



Regional District of Central Kootenays

Area G and Salmo Community Wildfire Protection Plan Update - 2017

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& Associates Ltd.**

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Area G and Salmo
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Update – 2017**

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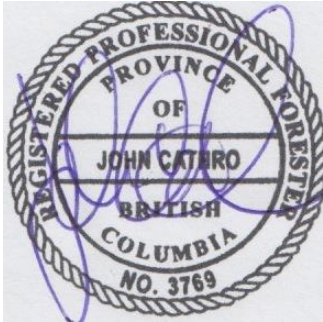

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I certify that I have reviewed this document and I have determined that this work has been done to standards acceptable of a Registered Professional Forester.		I certify that I have reviewed this document and I have determined that this work has been done to standards acceptable of a Registered Professional Forester.	

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In addition, the authors would like to thank for their cooperation, input, and insight: Ministry of Forests, Lands, Natural Resource Operations and Rural Development staff including Tara DeCourcy, District Manager Selkirk Resource District; Garth Wiggill, Director/Strategic Initiatives Kootenay Boundary Region; and Curt Nixon, Tenures Forester as well as BC Wildfire Service Southeast Fire Centre Fuels Management Specialist Mike Morrow. This report would not be possible without the Strategic Wildfire Prevention Initiative (SWPI) Program and funding from the Union of British Columbia Municipalities (UBCM).

EXECUTIVE SUMMARY

The Community Wildfire Protection Plan (CWPP) Program was created in British Columbia (BC) as a response to the devastating 2003 wildfire in Kelowna. As an integral part of the Strategic Wildfire Prevention Initiative, managed and funded through the Union of British Columbia Municipalities, CWPPs aim to develop strategic recommendations to assist in improving safety and to reduce the risk of damage to property from wildfires. In 2008, Community Wildfire Protection Plans were completed for Regional District of Central Kootenay (RDCK) Fire Protection Areas within Electoral Area G to guide the Regional District in wildfire risk reduction and mitigation activities.

This document updates the applicable 2008 CWPPs (collectively referred to as the 2008 CWPP) and the threat of wildfire within and around communities within Area G. This 2017 CWPP Update reflects changes in communities and current conditions throughout Area G using the current provincially accepted standard methodology and baseline data for hazard and threat analysis. This CWPP Update also examines the effectiveness of completed work, identifies opportunities for improvement within existing programs, and describes future initiatives. Significantly, the RDCK is engaging in collaborative planning and implementation of wildfire risk reduction activities within the Wildland Urban Interface (WUI) with local licensees, First Nations, and adjacent jurisdictions. This landscape level approach is reflected in the CWPP

Wildfire management requires a multi-faceted approach for greatest efficacy and risk reduction. Five key areas where changes can be made to address community wildfire risk are identified in this CWPP Update and include:

1. Communication and Education;
2. Structure Protection;
3. Planning and Development;
4. Emergency Preparedness; and
5. Vegetation/Fuel Management.

A total of 49 prioritized wildfire mitigation recommendations are made in this CWPP and summarized below. While it is recognized that the RDCK will not likely have the resources required to act upon all recommendations, it is recommended that the Regional District review and identify resource requirements and develop a timeframe for implementation of recommendations as funding and resources allow.

SUMMARY OF CWPP RECOMMENDATIONS

Table 1: Summary of CWPP recommendations

Item	Priority	Recommendation	Estimated Cost (\$)
Communication and Education			
Objective: To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner responsibility.			
1.	High	Establish a school education program to engage youth in wildfire management. Consult ABCFP, BCWS (the zone) and RDCK Fire Service to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in elementary and/or secondary schools. Educational programming can be done in conjunction with any currently running fire prevention education programs.	\$5,000
2.	High	Make summaries of this report and associated maps publicly available through webpage, social media, and public FireSmart meetings. Add fire threat spatial data to the interactive web-mapping tool to allow residents to find their property and the associated threat of wildfire.	Within current operating costs
3.	Moderate	Participate in the National Wildfire Community Preparedness day, typically in May each year.	\$2,500
4.	High	Expand door-to-door FireSmart assessment and/or Home Partner Program within the Area G and Salmo interface in order to educate residents and to quantify the level of risk in the interface.	\$20,000
Objective: To enhance the awareness of elected officials and stakeholders regarding the resources required to reduce fire risk.			
5	High	Develop regional development permit standards and align local government bylaws.	\$30,000
6.	High	Provide a group voice to the Building and Safety Standards Branch and other provincial entities,	Within current operating costs

