning when needed.

Key Steps	Key Partners
• Collaborate with an academic group to research fuel abatement best practices and debris management on other managed properties including parks, agricultural areas, and land clearing for development. • Communicate and provide education on fuel abatement alternatives such as an agricultural chipper program, land spreading, preserving some trees in land clearing for ecological benefits.	• Local Governments • Academic Institutions

Similar Initiatives:

- Regional District of Central Okanagan Agricultural Wood Waste Chipping Program (Okanagan Air Quality Program). Free chipping program.
- Regional District of Central Okanagan Mow/chip/rent-in rebate program. Provides rebates for farmers/orchardists to manage wood waste on their property.[26]

Build an understanding of the holistic nature of non-residential wood burning and raise awareness of industry best practices. Outdoor burning management can be complex due to multiple land owners under different regulations and mandates, also having different materials, contexts, and economics and land management issues.

Key Steps	Key Partners
• Build communications material to accompany outreach efforts that highlighting the different land management and the economics. • Integrate concepts relating to climate change, including maximizing carbon sinks and minimizing black carbon emissions.	• Local Governments • Academic Institutions • Industry

Assess the biomass market development opportunities. The Province supports biomass market development opportunities in regions where forestry is primarily public land (known as the Forest Carbon Initiative). This is not available to Comox Valley operations as they are on private lands.

Key Steps	Key Partners
• Build communications material to accompany outreach efforts that highlighting the different land management and the economics. • Integrate concepts relating to climate change, including maximizing carbon sinks and minimizing black carbon emissions.	• Local Governments • Provincial Government

Similar Initiatives:

- Forest Carbon Initiative[27]

5 Expand $PM_{2.5}$ Data Collection and Research to Inform Actions

Expanding local pollution data and exposure impact information can improve actions, policies, and regulations to reduce $PM_{2.5}$. In addition, there is a need to expand the existing air monitoring and support research efforts.

5A

Establish air monitoring network and conduct ongoing data analysis. There is currently one permanent monitoring station in the region. Given the results of mobile monitoring studies, this station does not typically reflect the spatial variation in smoke emissions and $PM_{2.5}$ concentrations, which may result in "hot spots" where $PM_{2.5}$ levels can be higher than what is captured by a single station.

Key Steps	Key Partners
• Establish a low-cost monitoring network in the Comox Valley, similar to other networks in BC. • Analyze the expanded monitoring data and report findings to guide and inform further action.	• Local Governments • Community Groups • Provincial Government • Environment and Climate Change Canada (ECCC)

Similar Initiatives:

- ECCC Small Low-Cost Air Quality PM Sensor Pilot Project: Environment and Climate Change Canada (ECCC) has undertaken a nationwide initiative of supporting low-cost $PM_{2.5}$ monitoring in partnership with First Nations, local and provincial governments, and interested stakeholders. The main objective of this project is to expand current air quality monitoring networks, especially in areas with limited or no air monitoring coverage. Under this initiative, communities can obtain and operate PurpleAir sensors for $PM_{2.5}$ monitoring in partnership with ECCC, BC ENV and citizen groups.
- Cowichan Valley Regional District PurpleAir Monitoring Network.[28]

5B

Conduct studies and mobile monitoring to fill network gaps. Regional academic mobile monitoring studies have deployed instruments for short periods, at temporary locations. Mobile monitoring has provided samples from various geographical points and pockets in the region. This has provided insight for "hot spots" as areas with greater pollution concentrations weather and trapped pollutants from weather and geography.

Key Steps	Key Partners
• Collaborate with an academic group to undertake an additional updated mobile monitoring study.	• Local Governments • Provincial Government • Academic Institutions

Similar Initiatives:

- CVRD Mobile Monitoring Study

Identify and establish academic partnerships for research projects. A number of actions identified in this strategy would benefit from additional academic and professional research projects. These include:

- 2A & 2B: Collect, review and publish data comparing space heating options, including $PM_{2.5}$ emissions, climate impacts and societal costs
- 4A: Assess the type and quantity of biomass material, and capacity for managing additional material in local compost facilities.
- 4B: Research fuel abatement opportunities for non-harvested lands.
- 5B: Conduct mobile monitoring study to fill gaps in the monitoring network.
- Research fuel abatement opportunities for non-harvested lands and use results for *Action 4B: Identify and research fuel abatement opportunities for non-harvested lands and communicate results.*
- Identify partnerships and to conduct mobile monitoring study to support *Action 5B: Conduct mobile monitoring study to fill gaps in the monitoring network*.

Key Steps	Key Partners
• Identify and prioritize research projects and initiatives. • Coordinate and promote prioritized research projects to academic institutions. • Source funding and support grant applications for research initiatives.	• Local Governments • Provincial Government • Academia

6 Expand wood smoke impact education programs

Various educational for wood smoke impacts and health impacts are active in the Comox Valley. These initiatives include partnerships with local community groups, government and health authorities. Ongoing campaigns and or creative multi-stakeholder collaboration will support increase awareness and education.

6A

Align education and communication initiatives from the Wood Smoke Reduction Program with the Action Plan.

Key Steps	Key Partners
• Obtain testimonies and feedback from residents on experiences with the Wood Smoke Reduction Program. This includes residents impacted by wood smoke and residents that have exchanged wood burning appliances for heat pumps. • Incorporate findings from research and monitoring from the Wood Smoke Reduction Strategy such as health impacts, costs, monitoring initiatives with the Wood Smoke Reduction Program.	• Local Government • Provincial Government • Community Groups • Health Authority

Similar Initiatives:

- Fraser Basin Council (FBC) completed the development of wood smoke education course.[29]

6B

Identify and incorporate creative and collaborative educational campaigns.

Key Steps	Key Partners
• Identify and align messaging with local governments, Island Health, BC ENV and BC Wildfire. • Integrate messaging into existing and new communication tools and education campaigns such as newsletters, signage and webinars. • Plan educational campaigns that focus on specific themes including health impacts, smart burning tips, available rebates and alternative appliance options.	• Local Government • Provincial Government • Community Groups • Industry

