Canadian Council of Forest Ministers

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CANADIAN WILDLAND FIRE STRATEGY

A 10-year Review and Renewed Call to Action

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Prepared on behalf of the Wildland Fire Management Working Group
established under the Canadian Council of Forest Ministers

CONTENTS

INTRODUCTION

Over the past 10 years, Canada has witnessed a serious and sustained increase in extreme wildland fire behaviour and wildland-urban interface (WUI) events resulting in threats to life, property and natural resource values being amplified. Impacts to people and communities across the country are increasing. While Canada is internationally renowned for its wildland fire response capabilities, Canadian jurisdictions are reaching the limits of what existing suppression resources can achieve. Our success with suppression should not be understated, but managing wildland fire in the face of growing challenges will continue to put increasing pressure on suppression capacity. Effort needs to be made toward increasing this capacity. An equivalent focus and commitment must also be made toward the shared responsibility for, and marked progress on, prevention, mitigation and preparedness.

In 2005, the Canadian Wildland Fire Strategy (CWFS) predicted a number of the challenges we are now experiencing such as more extreme fire behaviour, increasing wildland fire impacts, increasing effects of climate change and eroding response capacity. While all jurisdictions have made progress on various aspects of the CWFS, advancement has been slower and more costly than originally envisioned. Substantial resourcing (see Table 1) has gone into initiatives that support its strategic objectives; however, actions and investments have been somewhat ad hoc and not always strategically coordinated. A lack of standardized reporting makes it difficult to attribute actions and progress. Circumstances such as climate change, aging infrastructure, increasing industrial development and an expanding WUI have increased implementation costs. As a result, strategic, coordinated and targeted efforts are required or Canada will find itself in a situation where challenges exceed capacity.

Prepared on behalf of the Wildland Fire Management Working Group (WFMWG) established under the Canadian Council of Forest Ministers (CCFM), this report provides a

10-year update on the progress made on the CWFS, outlines required next steps and serves as a renewed call to action. The purpose of this report is not to rewrite the strategy or revisit its goals or objectives (see Appendix 1) since they remain as relevant today as when written. Rather, the purpose of this document is to re-engage senior officials, identify priorities for a renewed emphasis on implementation and enhance horizontal integration plus collaboration so as to reinvigorate the strategy and further realize its goals and objectives.

CURRENT STATE

Background

At the CCFM meeting in October 2005, the CWFS received a declaration of support signed by federal, provincial and territorial forest ministers. At that time, an implementation plan that estimated a required investment of $2.3 billion was developed. While there was no formal agreement established for sharing the costs associated with its execution, the expectation was that the federal as well as all provincial and territorial governments would contribute.

Founded on the principles of risk management and analysis, as well as science and technology, the CWFS was developed to communicate and support a new, innovative vision for wildland fire management in Canada that would foster resilient communities, empower the public, develop healthy and productive forest ecosystems and incorporate modern business practices.

To achieve this desired future state, the CWFS focused on four strategic objectives:

- Public education/awareness and policy/risk analysis.
- A Canadian FireSmart initiative.
- Preparedness and response capability.
- Innovation.

Comprised of senior representatives from agencies responsible for wildland fire from across the country, the WFMWG has undertaken a number of projects in the last decade to advance the analysis and resolution of shared concerns.

In 2008, a CWFS update report summarized progress, outlined what still needed to be done and acted as a renewed call to action at all levels of government. Although this report acknowledged accomplishments, it also highlighted the fact that the strategy was not progressing at the expected rate and that monetary commitments were falling significantly below what was required.

In September 2013, the WFMWG met to evaluate progress and the necessity of re-alignment in strategic direction regarding the CWFS. The working group concluded that the strategy's goals and objectives were still relevant as well as broad enough to encompass emerging needs to improve the management of wildland fire in Canada, but that several challenges (see Appendix 2) as well as opportunities to implementing the strategy existed. The WFMWG also refocused its efforts on developing capacity in fire prevention, loss and mitigation and on developing a plan for collaborative response to the most critical fire situations.

Progress in Canadian Wildland Fire Research in the Last 10 Years

Since 2005, the Canadian Forest Service (CFS) of Natural Resources Canada has played an active role in conducting, coordinating and collaborating on research to advance many of the themes in the CWFS.

For example, the Canadian Forest Fire Danger Rating System has improved the understanding and prediction of fire behaviour. These advances are driven by increasingly sophisticated consideration of forest fuels, including effects such as insect infestations and other changes to

forest structure. Developed in parallel with numerical models of fire behaviour covering a range of spatial and temporal scales, this work facilitates the improved integration of data from all jurisdictions, allowing more national products such as nation-wide mapping of current and projected fire risks.