Item	Priority	Recommendation	Estimated Cost (\$)
7.	High	Develop a coordinated approach to fuel management and hazard reduction within and adjacent to Area G and Salmo by coordinating with stakeholders including conservation organizations, communities, forest licensees, Ministry of Transportation and Infrastructure and utility companies, to aid in the establishment of FireSmart activities and large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas.	\$25,000
Structure Protection and Planning			
Objective: Enhance protection of critical infrastructure from wildfire.			
8.	High	Complete a fire flow / water vulnerability assessment for each water system and identify and map all alternative water sources (reservoirs, streams, lakes, etc.). Identify which areas may have insufficient or unreliable water supplies and provide recommendations to reduce vulnerability in Area G and Salmo. Explore collaboration with other agencies including Columbia Basin Trust, Ministry of Environment, Ministry of Transportation and Infrastructure and Interior Health Authority.	\$20,000
9.	High	Complete a vulnerability assessment of all critical infrastructure (not only RDCK critical infrastructure) including water infrastructure in interface areas with FireSmart recommendations.	\$20,000
10.	High	Develop alternative, back-up water sources for fire protection, and the establishment of standpipes as required.	Based on assessments
11.	High	Complete a detailed review of back-up power source options for all critical infrastructure and upgrade as required.	Review: \$20,000 Upgrade: Based on review
12.	High	Complete more detailed hazard assessments and developing, in collaboration with other available government funding, response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods.	\$25,000
13.	High	Establish a Joint Responsibility Area around the Village of Salmo in which Salmo and the RDCK will collaborate for wildfire response and initiatives.	

Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.			
14.	High	Support homeowners with professionals to provide the Home Partners Program or WUI Site and Structure Hazard Assessments for interface homes and provide information to homeowners on specific steps that they can take to reduce fire hazards on their property. Homeowners should not be charged for these assessments.	\$160 per house
Local Government Policy			
Objective: To reduce wildfire hazard on private land and increase FireSmart compliance.			
15.	High	Complete OCP review and implement and / or strengthen zoning to expand reach of the existing.	Within current operating costs
16.	High	Develop Wildfire Hazard Development Permit (DP) Areas for major retrofits / renovations or new builds (building permits), collecting bonds to be returned upon evidence of completing development and landscaping according to wildfire hazard assessment. Review District of North Vancouver and Kelowna DP processes, with particular attention to implementation, enforcement, affordability and associated liabilities. Explore proactive incentives, such as tax reductions and reduced building permit fees.	\$25,000
17.	High	Obtain legal advice regarding the Building Act, specifically regarding the temporarily unrestricted matters and local government authority to set exterior building materials requirements. Use local government authority to mandate FireSmart construction materials beyond BC Building Code in wildfire hazard development permit area, as allowed.	\$10,000
18.	High	Develop a landscaping standard to be applied in interface / DP areas. The standard should list flammable non-compliant vegetation, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Include meeting landscaping standard as a requirement of Development Permit. Review District of North Vancouver and Kelowna DP processes, with particular attention to implementation, enforcement, affordability and associated liabilities. Explore proactive incentives, such as tax reductions and reduced building permit fees.	Within current operating costs
19.	High	Proactively enforce wildfire covenants requiring owners to maintain their properties hazard free on all properties in Development Permit areas. Enforcement will serve to minimize fuel risks on problematic private properties that have allowed hazardous accumulation of fuels and provide improved protection to adjacent lands.	Budget required for additional bylaw enforcement capacity