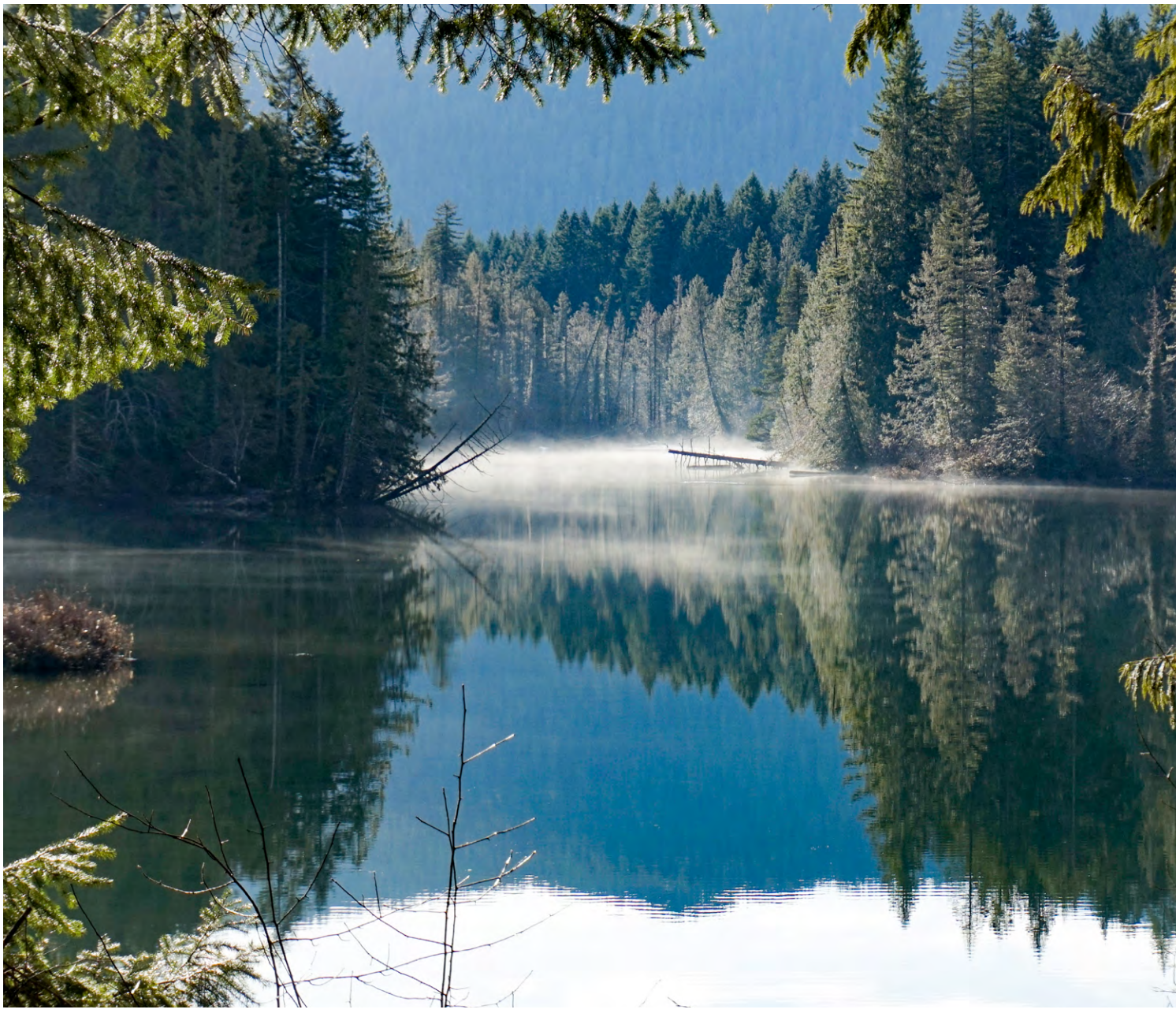
Similar Initiatives:

- San Francisco Bay Area Spare the Air Program creatively incorporates messaging to emphasize the health impacts.[30]

6C

Plan and implement educational events, courses and webinars.

Key Steps	Key Partners
• Identify opportunities for strategic/themed educational campaigns. • Source grant funding and support applications to fund research initiatives. • Leverage existing communications to expand outreach by adding air quality AQHI and VI widgets, targeted flyers.	• Local Government • Provincial Government • Community Groups • Health Authority



Implementation

The list of actions require a combined effort over various timelines. The actions are a list of all the different approaches identified for improving air quality through wood smoke reduction. Because actions cannot be implemented simultaneously, three criteria were used for prioritization. The criteria consider the availability of resources, the ease of implementation and the impact each action has on the three goals.

Implementation considerations serve as a basis to establish partnerships and direction for the identified actions. Refinement of costs and resources require further analysis and feasibility determination by the partners involved. Other action items that are not prioritized should not be overlooked if there is an opportunity for earlier implementation.

Prioritizing Actions

The criteria selected for evaluating the prioritization of actions are listed below:

1. Resources (max score 3 points)

Availability of resources, financing and funding to cover actions. This includes costs of the action, commitment of partners, staff time and related skills and expertise.

High resource availability =	**High score**
Low resource availability =	**Low score**

2. Ease (max score 3 points)

Ease or difficulty required for the action. Is the action simple or complex? What level of coordination is required, furthermore are there elements of uncertainty or risk.

Action is complex =	**Low score**
Action is simple =	**High score**

3. Goal Impact (max score 4 points)

How many goals does the action support? Each of the goals are worth the following:

Goal 1: Reduce PM2.5	**2 points**
Goal 2: Expand Air Quality Data	**1 point**
Goal 3: Air Quality Education	**1 points**

If all the goals are selected the goal impact total will add up to 4 points.

Total Score (max score 10) = Resources + Ease + Goal Impact

Each individual action in under the Wood Smoke Reduction Strategy Action Plan has been evaluated using the three outlined criteria. Each action has a priority score of either Low, Medium or High.

Total Score	**Priority**
1–3	**Low**
4–7	**Medium**
8–10	**High**

Time Frames

The Wood Smoke Reduction Strategy is designed to guide wood smoke reduction initiatives. Implementation timelines may vary and may not be related to prioritization of actions. The following timelines have been assigned to the actions:

Short-Term	**1 – 3 years**
Medium-Term	**4 - 6 years**
Long-Term	**More than 6 years**
Ongoing	**ongoing and anticipated to continue**

Example of Action Priority Score Calculation

"***Action 2A***. *Collect, review and publish data comparing space heating options*"

	Priority Criteria			
	Resources (1-3)	**Ease (1-3)**	**Goal Impact (1-4)**	**Total (1-10)**
Action Score	3	2	3	8
What does it mean?	High resource availability	Action is complex	Addresses high percentage of goals	Impact for action is high

Actions Priority Evaluation and Timeframes (see breakdown in Appendix C: Action Evaluation Matrix)

	Action Description	Priority*	Action Timeframe**
1	**Reduce Emissions from Existing Wood Burning Appliances**		**O**
1A	Collect and maintain data on operating wood burning appliances	Med	O
1B	Develop targeted strategies to enhance cleaner burning education	High	M
1C	Identify, evaluate and update local bylaws related to indoor burning	Med	M
2	**Transition Away from Using Wood Burning Appliances Prioritizing Core Settlement Areas**		**O**
2A & 2B	Collect, review and publish data comparing space heating options, including $PM_{2.5}$ emissions, climate impacts and societal costs	Med	M
2C	Expand and update financial support for wood burning appliance removals	Med	O
2D	Develop local bylaws to phase out use of wood burning appliances in core settlement areas	Med	S
3	**Reduce Emissions from Recreational Fires and Eliminate Yard Waste Burning**		**O**
3A	Identify needs for debris removal in all areas	Med	S
3B	Provide outreach and education on composting, chipping and other alternatives to burning	Med	O
3C	Identify opportunities to expand current chipping program that includes smoke control measures	Low	S
3D	Review and identify opportunities to update local outdoor burning bylaws	Med	S
3E	Develop educational materials and messages to minimize smoke from recreational fires	High	M
4	**Promote and Advocate for Alternatives to Non-Residential Open Burning**		**O**
4A	Assess the type and quantity of biomass material, and capacity for managing additional material in local compost facilities	Med	S
4B	Research fuel abatement opportunities for non-harvested lands	Med	M
4C	Build and understanding of the holistic nature of non-residential wood burning and raise awareness of industry best practices	Med	M
4D	Assess the biomass market development opportunities	Low	S
5	**Expand $PM_{2.5}$ Data Research and Collection to Inform Actions**		**O**
5A	Expand air monitoring network and conduct ongoing data analysis	Med	O
5B	Conduct mobile monitoring study to fill gaps in the monitoring network	Med	M
5C	Identify and establish partnerships for $PM_{2.5}$ research projects to support actions in this plan	Med	O
6	**Expand Wood Smoke Education Programs**		**O**
6A	Align education and communication initiatives from the Wood Smoke Reduction Program with the Action Plan	High	O
6B	Identify and incorporate collaborative educational campaigns	High	O
6C	Plan and implement educational events, courses and source funding	High	O