The CFS has also invested considerable effort into anticipating the possible impacts of a changing climate on fire behaviour and severity. This work has encompassed projections of risk and has examined potential changes in the ecological impacts of wildland fire and overall changes to landscape. For example, the ecological value of forested peatlands was highlighted as scientists examined the relationship between vegetation and fire frequency. The evolving wildland fire regime also plays a significant part in carbon budgets and their role in a changing climatic regime.

The human dimension of wildland fire has been an evolving area of research both in terms of guiding communication on fire and as well as in assessing its impacts on affected individuals and communities. An improved understanding of these impacts facilitates the management of response in relation to fire suppression as well as addressing collateral effects.

Extent and Impact of Wildland Fires in Canada

In Canada, wildland fires have had a significant impact on ecosystems, the economy as well as the health and safety of our communities. On average, 7,084 wildfires have burned 2.72 million[1] hectares each year over the past 10 years, with suppression costs approaching $800 million annually[2]. An average of 20 communities and 70,000 people are affected annually by wildland fire events and more than 8,500 people are evacuated[3]. Between 1980 and 2014, the number of evacuations as well as the number of evacuees has increased and these numbers are expected to continue to rise as communities expand into the WUI and as climate change leads to increase the number, size and intensity of wildland fires.

Close to half of all annual wildland fires in Canada are human-caused. These types of wildland fires tend to be the most destructive as they are often located near populated areas and industrial development. Significant opportunities remain to influence the occurrence of these preventable wildland fires.

The impact of climate change on forest health has, and will continue to, exacerbate the risk of wildland fire in Canada. Wildland fires in the 21st century are becoming more severe in behaviour and more concentrated in occurrence, resulting in an increase in intensity of response efforts and associated costs.

Additionally, the frequency of extreme wildfire events in Canada is also increasing. For example, the 2003 and 2009 fires in British Columbia, the 2010 and 2013 fires in Quebec, the 2011 fire in Slave Lake, Alberta, the 2011 fires across Ontario and Newfoundland, the 2014 fires in the Northwest Territories and the Yukon, the 2015 fires that spanned Saskatchewan, Alberta and British Columbia and the 2016 fire in Fort McMurray, Alberta. These extreme wildland fire events have resulted in an increased loss of homes and property, an increased threat to communities, an increased loss of natural resources and economic opportunities and an increased pressure on fire management resources.

Canadian wildland fire management agencies work collaboratively to share resources including

[1] CIFFC. (2015). Annual Canada Report.

[2] These costs are suppression costs only and do not take into account any other costs (e.g. socio-economic costs).

[3] NRCan. (2016). Wildland fire evacuations. Natural Resource Canada website. Retrieved from: http://www.nrcan.gc.ca/forests/climate-change/forest-change/17787

personnel, aircraft and equipment through the Canadian Interagency Forest Fire Centre (CIFFC). This facilitated resource sharing has proven to be critical in meeting Canada's changing wildland fire response demands. However, pan-Canadian support is becoming more and more not enough and Canadian jurisdictions are increasing their reliance on international resources.

Challenges and Risks

Fire is a natural and essential ecological process in most of Canada's forests and balancing the potential benefits and risks of wildland fire is a complex task. As governments strategize toward meeting Canada's future wildland fire suppression resource demands, they will be faced with several challenges and risks.

Changing Climatic Conditions

Climate change is anticipated to cause greater climatic variability and extreme weather patterns, resulting in longer fire seasons, increasing the number of wildland fires and amplifying the effects of wildland fire, particularly in regions where fire has not been historically prominent. Factors resulting from climate change that will continue to drive increasing prevalence and severity of fire include:

- rising temperatures,
- decreasing soil moisture,
- increasing arid conditions,
- accumulating vegetative fuels that enable and sustain fires,
- shifting of vegetation to more drought-resistant trees and grasslands that are more fire prone and
- decreasing water availability.

Wildland fires caused by lightning and humans are predicted to increase 18% by 2050 and 50% by 2100[4]. The growth of the WUI, expanding industrial development and consequential results of climate change are compounding factors of this projection.

Rising temperatures continue to exacerbate the impact of insect and disease infestations in our forests. The mountain pine beetle in British Columbia and Alberta has significantly increased fuel build-up in many areas in these provinces. Other insect and disease infestations across Canada have resulted in forest flammability reaching its highest level to date.