Item	Priority	Recommendation	Estimated Cost (\$)
20.	High	Develop a landscaping standard to be applied in interface / DP areas to ensure that developers leave building set backs on private land so that there is a minimum of 10 m distance between buildings and forest interface.	Within current operating costs
21.	High	Consider developing an outdoor burning bylaw specifying requirements for and limitations to outdoor burning and, in conjunction with the Fire Chief, implement the bylaw at times of high fire danger when provincial bans are not in place. The bylaw should consider effective and efficient enforcement measures and powers.	Develop bylaw within current operating costs Budget required for additional bylaw enforcement capacity
22.	Moderate	Work with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the interface to prevent the spread of wildfire.	Within current operating costs
Emergency Response and Planning			
Objective: To improve structural and wildfire equipment and training available to RDCK Fire and Rescue.			
23.	High	Conduct annual mutual aid training with MFLNRORD and BCWS including completion of a mock wildfire simulation in coordination with BCWS and safety training specific to wildland fire and risks inherent with natural areas. As part of the training, conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well versed in their set-up and use. Wildfire training should follow Office of the Fire Commissioner standards.	Within current operating costs
24.	High	Ensure RDCK Wildfire Mitigation Coordinator act as liaison between the RDCK Collaborative Planning Group and the Emergency Preparedness Committee for Area G, as well as organizations in the municipality of Salmo. Coordination and information sharing are crucial to the development of a community well prepared for wildfire.	Within current operating budget.
25.	Moderate	Review and clarify SPU request procedures with RDCK fire Chiefs and ensure robust SPP115 training for fire fighters.	Within current operating budget.
26.	Moderate	Develop Regional Service to fund additional SPUs and maintain existing SPUs.	\$50,000 (Annually)

Item	Priority	Recommendation	Estimated Cost (\$)
27.	Moderate	Explore opportunities to collaborate with BCWS and within RDCK fire service to coordinate discount volumes of hose for interface fires, reducing costs and logistics to local fire departments	Within current operating costs
28.	High	Explore opportunities to ensure a duty officer is in place in each Fire Protection Area to provide coverage for periods of high or extreme hazard.	To be determined based on current rates.
29.	Moderate	Conduct fire preplan assessment for key interface areas in Area A. Other jurisdictions have completed assessments that prioritize fire department-specific variables, such as distance to hydrants, response time from nearest fire station, etc. to produce local risk ratings.	\$5,000
Emergency Response Evacuation and Access			
Objective: To improve access and egress to neighbourhoods at risk and natural areas within RDCK.			
30.	High	Develop a Total Access Plan to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. Fire threat mapping from this CWPP should be included. The plan should be updated every five years, or more regularly, as needed to incorporate additions or changes.	\$8,000 + updating costs
31.	High	Require that all new interface developments have access for evacuation and sufficient capacity for emergency vehicles.	Within current operating costs
32.	Moderate	Facilitate completion of emergency planning zones for interface neighbourhoods with limited access	Within current operating costs
Fuel Management			
Objective: Reduce wildfire threat on public lands through fuel management.			
33.	High	Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified in this CWPP. Collaboration with licensees may facilitate larger projects.	UBCM ICRI, CBT, FES BC Funding / local government Funding as available
34.	High	Prioritize Areas of Interest across Electoral Areas with updated CWPPs to ensure effective and objective treatment	Within current operating costs

Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Maintain treated areas under an acceptable level of wildfire fire threat (moderate).			
35.	Moderate	As treatments are implemented, complete monitoring within 10 years of treatment (subject to site conditions) and maintenance every 15-20 years (subject to prescription and site conditions) on previously treated areas. Treated areas should be assessed by a Registered Professional Forester, specific to actions9**- required in order to maintain treated areas in a moderate or lower hazard.	UBCM ICRI, CBT, FES BC Funding / local government Funding as available

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SECTION 1: INTRODUCTION

The Community Wildfire Protection Plan (CWPP) Program was created in British Columbia (BC) to aid communities in developing plans to assist in improving safety and to reduce the risk of damage to property. The Program was developed in response to recommendations from the “Firestorm 2003 Provincial Review” (Filmon, 2003).

The Regional District of Central Kootenay and Electoral Area G (Area G), as well as the Municipality of Salmo, retained Cathro Consulting Ltd to complete an update to the 2008 Community Wildfire Protection Plan completed for Salmo and Ymir by B.A. Blackwell and Associates Ltd. This 2008 CWPP is the only formal CWPP previously completed in Area G that overlaps with the current Area of Interest.