*Priority: High/Medium/Low ** Action Timeframe: Short, Med, Long or Ongoing

Conclusion

Funding and Resources

This Strategy was developed as an initiative under the CVRD's Regional Growth Strategy service area. The CVRD committed to undertake a Roundtable process with the support of multiple committed government, community and industry organizations. The CVRD does not currently have a specific service to address air quality. Ensuring the medium and longer-term success of this Strategy will involve identifying a stable source of funding, and champions for ongoing implementation.

Ongoing multi-agency committee

The development of this Strategy has truly been a multi-agency effort, with substantial input and effort from members of the Steering Committee and the Roundtable. The input of these participants has been invaluable and is greatly appreciated. Existing members of the Steering Committee and Roundtable have committed to this process and will continue to be involved in the first year of implementation to support and champion initiatives, and to seek alignment with similar initiatives underway in their realms. Following the first year of implementation, a renewed multi-agency committee with ongoing input, support and leadership from its members, will be integral to medium and longer-term success of the Strategy.

Monitoring and Reporting

Under the current initiative, the CVRD committed to providing annual reports for three years about the development and implementation of this Strategy. Reporting to date includes the following:

- **State of the Air Memo (2020)**
- **Regional Airshed Roundtable End of Year 1 Report (2021)**
  (air quality coordinator)
- **Staff reports, Roundtable meeting presentations**
- **Wood Smoke Reduction Strategy (2022)**
  It is recommended that an implementation status report be provided within one year of the strategies adoption by the board.

Other Considerations and Limitations

Other emission sources and air pollutants were not explored in detail due to the Roundtable's prioritization of $PM_{2.5}$ as the main pollutant of concern, and the focus on $PM_{2.5}$ from wood burning. Although other pollutants and emission sources related to transportation and climate action were not explored in detail, there is opportunity to draw alignment with other programs in future initiatives.