Canada's wildland fire management agencies and response efforts will be significantly strained in the coming years as the impacts of climate change worsen. Canada must take this future wildland fire risk seriously.

Workforce

Like many organizations, wildland fire management agencies are under human resource pressures due to a large number of retirements, a loss of institutional knowledge, broader shifts in market demand for labour, constraints to budgets and changes in the way Canadians prefer to learn and work. Furthermore, the declining availability of qualified individuals is driving an increasing reliance on retired firefighters, contractors and municipal or local fire departments. Worker stress resulting from lengthening fire seasons and extreme fire behaviour is also of concern.

The CWFS predicted most of the human resource conditions that agencies are currently dealing with. However, the CWFS did not anticipate the economic downturn in 2008, which has restricted the ability of governments to address these concerns.

[4] Stocks, B.J, (2013). Evaluating Past, Current and Future Fire Load Trends in Canada. CIFFC.

Public Risk and Concern

Canada has experienced a recent surge in urban and industrial expansion into forested areas, exponentially increasing the risk of wildland fire starts. The increase in community development and industrial investments including pipelines, transmission lines, windmill farms, hydro dams and rail lines is also increasing the economic risk of wildland fires as well as budgetary and resource pressures on fire agencies. As the WUI continues to expand, the safeguarding of lives and property will remain a top priority in wildland fire response.

Since the development of the CWFS, efforts have been made to develop and implement FireSmart initiatives including a series of manuals developed for different target audiences such as homeowners, community leaders and, in cooperation with the Canadian Association of Petroleum Producers, for oil and gas infrastructure. Some communities located in WUI areas have engaged in FireSmart practices; reducing flammable vegetation around and within communities and building structures with fire resistant materials. Some local and provincial governments have financially supported communities to receive a FireSmart designation. However, the vast majority of communities across Canada are still not engaged in these types of initiatives.

First Nations communities continue to be seriously impacted by wildland fire and are the largest group impacted by evacuations due to wildfires threats. To that end, several agencies have been working with Indigenous and Northern Affairs Canada (INAC) to cooperatively deliver FireSmart projects. In some jurisdictions, cooperative effort with INAC has enabled First Nation communities to access provincially funded FireSmart grants for planning and undertaking FireSmart work and education.

Public health and safety concerns related to wildland fire are also on the rise. The Public Health Agency of Canada notes that as wildland fires increase in extent and intensity, their effects on human health will also increase. There is strong evidence that smoke from wildland fires compromises respiratory health and its effects are exacerbated in the elderly and in those with chronic respiratory conditions. There is also emerging evidence linking smoke from wildland fires to heart-related problems[5].

Additionally, smoke from wildland fires is increasingly affecting air quality in urban centres, even those often far removed from fires. The future of wildland fire management must acknowledge and responsibly consider the growing evidence that smoke mixed with urban pollution creates significant health risk in highly populated areas.

Wildland Fire Costs

Response expenditures are rising due to the increasing size and intensity of wildland fires and their subsequent threat to public safety. Typically, the cost of a fire is reported as the total cost of response (staff, equipment and supplies); however, these costs represent a mere fraction of the actual economic, social and environmental impacts associated with many larger wildland fires.

The economic impacts of wildland fires include the loss of valuable timber, damage to private property plus public infrastructure and the significant costs involved in the evacuation of communities and the disruptions to economic activity resulting from road and rail closures. The frequency of preventative evacuations to limit the effects of smoke on human health is increasing with a corresponding increase in wildfire-related costs. Communities and businesses also suffer other less obvious economic losses for some time following a fire. These additional indirect costs that affect the

[5] Public Health Agency of Canada. (2015). Climate change, forest fires and your health. *Public Health Agency of Canada website.*

local community are of great concern and often far exceed the cost of fire suppression.

The increasing direct costs of wildfire continue to be a challenge for federal, provincial and local governments as well as fire managers. Indirect costs such as lost productivity or disruptions to infrastructure tend to have their strongest impact outside of government. Canada needs to be looking at ways to mitigate costs in the longer-term including strategic investment in prevention, mitigation and preparedness.

PROGRESS TOWARD DESIRED FUTURE STATE

Over the past 10 years, jurisdictions have made progress toward and investment in, activities which support the four strategic objectives of the CWFS. Highlights of achievements to date include[6]:

Public education/awareness and policy/risk analysis

- Development of new wildland fire management strategies and completion or updates to current plans.
- Development of public education programs and guidebooks.