1.1 Purpose

Since 2008 considerable new development in the Wildland Urban Interface (WUI) has occurred. These areas either were not previously assessed for hazard, or the hazard and associated threat has increased due to the location and siting of the new development in relation to the assessment polygons. This CWPP update provides a reassessment of the level of risk with respect to changes in Area G and reflects current conditions. In addition, methods for

assessing wildfire threat have evolved since 2008. This update uses the provincially accepted standard methodology and baseline data for hazard and threat analysis.

Specifically, the objectives of this update are to:

- Summarize implemented recommendations from the 2008 CWPP;
- Summarize wildfire risk mitigation actions implemented by the RDCK that may be outside the recommendations of the 2008 CWPP;
- Provide the RDCK with an updated threat assessment;
- Prioritize mitigative action recommendations to address communication and education, structure protection, emergency response, and fuel management;
- Provide a prioritized maintenance schedule for the areas that have been treated; and,
- Provide a current document that highlights best practices for smoke management and safe prescribed burning practices, as well as explores alternative avenues for reducing woody debris on fuel treatment areas.

This CWPP update will provide the RDCK with a framework that can be used to identify methods and guide future actions to mitigate fire risk in the community. The scope of this project included three distinct phases:

1. Assessment of fire threat to spatially identify those areas of electoral Area G and Salmo most vulnerable or at highest risk of fire;
2. Consultation with representatives from RDCK's staff, Fire Departments, Ministry of Forests, Lands and Natural Resource Operations (MFLNRORD), BC Wildfire Service (BCWS), Union of British Columbia Municipalities (UBCM), residents, stakeholder groups, licensees, and First Nations to assist with defining the objectives for wildfire protection, and to develop the mitigation strategy alternatives that would best meet the needs of Area G and Salmo; and
3. Development of the Plan which outlines measures to mitigate the identified risk through communication and education programs, structure protection, emergency response and management of forestlands adjacent to the community.

1.2 CWPP Planning Process

This is an update to the 2008 Community Wildfire Protection Plan completed within the RDCK Area G (2008 Salmo and Ymir CWPP's) and accounts for changes to forest fuel types due to forest growth, forest health, windthrow, forest harvesting, forest fires, and new developments. This project has been undertaken with funds from the Strategic Wildfire Prevention Initiative (SWPI), administered through the Union of BC Municipalities (UBCM). The broad goals of this project are to restore and maintain landscapes, create fire adapted communities, and promote safe, effective, efficient wildfire response.

These objectives are achieved by creating an action plan that focuses on these fundamental components of a CWPP:

1. Communication, Education, and training;
2. Structure Protection;
3. Planning and Development;
4. Emergency Response; and,
5. Vegetation (Fuels) Management.

The CWPP update was developed in seven general phases:

1. Background research - general community characteristics, such as demographic and economic profiles, critical infrastructure, environmental and cultural values, fire weather, fire history, relevant legislation and land jurisdiction.
2. Initial GIS analyses - updating fuel typing, creating threat polygons for Area G, assigning initial threat based upon fuel type, aspect, slope, and proximity to structure.
3. Field work - site visits to the area allow for 1) meetings with RDCK staff; 2) fuel type verification; 3) completing hazard assessment forms; 4) ground-truthing initial threat ratings, and; 5) identification of site specific issues.
4. Consultation - meetings and consultation with MFLNRORD District staff and RDCK Fire Department representatives, residents, licensees, infrastructure providers, private land owners, adjacent communities, stakeholders, and First Nations.
5. Secondary GIS analyses - final fuel type updating and threat rating based upon field ground-truthing and results of hazard assessment forms.
6. Report and map development - identification of RDCK challenges and successes, identification of measures to mitigate risks, and recommendations for action.
7. Report review - By RDCK staff as well as representatives from the Selkirk Resource District, and BCWS. Note, that all identified First Nations must be consulted during detailed assessment and prescription development for any fuel treatments and prior to any fuel treatments proceeding.)

Reducing the level of wildfire risk to RDCK Area G is the main focus of the CWPP. This document makes specific recommendations (planning tools) on how risk can be reduced by making changes to these five elements. A detailed methodology on the threat analysis can be found in Appendix 2.

In order to protect the significant ecological, cultural, and economic values of the surrounding forests the RDCK has made progress at implementing recommendations from the 2008 CWPP. The RDCK has shown provincial leadership in many aspects of wildfire mitigation activities, acknowledging the deep connection that residents in this electoral area have to forest industry jobs, various recreational uses (mountain biking trails, rock climbing, etc), aesthetics, and important ecosystem values such as water.