Appendices

Appendix A

Ambient Air $PM_{2.5}$ Objectives and Levels

Appendix B

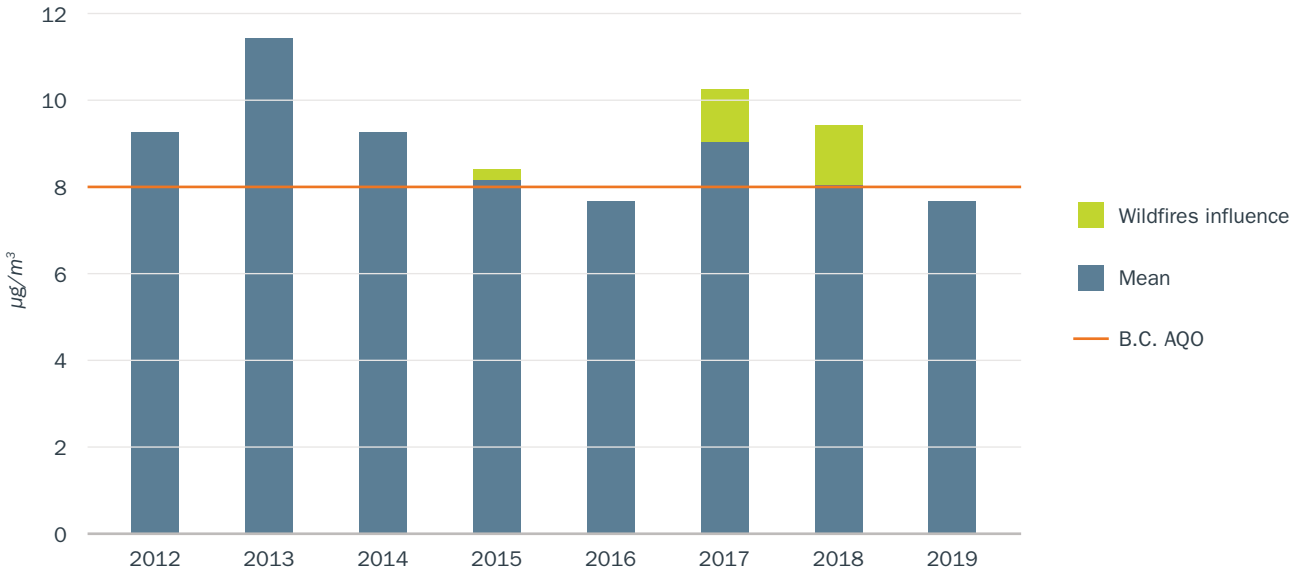
Air Quality Regulations and Initiatives

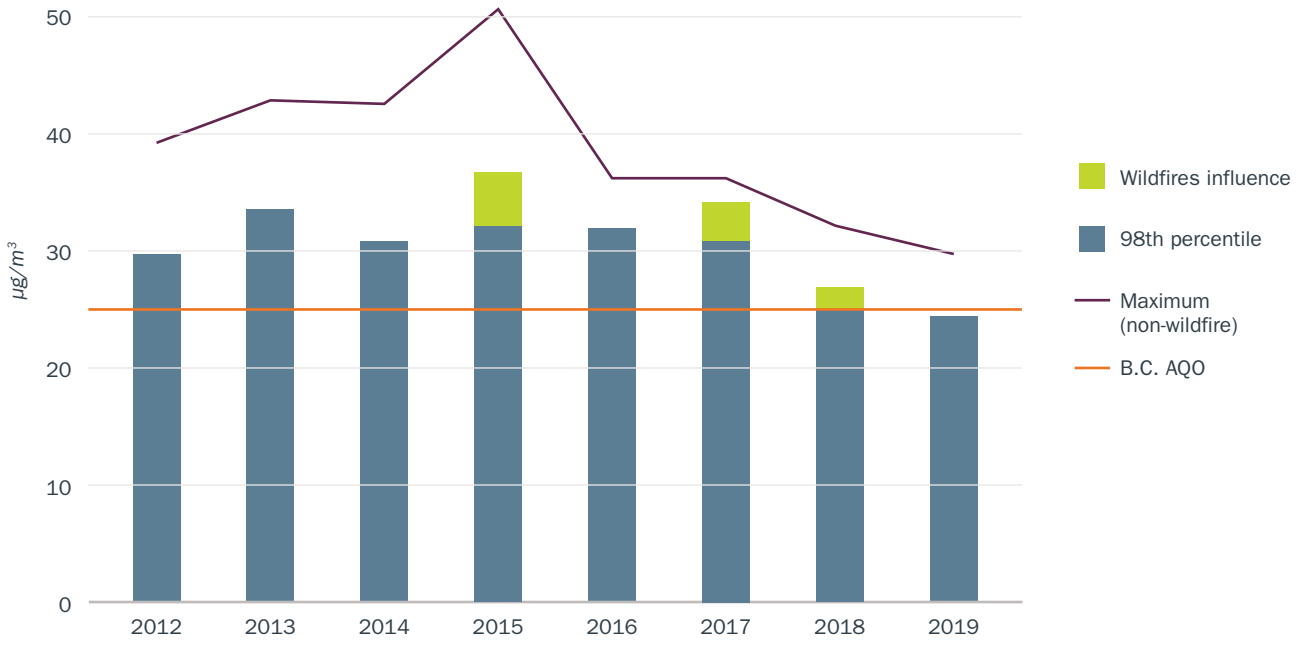
Appendix C

Action Evaluation Matrix

Appendix A: $PM_{2.5}$ Metrics, Standards and Management Levels

Comox Valley $PM_{2.5}$ Annual Metrics Relative to BC Air Quality Objectives (AQOs)





Federal Standard and Provincial $PM_{2.5}$ Objectives [2]

Averaging Period	Federal Standard ($\mu g/m^3$)	Provincial Objective ($\mu g/m^3$)
24 hour	27	25
Annual	8.8	8

Canadian Ambient Air Quality Standards (CAAQS)[31] Levels and Objectives 2015–2020

Air Quality Management Levels	Management Levels for the Annual Fine Particulate Matter CAAQS (micrograms per cubic metre)		Management Levels for the 24-hour Fine Particulate Matter CAAQS (micrograms per cubic metre)	
	2015	2020	2015	2020
Red	>10	>8.8	>28	>27
Orange	6.5 to 10	6.5 to 8.8	20 to 28	20 to 27
Yellow	4.1 to 6.4		11 to 19	
Green	≤4.0		≤10	

Level Objectives

Red	Achieve CAAQS
Orange	Prevent CAAQS Exceedance
Yellow	Prevent Air Quality Deterioration
Green	Keep Clean Areas Clean

$PM_{2.5}$ Metrics and Air Zone Management Levels for the Georgia Strait Air Zone (2017 – 2019) data

Location	No. Valid Years	$PM_{2.5}$ 24-hour Metric (98th percentile, µg/m³)		$PM_{2.5}$ Annual Metric (Annual Average, µg/m³)		Air Zone Management Level
		As Measured	TF/EE Adjustment*	As Measured	TF/EE Adjustment	
Campbell River	3	20	18	7.2	7.0	Goal: Prevent CAAQS Exceedance
Colwood	2	28	18	7.1	6.2	
Courtenay	2	30	28	9.0	8.6	
Crofton	3	23	23	5.1	4.3	
Duncan	2	27	25	8.3	8.0	
Duncan-Deykin Ave.	3	27	20	8.0	7.2	
Langdale	3	35	16	7.3	6.3	
Nanaimo	3	22	13	5.1	4.3	
Port Alberni	3	28	27	9.7	9.3	
Powell River - James Thomson School	3	20	8	3.1	2.5	
Squamish	3	42	14	6.3	5.1	
Victoria	3	22	19	7.7	7.3	
Whistler	3	55	17	7.9	6.0	

**Transboundary flows* TF and *exceptional events* EE adjustment are accounted for cases where CAAQS's are not achieved because of pollutants over which jurisdictions have little or no control. TF's are defined as the transport of air pollution across provincial and territorial boundaries. EE's are events that contribute to air pollution levels in an air zone that are not reasonably controllable or preventable e.g. forest fires by non-controllable causes, intercontinental transport of air pollution.

Level Objectives

Red	Achieve CAAQS
Orange	Prevent CAAQS Exceedance
Yellow	Prevent Air Quality Deterioration
Green	Keep Clean Areas Clean

Appendix B: Air Quality Regulations and Initiatives

Local Government Regulations and Initiatives

Table 1. Local government actions in Comox Valley to address air quality

Action	CVRD	City of Courtenay	Town of Comox	Village of Cumberland
Bylaws regulating and/or prohibiting open burning	X*	X	X	X
Bylaw prohibiting installation of wood burning appliances in new construction		X	X	X
*Wood Smoke Reduction Program***	X	X	X	X
Comox Valley Waste Management Centre composting program	X (drop-off only)	X (drop-off only)	X (collection)	X (collection)

* This CVRD bylaw (258) has open burning restrictions that are limited in geographic scope
** Funding for this program is provided by BC ENV, BC Lung Association and Island Health and Island Health

Table 2. Wood Burning Appliance Regulations

Jurisdiction	Bylaw Banning Wood Burning Appliances in New Building	Bylaw	Bylaw Adoption Date
CVRD Electoral Areas	X	N/A	N/A
K'ómoks First Nation	X	N/A	N/A
Village of Cumberland		The Village of Cumberland Solid Fuel Burning Appliance Bylaw No. 1091, 2018	2018-12-10
Town of Comox		Town of Comox Building Bylaw 1472	2019-03-20
City of Courtenay		City of Courtenay Building Bylaw No. 3001, 2020	2020-04-06