Canadian FireSmart initiative

- Development and introduction of provincial FireSmart strategies and programs.
- Development and distribution of educational FireSmart products and activities.
- Development of FireSmart branding so as to increase and renew public awareness of WUI wildland fire issues.
- Significant progress on implementation of the Strategic Wildfire Prevention Initiative.
- Creation of FireSmart and Wildfire Management Specialist positions.

Preparedness and response capability

- Modernization and expansion of air and ground fleet.
- Construction of and upgrades to infrastructure.
- Community mitigation projects.
- Development and training of firefighting staff and volunteer fire fighters.

Innovation

- Enhancement of the Canadian Forest Fire Danger Rating System (CFFDRS) with next generation models that form the foundation of all operational decision support systems in Canada.
- Expansion of the Canadian Wildland Fire Information System (CWFIS) through new knowledge, tools and enhanced collaboration.
- Development of the Fire Monitoring Accounting and Reporting System (FireMARS), which estimates annual emissions from wildland fire for annual reporting submitted to the United Nations Framework Convention on Climate Change (UNFCCC).
- Assessment of wildland fire impacts and mitigation behaviour to expand knowledge about the impacts of wildland fire on communities as well as homeowners and identify actions that will mitigate wildland fire risks, through programs such as FireSmart.
- Development of operational smoke forecasting systems by CFS researchers, working in collaboration with colleagues from universities, plus provincial and territorial governments to reduce the impacts of wildland fire smoke on Canadians.

[6] A full list of achievements is available from WFMWG.

Although progress has been made on all of the strategic objectives of the CWFS, advancement is ultimately uneven as well as incomplete and much remains to be done.

Table 1 provides a 10-year summary of investments made in the CWFS, as reported by individual jurisdictions.[7]

Table 1. Projected vs. Actual CWFS Expenditures (millions).

Strategic Objective	Projected 10-year Expenditures (2005-2015)	Actual 10-year Expenditures (2005-2015)
Education/Awareness & Policy/Risk Analysis	$29.9	$20.2
FireSmart	$885.3	$213.9
Fire Response Preparedness	$1,361.3	$1,171.9
Innovation	$49.8	$70.6
Total	$2,326.3	$1,476.6

Significant investment in wildland fire management has been made by governments; however, strategic, coordinated and targeted investment is needed to expedite progress on the strategic objectives of the strategy and overcome escalating implementation costs.

[7] It must be noted that investment in the CWFS has been somewhat ad hoc and uncoordinated, which has led to some inconsistency and difficultly in reporting on CWFS investments. In addition, it is difficult to say what level of investment can be directly attributed to the CWFS as opposed to that which would have occurred in the absence of the strategy.

NEXT STEPS

To continue to move forward with the strategic objectives of the CWFS, the WFMWG has identified the following specific actions as critical:

- recommit to the strategy,
- enhance horizontal collaboration and integration,
- increase investment in innovation
- enhance prevention and mitigation capability,
- enhance commitment to FireSmart and
- increase preparedness capacity.

Recommit to the Strategy

In order to achieve the strategic objectives of the CWFS and position Canada to meet the significant challenges ahead, a commitment of time, resources and support is imperative. The CWFS needs to be re-established as a priority with all levels of government and actions must accelerate.

Enhance Horizontal Collaboration and Integration

Wildland fire is not just a forestry issue, it is also a significant public safety, climate change, public health and First Nation community issue and needs to be on the national radar as such. Enhanced collaboration between federal, provincial and territorial agencies needs to be a focus moving forward.

The need for collaboration among land managers, government agencies, local governments and across Canadian wildland fire jurisdictions has become more pressing. Canada has demonstrated world-leading collaboration in wildland fire response and long-term planning through CIFFC and the WFMWG, but progress is slow. Increasing challenges require sustainable structures for shared risk

management. Going forward there must be an enhanced focus on shared information and information systems, collaborative decision-making and decision-support tools and evidence-based analysis of strategic solutions.

Increase Investment in Innovation

Canada's capacity in fire response has been built on past investments in science, decision analysis and practical technology application. From aircraft design to suppression systems to computer-based fire behaviour predictions the investment in science and the university trained people who carry out such work has consistently diminished. The problems of the future will not be resolved by relying on the science of the past nor will they be resolved without focused programs in government and universities.

Enhance Prevention and Mitigation Capability

Considerable efforts must be made toward improving Canada's prevention and mitigation strategies to protect communities and industrial development as well as decrease the socio-economic risk and costs from future wildland fires. It is imperative that this capacity is developed through:

- reducing hazardous fuels,
- expanding landscape fire management activities,
- assessing wildfire hazard through fire growth models,
- mandating engineering specifications for community expansion and new infrastructure developments,
- improving planning through collaboration and consultation with communities, First Nations and stakeholders and
- increasing community responsibility and engagement.