This document acknowledges work completed, assesses progress to implementation of recommendations in the 2008 CWPP, offers improvements to currently existing programs, and recognizes opportunities for improvements and new initiatives. A summary of the most pertinent recommendations can be found throughout the document in the relevant sections, with highlights summarized on page 4. A comprehensive table of recommendations and implementation status can be found in Appendix 4.

SECTION 2: LOCAL AREA DESCRIPTION

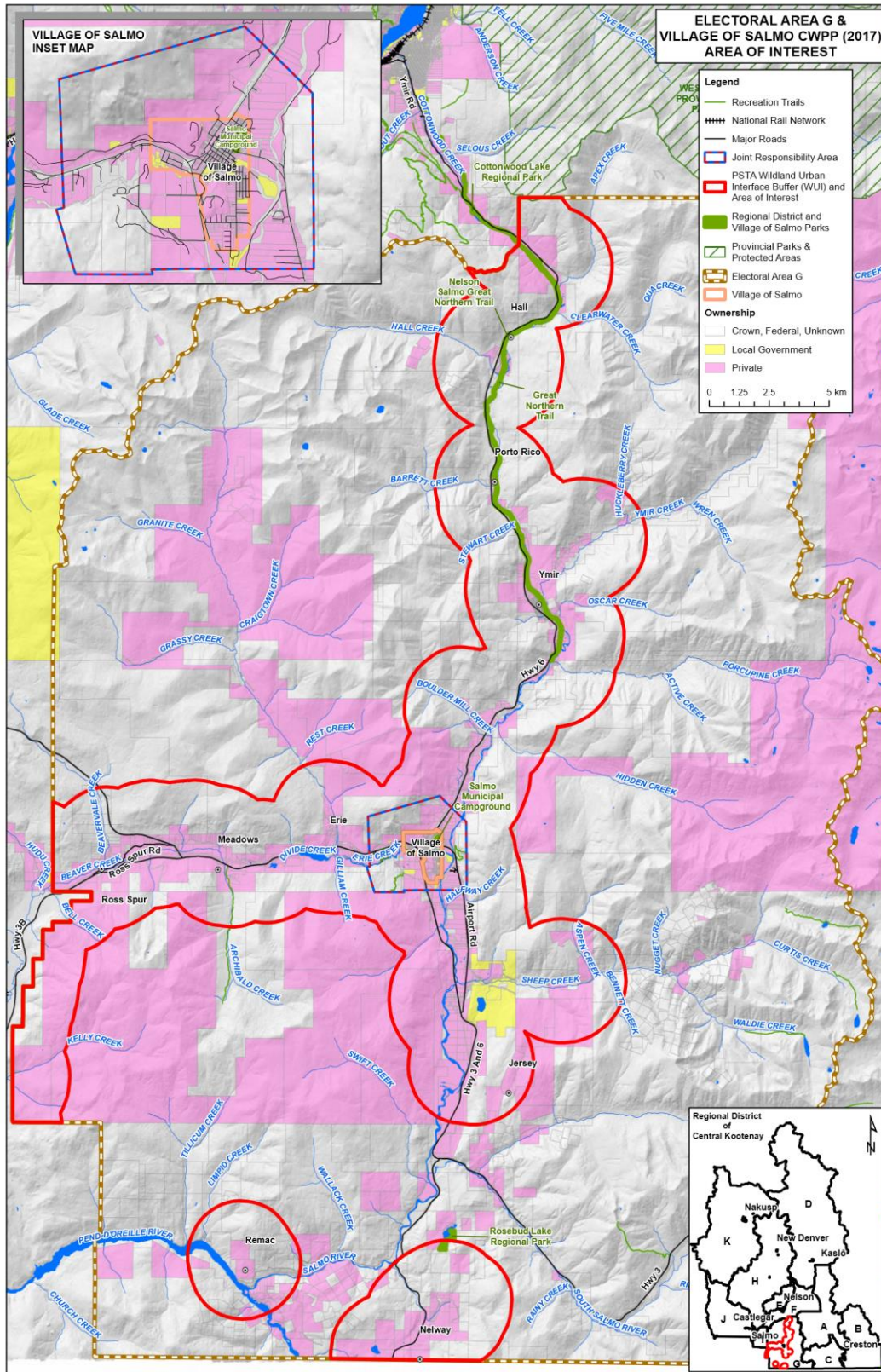
Area G measures 151,900 ha and is located southwest of Kootenay Lake, stretching from the Canadian border to just South of Nelson. The Western border is near Castlegar, and the Eastern border ends at the ridge of the mountain chain of the Three Sisters. RDCK Electoral Area J is to the west, Area E to the north, and Areas A and C to the east.