Table 3. Outdoor Burning Bylaw Summary for Local Government Areas

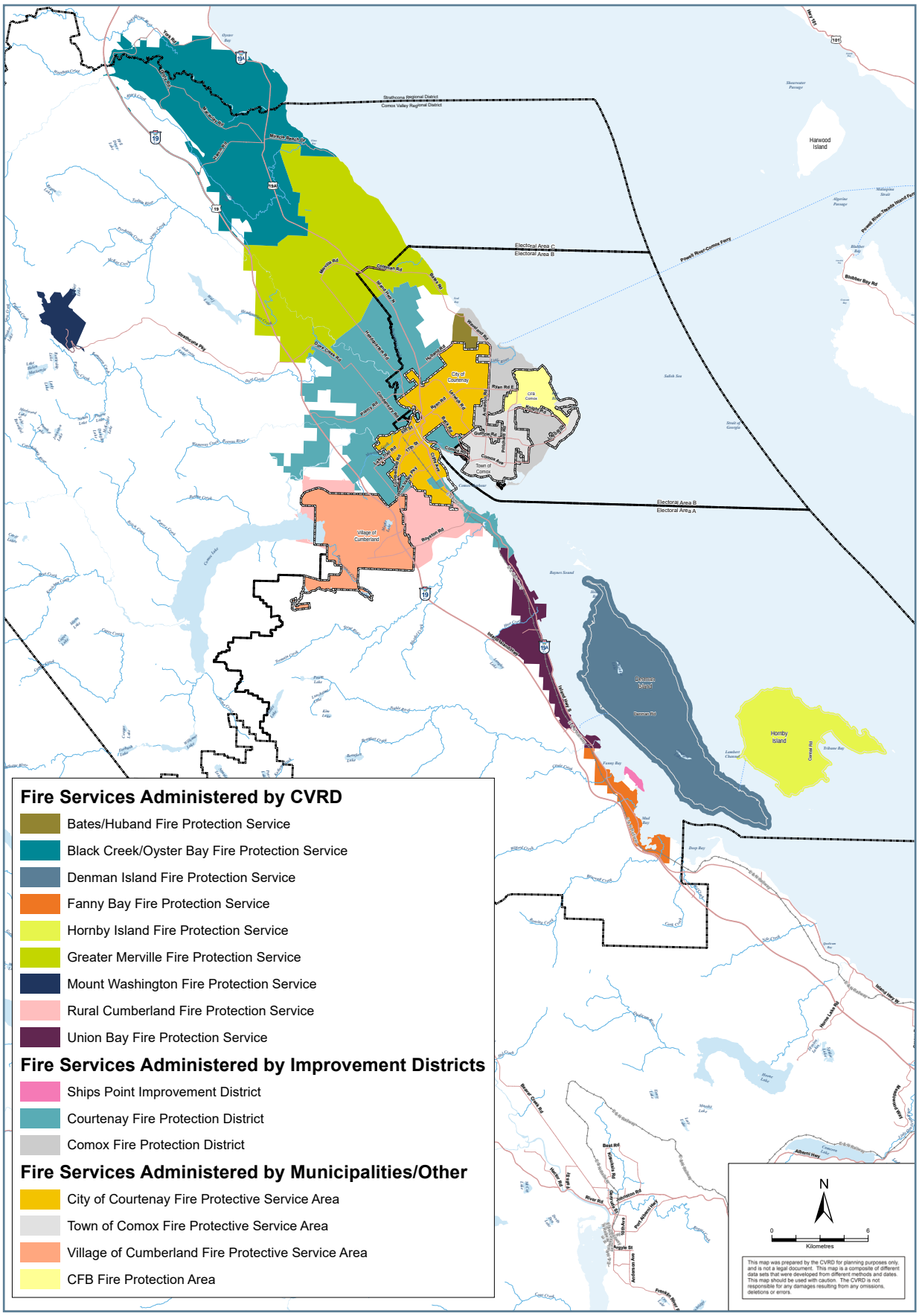
Jurisdiction/Fire Service Area	Bylaw Name and No.	Bylaw Adoption Date
Comox	Town of Comox Bylaw No. 1856	19 April 2017
Courtenay	The Corporation of the City of Courtenay Bylaw No. 2556	09 October 2008
Village of Cumberland	Fire Protection Services and Regulation Bylaw No. 988	11 August 2014
CFB Fire Protection Area	Federal Rules / OBSCR	

Table 4. Outdoor Burning Bylaw Summary for Fire Service Areas (CVRD Electoral Areas)

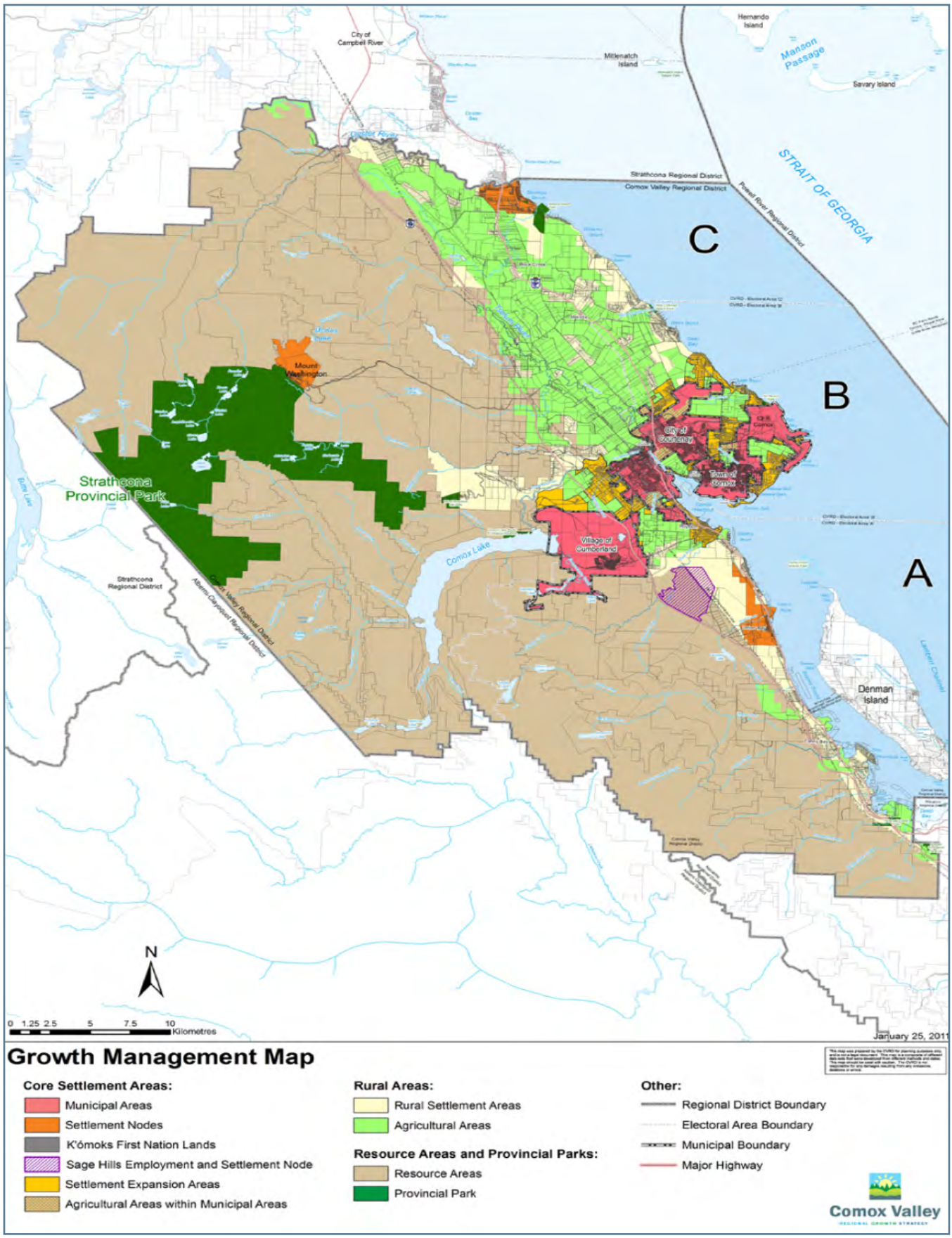
Jurisdiction/ Fire Service Area	Bylaw Name and No.	Bylaw Adoption Date
Black Creek Oyster Bay	Northern Fire Protection Service Areas Regulation Bylaw No. 689, 2022	25 January 2022
Denman Island	Denman Island Fire Control Bylaw No. 281, 2013	26 November 2013
Fanny Bay	Fanny Bay Fire Protection Service Regulation Bylaw No. 283, 2013	26 November 2013
Hornby Island	Hornby Island Fire Protection Service Regulation Bylaw No. 282, 2013	26 November 2013
Tsolum Farnham (CVRD Area C)	Tsolum Farnham Fire Protection Service Regulations Bylaw No. 261, 2013	30 July 2013
Union Bay	Union Bay Fire Protection Service Regulations Bylaw No. 688, 2022	
Rural Cumberland	Rural Cumberland Fire Protection Service Regulations Bylaw No. 258, 2013	30 July 2013
Mount Washington	Northern Fire Protection Service Areas Regulation Bylaw No. 689, 2022	25 January 2022
Greater Merville	Northern Fire Protection Service Areas Regulation Bylaw No. 689, 2023	25 January 2022
Bates Huband	Wildfire Regulation and Act / Comox Fire Department	
Ships Point Improvement District	Ships Point Fire Protection and Regulation Bylaw No. 83	19 May 2002
Courtenay Fire Protection District	Courtenay Fire Hazard Protection Permit Bylaw No. 54	17 April 1996
Comox Fire Protection District	Comox Fire Protection District Bylaw No. 51	
CFB Fire Protection Area	Federal Rules / OBSCR	

This bylaw list was compiled in February 2022. Please confirm with the associated municipalities for current bylaws as they are subject to change.