The benefits of enhancing prevention and mitigation capacity have been realized by a handful of communities who were spared major wildland fire damage as a result of successful initiatives to date.

Enhance Commitment to FireSmart

Initiatives and programs that support the establishment of resilient communities are of critical importance. As the WUI expands, communities must mitigate and prepare for wildland fire. The effective implementation and investment in Canada's FireSmart initiative will engage homeowners and local communities in building communities in Canada that are more fire resilient.

Some progress has been made to engage communities across the country in FireSmart initiatives, but the vast majority of communities remain unengaged. It is anticipated that most communities threatened by wildland fire are in regions whose burn areas are projected to increase 50-200% as a result of climate change. The FireSmart concept has grown but will require focused investment in both sustained coordination and local projects to develop plans and community engagement.

Increase Preparedness Capacity

Wildland fire response efforts have increased substantially over the past 15 years in response to the increase in fire severity and occurrence. During extreme fire events, Canada's response efforts have become maximized. As a result, preparedness capacity must be improved through:

- enhancing firefighting capacity, including training and employment of First Nations, to address national needs and reduce local attrition of skills,
- reviewing and renewing critical assets such as fire-qualified personnel, aircraft and equipment inventories,

- maintaining or replacing critical infrastructure and
- developing solutions to human resource challenges.

CONCLUSION

Canada has made important progress on the implementation of the CWFS over the past 10 years; however, progress has been slower and more costly than anticipated. The federal, provincial and territorial governments must recommit to the strategy as partners and effectively support its continued implementation to ensure that Canada is able to meet the challenges that lie ahead.

APPENDIX 1: GOALS OF THE CWFS

Resilient communities and an empowered public

- Inform and engage the public through wildland fire awareness and information initiatives and communicate the appropriate response concept to professionals, politicians, and the public.
- Share responsibility through development of integrated government policies clearly defining the risks, roles, and responsibilities of all constituencies (individuals, communities, industries, and governments).
- Minimize the risk to public safety and property by developing and implementing a Canadian FireSmart initiative with distinct components addressing mitigation, preparedness, response, and recovery.
- Initiate a directed and integrated program of physical and social science research and technology transfer on WUI issues.

Healthy and productive forest ecosystems

- Integrate land, forest, and fire management policies and practices such that fire management policies and actions are derived from explicit land and forest management objectives. In addition, ensure that land and forest management policies consider the biological, ecological, and physical characteristics of wildland fire.
- Reintroduce and/or maintain fire on parts of the landscape by appropriate means, including prescribed fire, with the goal of maximizing biodiversity, ecological integrity, and productivity in fire-dependent ecosystems.

Modern business practices

- Maintain an economically efficient and world-class wildland fire preparedness and response capability through long-term replacement of deteriorating equipment and infrastructure, implementing Canadian training standards, and recruiting and training personnel at universities and community colleges.
- Build effective partnerships and innovative institutional arrangements for reducing inter-annual variability of wildland fire management expenditures through the development and use of a Canadian interagency operational preparedness system, and foster effective communication and adaptive management through Canada-wide workshops and information-sharing sessions.
- Develop innovative risk- and cost-sharing approaches consistent with insurance principles.
- Adopt a culture of continuous improvement in policy and practice by establishing a collaborative analysis group to carry out policy assessments and analyses of level of protection, and initiate a directed program of fire science and innovation coupled with a comprehensive program of technology transfer.

APPENDIX 2: CWFS IMPLEMENTATION CHALLENGES IDENTIFIED BY WFMWG

In its assessment of progress on the implementation of the CWFS in 2014, the WFMWG identified several challenges and opportunities:

- The partnership of wildland fire agencies continues to support the goals of the CWFS, however capacity issues have affected the ability to advance the strategic priorities and need to be addressed. The challenge is not what needs to be done or why, but how to advance the agenda.
- Canadian preparedness for a major fire event continues to be a priority; the capacity of the agencies must be best applied to protect public safety and reduce damages at both jurisdictional and pan-Canadian scales. The credibility of wildland fire agencies and Canadian cooperation will be tested in such a situation and the need for a National Response Plan to prepare for future wildland fire management challenges was identified in the CWFS but development of such a plan has yet to begin.
- Budget pressures and constraints are being experienced by many agencies, (the WFMWG recognizes that the necessary focus of all governments on economic issues following the 2008 world financial crises has reduced both senior management's focus on this work and capacity to expand our efforts).