2.1 CWPP Area of Interest

The RDCK Area G and Salmo Study Area is situated in the Selkirk Resource District (Ministry of Forests, Lands and Natural Resource Operations), and the South East Fire Region and is shown in Map 1. This Study Area is the Wildland Urban Interface (WUI) and includes a 2 km buffer around all residences and critical infrastructure based on density criteria described below.

The Study Area uses the Provincial Strategic Threat Analysis (PSTA) data package and the British Columbia Wildfire Service (BCWS) - WUI Area. The PSTA WUI Area is based on structure density, with a buffer established to meet the SWPI program density criteria of more than 6 structures per hectare. The total Study Area for this 2017 CWPP Update is 37,827 hectares. Of this, 7238 ha is private land, 225 ha municipal, 22,305 ha provincial Crown. Federal land in the study area is negligible, with less than a ha present occurring on the American border.

The forest within and surrounding the Study Area is largely mixed coniferous second growth resulting from early fires and forest management. Typical of the interior temperate rainforest, this forest is characterized on wet sites by dense western red cedar and western hemlock, and on dry sites by Douglas fir, western larch, and lodgepole pine. Several decades of fire suppression have resulted in patches of overstocked high hazard forest.



Map 1: Area of Interest

2.2 Community Description

Incorporated in 1965, the RDCK is a local government serving an estimated population of 60,000 residents. The RDCK consists of 11 electoral areas and nine member municipalities: Castlegar, Creston, Kaslo, Nakusp, Nelson, New Denver, Salmo, Silverton, and Slocan.

The RDCK, like all local governments, is granted its powers by the provincial government and is governed primarily by two provincial pieces of legislation – the Local Government Act and the Community Charter – as well as numerous other supplementary enactments. The RDCK is governed by a board consisting of two types of directors: RDCK and Municipal. RDCK Directors are elected directly by rural area voters, and serve four-year terms. The RDCK Board consists of eleven electoral Area Directors. Municipal Directors are first elected to a municipal council, and are then appointed by their council to the Regional District Board for a one-year term. The RDCK Board consists of nine municipal directors. The Board selects its own chair and vice-chair¹.

The RDCK provides approximately 160 services to taxpayers. The choice of services is determined by the regional board but only with the approval of the electors. The scope of services therefore varies with each regional district.

There are five First Nation groups within the Kootenay Lake Timber Supply Area (TSA) – the Lower Kootenay Indian Band, Shuswap Indian Band, Ktunaxa Nation Council, Okanagan Nation Alliance, and Shuswap Nation Tribal Council. The Lower Kootenay Indian Band and the Shuswap Indian Band have Forest and Range Agreements with the Province (Snetsinger, 2010). Area G also falls within the Arrow TSA, but no additional First Nation interests have been identified in the Study Area.