Map 1. Fire Service Areas Map[33]



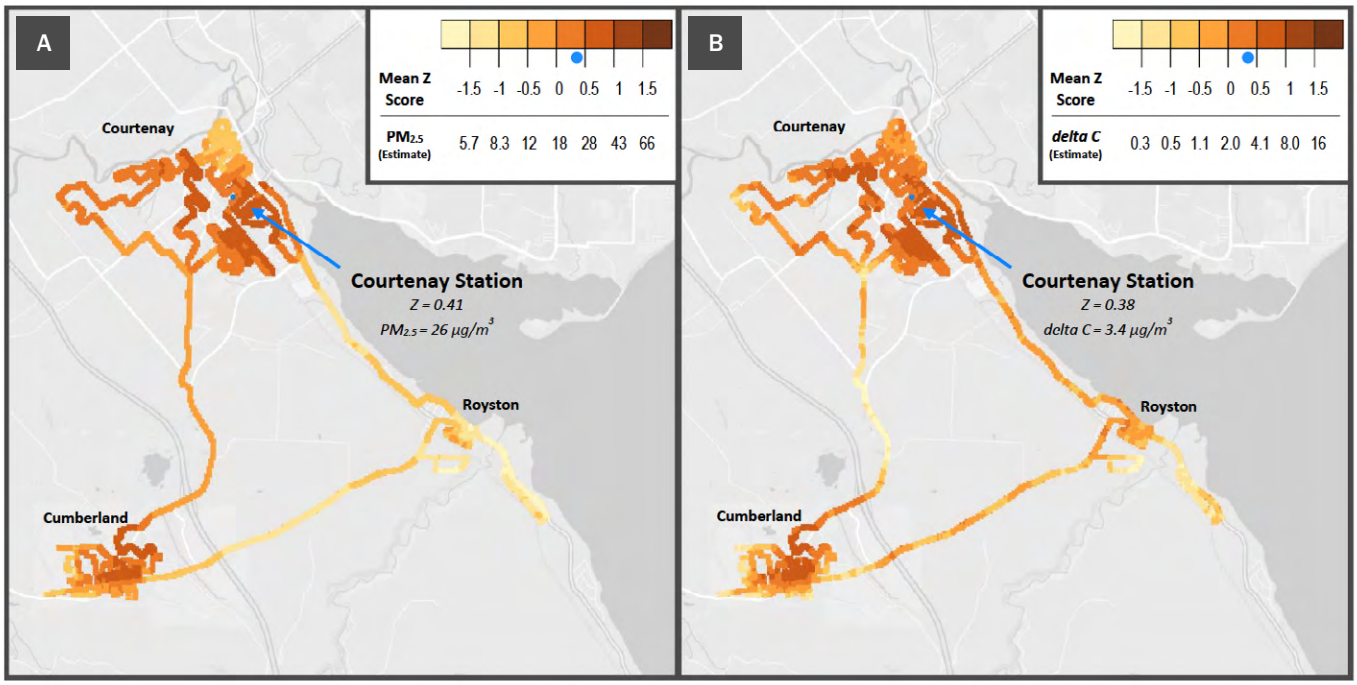
Map 2. Core Settlement Areas Map[34]



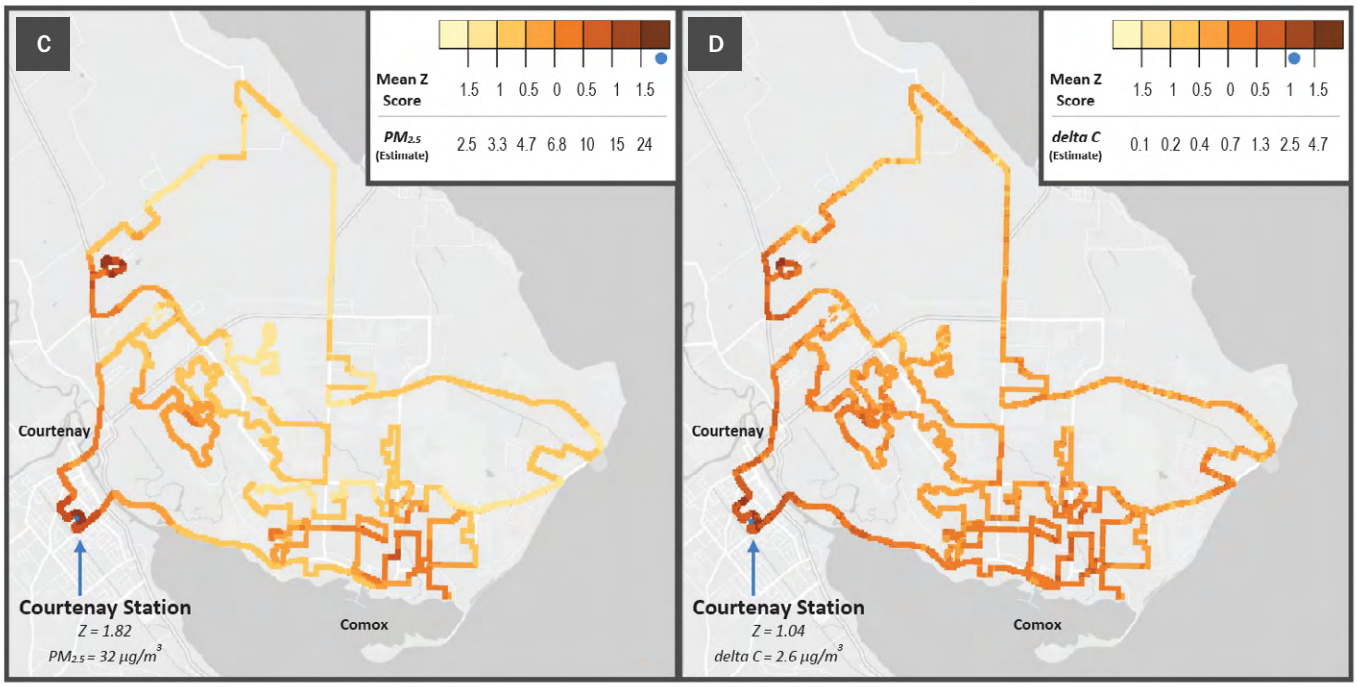
Map 3. 2009 Mobile Nephlelometer Monitoring Study Map

Map 4. 2018 Mobile Monitoring Study Maps (Matthew Wagstaff)[35]