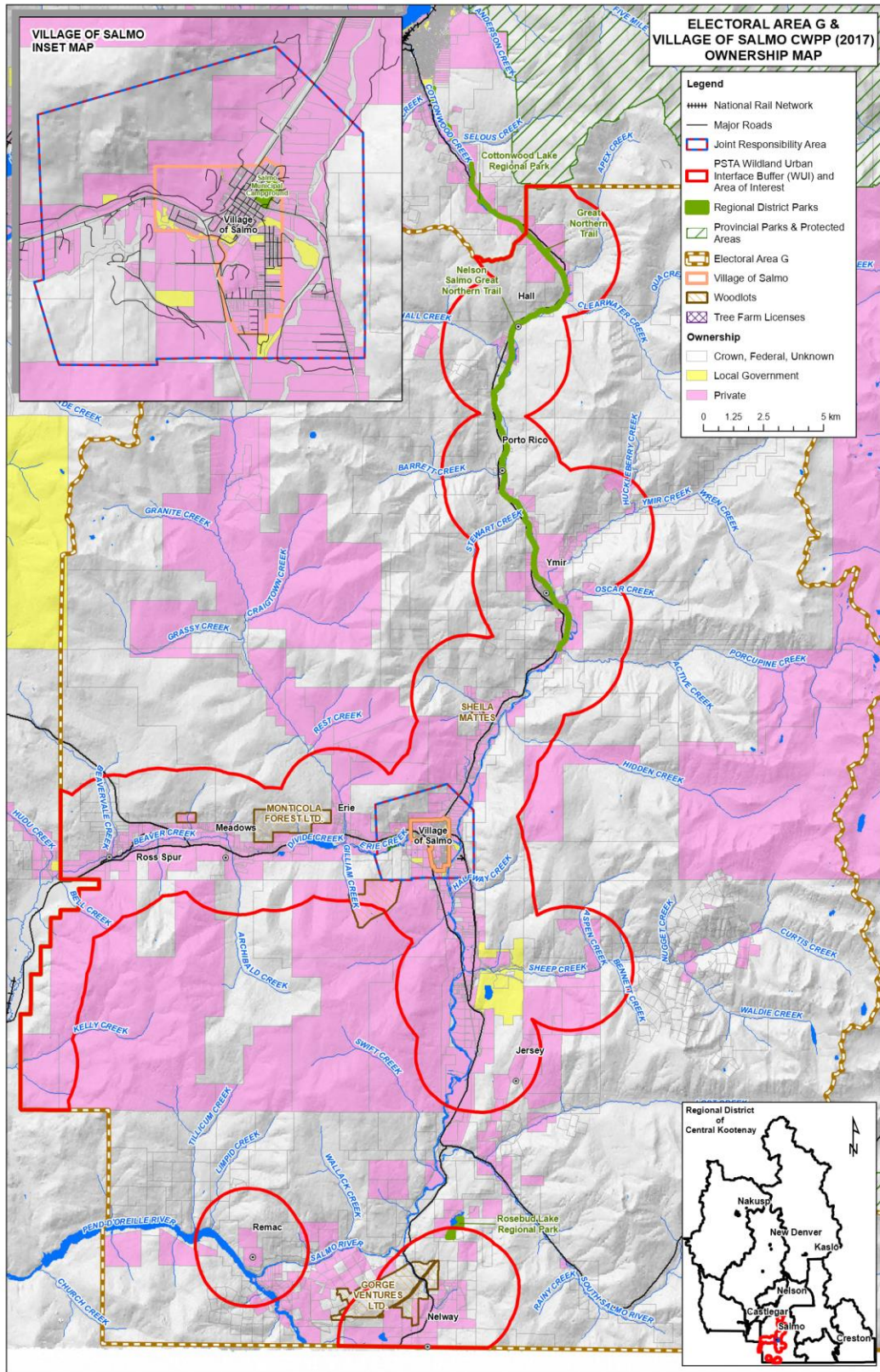
Area G had a population of 1623 residents in 747 occupied dwellings in 2016. This represents a 1.6% increase in residents from the 2011 census (BC Stats, 2016). Community access is largely served through Highway 3 from the west and east, with Highway 6 running the length of Area G mostly along the Salmo river from the Southern border north to Nelson. The route passes through many other spread out and small communities, the largest of which are Salmo, Ymir, Hall Siding, Ross Spur, Airport Road, Erie, Porto Rico, Nelway, Remac, and Meadows. Most communities are located in the valley bottom, with an elevation between 600-800m. Area G does not have an airport, but commercial flights operate from the Castlegar Regional Airport, approximately a 30 minute to 1-hour drive from anywhere in Area G. Access to evacuation routes through Highway 3 and 6 are available in all 4 cardinal directions, providing good access.

Emergency fire services in Area G are comprised of volunteer fire halls in Salmo and Ymir. The unincorporated communities of Rosebud Lake and Nelway do not currently have fire service. First responders are present in Salmo and Ymir, with a BC Ambulance station in Salmo. Health care is available from the Salmo Health and Wellness centre, and further emergency care is available in Creston, Trail, Castlegar, or Nelson. A RCMP detachment in Salmo provides policing for the area. During times of significant emergency or disaster regional emergency operation centers are established by Central Kootenay Emergency Management in Nelson. This is operated by the RDCK in order to provide access to more resources for the Incident Commander.