Courtenay and Cumberland Monitoring Route



Courtenay and Comox Monitoring Route



Appendix C: Action Evaluation Matrix

Action	Action Description	Resources (Max 3)	Ease (Max 3)	Goal 1: Reduce $PM_{2.5}$ (Max 2)	Goal 2: Expand Air Data (Max 1)	Goal 3: Air Quality Education (Max 1)	Priority Score (Max 10)	Priority (High/Medium/Low)	Action Timeframe (Short, Med, Long or Ongoing)
1	**Reduce emissions from existing wood burning appliances**								**O**
1A	Collect and maintain data on operating wood burning appliances	1	1	1	1	1	5	Med	O
1B	Develop targeted strategies to enhance cleaner burning education	3	3	2	0	1	9	High	O
1C	Identify, evaluate and update local bylaws related to indoor burning	1	0	2	1	1	5	Med	M
2	**Transition away from using wood and pellet stoves, prioritizing core settlement areas**								**L**
2A	Collect, review and publish data comparing space heating options	1	1	1	1	1	5	Med	O
2B	Assess the societal costs of smoke from wood burning appliances	1	2	1	1	0	5	Med	M
2C	Expand financial support for smoke from wood burning appliance removals	3	2	1	0	1	7	Med	M
2D	Develop local bylaws to phase out use of wood burning appliances in core settlement areas	1	1	2	1	0	5	Med	S
3	**Reduce emissions from recreational fires and eliminate yard waste burning**								**O**
3A	Identify the needs, options and alternatives for debris disposal for all areas	1	1	1	1	0	4	Med	O
3B	Provide outreach on composting, chipping, and other alternatives to burning	2	2	1	0	1	6	Med	O
3C	Identify opportunities to expand current chipping program that includes smoke control measures	1	1	1	0	0	3	Low	O
3D	Review and identify opportunities to update local outdoor burning bylaws	1	1	2	0	1	5	Med	S
3E	Develop educational materials and messages to minimize smoke from recreational fires	3	2	2	0	1	8	High	M

Action	Action Description	Resources (Max 3)	Ease (Max 3)	Goal 1: Reduce $PM_{2.5}$ (Max 2)	Goal 2: Expand Air Data (Max 1)	Goal 3: Air Quality Education (Max 1)	Priority Score (Max 10)	Priority (High/ Medium/ Low	Action Timeframe (Short, Med, Long or Ongoing)
4	**Promote and advocate for alternatives to non-residential open burning**								**M**
4A	Identify and assess sources and quantity of material that could be diverted to compost facilities	1	2	1	1	0	5	Med	O
4B	Identify and research fuel abatement opportunities for non-harvested lands and communicate results	1	2	1	1	1	6	Med	M
4C	Build and understanding of the holistic nature of non-residential wood burning and raise awareness of industry best practices	2	2	1	0	1	6	Med	M
4D	Assess the biomass market development opportunities	1	1	1	0	0	3	Low	S
5	**Expand $PM_{2.5}$ data research and collection to inform actions**								**O**
5A	Expand air monitoring network and conduct ongoing data analysis	2	2	2	1	0	7	Med	O
5B	Conduct studies and monitoring to fill network gaps	2	2	1	1	0	6	Med	O
5C	Identify and establish partnerships for $PM_{2.5}$ research projects to support actions in this plan	2	2	1	1	0	6	Med	M
6	**Expand wood smoke education programs**								**O**
6A	Align education and communication initiatives from the Wood Smoke Reduction Program with the Action Plan	3	2	2	0	1	8	High	O
6B	Identify and incorporate collaborative educational campaigns	3	3	2	0	1	9	High	O
6C	Plan and implement educational events, courses and source funding	3	2	2	0	1	8	High	O

Glossary

Air zone – Air Zone Management is used to assist with air quality management, provinces and territories have defined smaller geographic areas called air zones that divide their jurisdictions and that have unique air quality characteristics. These characteristics may include pollutant sources, topography, meteorological patterns, population density and other potential factors that influence ambient air concentrations.

Airshed – An airshed is a region sharing common airflow patterns hindered by local features, such as mountains and weather, and often exposed to similar levels of air pollution.

AQHI – The Air Quality Health Index (AQHI) is a scale (1–10+) designed to help understand what the quality of the air around us means to our health. It is a tool developed by health and environmental professionals based on air pollutants levels including $PM_{2.5}$ and is used to communicate the health risk posed by air pollution.

AQMS – The Air Quality Management Systems (AQMS) is a comprehensive and collaborative approach by federal, provincial and territorial governments to reduce the emissions and ambient concentrations of various pollutants of concern.

AQO's – Air Quality Objectives (AQO's) are adopted air quality objectives and standards for a number of contaminants, including Particulate Matter (PM_{10} and $PM_{2.5}$), ozone, sulphur dioxide, nitrogen dioxide and carbon monoxide

CAAQS – The Canadian Ambient Air Quality Standards (CAAQS) are developed as a key element of the Air Quality Management System to drive improvement of air quality across Canada. CAAQS have been developed for nitrogen dioxide (NO_2), sulphur dioxide (SO_2), fine particulate matter ($PM_{2.5}$) and ozone (O_3). Ongoing reviews of the CAAQS help ensure they reflect the latest scientific information. The CAAQS are established as air quality objectives under the *Canadian Environmental Protection Act, 1999*.

Campfire – An open fire that burns piled material no larger than 0.5m in width and 0.5m in height used for recreational purposes.

CEPA – The Canadian Environmental Protection Act (CEPA) is an Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development.

CSA Standard – The Canadian Standards Association (CSA) is a Canadian standards development organization that develops and maintains consensus standards to help protect the health and safety of Canadians, enhance Canadians' quality of life, protect the environment, and facilitate trade.

CSA-B415.1standard. Performance Testing of Solid Fuel-Burning Heating Appliances. The standard specifies requirements for performance testing of solid-biofuel-burning heating appliances, including maximum emission rates.

BC ENV – The Ministry of Environment and Climate Action Strategy (ENV) is responsible for the effective protection, management and conservation of BC's water, land, air and living resources. It leads work on climate preparedness and adaptation and leads plans to meet greenhouse gas reduction targets.

MI – Acute Myocardial Infarction (MI) is also known as a heart attack, it is a life-threatening condition that occurs when blood flow to the heart muscle is abruptly cut off, causing tissue damage.

Nephelometer – Instrument used for measuring air quality to estimate $PM_{2.5}$ an instrument for measuring the size and concentration of particles suspended in a liquid or gas, especially by means of the light they scatter.

OBSCR – The *Open Burning Smoke Control Regulation* (OBSCR) regulates land clearing, forestry operations and agriculture, giving the conditions when and where open burning is allowed. It applies to several categories of fire use i.e. category 2 & 3. When diameter exceeds 3cm (partial) and 10cm (full) for local and provincial jurisdictions. Does not apply to campfires or resource management open fires. Also addresses venting and fuel conditions for open burning.[36]

$PM_{2.5}$ – Fine particulate matter ($PM_{2.5}$) are liquid or solid airborne particles smaller than 2.5 micrometres (μm) in diameter. PM may be classified as primary or secondary, depending on the process that led to its formation. PM exists in various sizes and the particles of most concern for human health are those with a diameter of less than 2.5 micrometres ($PM_{2.5}$).

RGS – The Comox Valley Regional Growth Strategy (RGS) is a shared vision for managing growth and community impacts in our diverse urban and rural neighbourhoods. It is a commitment made by the Comox Valley Regional District (CVRD), the City of Courtenay, the Town of Comox, and the Village of Cumberland to work together to promote communities that are socially, economically and environmentally sustainable for generations to come. The RGS is implemented within each community through local Official Community Plans, Infrastructure Plans, and regulatory tools such as zoning.

SFBDAR – The *Solid Fuel Burning Domestic Appliance Regulation* (SFBDAR) requires solid fuel burning appliances sold in BC to meet certified emission standards, and regulates that only untreated seasoned wood or wood products can be burned.

Temperature Inversion – A temperature inversion is a reversal of the normal behaviour of temperature in the troposphere (the region of the atmosphere nearest to the Earth's surface in which a layer of cool air at the surface is overlain by a layer of warmer weather. Air temperatures usually decreases with height under normal conditions.

The Roundtable – The Airshed Roundtable (The Roundtable) is a collaborative framework that was established direction from the CVRD Board on September 17, 2019 to create a collaborative framework for improving air quality in the Comox Valley.

US EPA – The US Environmental Protection Agency (US EPA) is an environmental agency that is responsible for developing and enforcing regulations to protect the environment. The "EPA Standard" means the "New Source Performance Standards, Title 40, Part 60, Sub-part AAA of the Code of Federal Regulations (USA) (7-1-02 Edition)".

VI – The Ventilation Index (VI) is a forecast released daily by Environment and Climate Change Canada. It estimates how well the atmosphere disperses smoke on any given day. The index is similar to a weather forecast, except it provides information on how well smoke will mix into the air.[37]

West Coast Fuel Smoke Management Plan – The West Coast Fuel Smoke Management Plan standardizes smoke management best practices for major forestry companies in the west coast, providing a pathway to maximize opportunities to abate fire hazards and manage smoke emissions responsibly and appropriately. The signatories agree to open burning subject to conditions for a defined period, in a defined area, during which the conditions are assessed for their effectiveness in reducing fire hazard. The Plan provides a forum to ensure that the smoke from fire hazard abatement does not impact communities, public health and safety. The plan includes developing best management practices for piling, curing, and burning woody debris within their operating areas.

Wildfire Act and Regulation – specifies rules and regulations around fire use, fire prevention and wildfire control. It regulates open burning on provincial crown land. Applies on private land and within a local jurisdiction when: there is no structural fire department assigned/responsible for responding to fire in a given area i.e. no formal fire protection area. When there is a structural fire department responsible for responding to fires (Fire Protection area or improvement area but no Local Government open fire bylaws exist.[38]

End Notes

1 https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/courtenay_airquality_report_2011-2016.pdf

2 https://www.canada.ca/en/health-canada/services/publications/healthy-living/2021-health-effects-indoor-air-pollution.htm

3 https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/prov_aqo_fact_sheet.pdf

4 https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/air-zone-reports/2017-2019/georgia_strait_air_zone_report_2017_2019.pdf

5 Mobile Nephelometer Study by K. Poplawski: http://www.llbc.leg.bc.ca/public/pubdocs/bcdocs2010/463390/viha2009airqualitymonitoringreport_1.pdf

6 https://www.env.gov.bc.ca/epd/bcairquality/data/station.html?id=E285829

7 Air Quality Patterns Study: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/courtenay_airquality_report_2011-2016.pdf

8 https://journals.lww.com/epidem/Fulltext/2017/05000/Biomass_Burning_as_a_Source_of_Ambient_Fine.5.aspx

9 Mobile Monitoring Study M. Wagstaff: https://open.library.ubc.ca/media/stream/pdf/24/1.0371217/4

10 Air Pollution and Retinal Vessel Study J. Korsiak: https://www.nature.com/articles/s41598-021-92269-x.epdf?sharing_token=Q_E0Ewr93h0rqyp9VM9qoNRgN0jAjWel9jnR3ZoTv0On2QDbEaCbuDSmxPTx-mrOpBxaPzUNsbQ20vwfrzwjJ1UadJMEt46RYhmybW5tiuNAvvBskZAXvJxxCOGAZg0TOYs3tdM0QP-w80ig1lsV-0qDv22aYgeR1Exfbmxrs1ndY%3D

11 https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/comox_valley_pm_emissions_inventory.pdf

12 https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/openburningregulation

13 https://www.comoxvalleyrd.ca/projects-initiatives/past-current-projects/wood-smoke-reduction-program

14 The Steering Committee and Roundtable membership is provided in the Regional Airshed Roundtable Update (Year One) Report: https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/cvrd_airshed_roundtable_pinnasustainability_year1report.pdf

15 https://www.acrd.bc.ca/247?msclkid=fe7ec931bb4411ec9bb2bc840f801a99

16 https://www.comoxvalleyrd.ca/projects-initiatives/past-current-projects/wood-smoke-reduction-program

17 Cowichan Healthier Home Video: https://www.youtube.com/watch?v=sOxtX9g6hZc

18 http://www.metrovancouver.org/boards/Bylaws1/MVRD_Bylaw_1303.pdf

19 https://www.saanich.ca/assets/Local~Government/Documents/Bylaws~and~Policies/fire-prevention-bylaw-2006-no-8807.pdf

20 https://portalberni.ca/sites/default/files/bylaws/4802_SolidFuelBurning_tm.pdf

21 https://www.acrd.bc.ca/dms/documents/bylaws/regulatory-bylaws/r1030.pdf

22 https://www.comoxvalleyrd.ca/projects-initiatives/past-current-projects/transition-2050-residential-retrofit-acceleration

23 http://www.metrovancouver.org/services/air-quality/AirQualityPublications/HealthEconomicImpacts.pdf

24 https://www.comoxvalleyrd.ca/sites/default/files/docs/Services/CSWM/RuralRoadside/07082021_spring_2021_rural_roadside_collection_consultation_report_final.pdf

25 https://www.comoxvalleyrd.ca/firesmart

26 https://www.rdco.com/en/environment/wood-waste-disposal.aspx

27 https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/natural-resources-climate-change/natural-resources-climate-change-mitigation/forest-carbon-initiative

28 Purple Air Sensor Map: https://map.purpleair.com/1/mAQI/a10/p604800/cC0#10/48.7994/-123.916

29 https://www.fraserbasin.bc.ca/WoodSmokeCourse/story_html5.html

30 https://www.sparetheair.org/

31 https://ccme.ca/en/air-quality-report#slide-7

32 Monitoring Residential Woodsmoke in British Columbia Communities (ubc.ca)

33 https://www.comoxvalleyrd.ca/sites/default/files/images/Projects-Initiatives/3cvrd_fire_protection_areas_map.pdf

34 https://www.comoxvalleyrd.ca/sites/default/files/uploads/bylaws/bylaw-120_comox_valley_regional_district_regional_growth_strategy.pdf

35 Monitoring Residential Woodsmoke in British Columbia Communities (ubc.ca)

36 https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/openburningregulation

37 Categorized as Poor 0–33, Fair 34–54, and Good 55–100. https://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=6d288bc667b24528a5c1e3b4c0373d07

38 https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/11_38_2005

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