¹ <http://www.rdck.ca/EN/main/government/welcome.html>

Electrical service for most of Area G is received through a network of wood pole transmission and underground distribution infrastructure supplied by BC Hydro and Fortis BC. Neighbourhoods with small, street-side wooden poles to connect homes are particularly vulnerable to fire.

The majority of commercial and business opportunities are centered around Salmo and Ymir. Rural communities also support commercial facilities and tourist opportunities and accommodation. Home based businesses are found throughout, and represent a vital aspect of maintaining the social sustainability and livability throughout Area G. Industrial operation in both small and large scale are generally concentrated around the Hwy 6 access corridor, and are oriented towards primary and secondary resource processing for forestry, mining, and machine and heavy equipment repair. Only 3% of Area G is within the Agricultural Land Reserve; in 2016 agricultural production occurred actively on 340ha. There is great opportunity for this to expand however as much of the ALR is under Provincial ownership. Other sectors such as manufacturing, hotel and food services, outdoor recreation, retail trade, health and social services, and educational services also contribute to the economy. Due to the scenery and opportunities for recreational activity in the area, tourism has become a new and important sector within the economy of this area.



Map 2: Privately owned property in the Study Area

2.3 Past Wildfires, Evacuations and Impacts

Due to the low wildfire occurrence in the Study Area over the past 80 years, the evacuation history is almost non-existent. Wildfire related impacts for this region are typically related to the adverse effects smoke has on tourism, productivity, and health. Most wildfires over the last 50 years are lightning caused and thus tend to burn along higher elevation areas fairly far from communities. Slopes tend to act as a natural downhill fire break, further reducing the risk to communities of these lightning started fires.

Three properties were issued an evacuation order in Sheep Creek during the McArthur Creek fire in 2018. When this fire grew to 56ha, it was actioned by Structure Protection Units deployed from the RDCK fire departments of Balfour, Beasley, Ootischenia, and Tarrys.

In both 2017 and 2018 fires threatened the Shambhala Music Festival near Salmo. Official attendance estimates including staff was around 17,000 people in 2017. While interruption or cancellation due to wildfire brings economic consequences for the region, this influx of people contributes to wildfire risk, and in an emergency introduces new complexity to evacuation and emergency care. An evacuation alert in 2017 which threatened to end the festival prematurely was estimated to cost the festival \$500,000 despite not offering refunds. After canceling all acts and recommending that attendees leave, they ended up reopening and selling tickets to fill the spaces opened by departing festival goers. It can be expected that in the future attendees may be reluctant to evacuate, and that the economic incentive to holding the festival precludes early evacuations. The festival site has only one access route to the highway, complicating evacuation.

In 2017 an evacuation order was issued for the Nelway area, including 39 properties and the United States border crossing.

In 2018 a fire in Blaze Creek on Kootenay Pass closed the route interrupting transportation throughout the region and threatening critical infrastructure including power lines.

Wildfire evacuations and damage outside of Area G have been minimal over the last 80 years. Although the majority of wildfire tend to burn outside the valley bottoms in which communities are found, alpine and high elevation burning can have negative influences on watershed stability. As an example, in Area A an evacuation alert was issued for Kuskanook during the August – September fire of 2003 when lightning burned thousands of ha along the top of the valley slope and mountainous uninhabited area. One year later in August 2004 a channelized debris flow occurred in the fire affected watershed destroying two houses, damaging several other buildings, and closing Highway 3A for several days. No injuries occurred as all dwellings were vacant at the time. Residents had been experiencing black sludge in their water intakes after heavy storms over the prior year. Investigation found that in the burned area sections of high intensity burn created a discontinuous hydrophobic layer 1-2 cm deep. This caused some drainages to swell to several times their own bankful depth and width during periods of large precipitation. Visual assessment shows a marked increase in erosion where the headwaters steepened to 25%, and at the point where the drainage hit 29% slope stability and cohesiveness failed (Jackson, 2009). This combination of high intensity burn, environment, and topography create an additional risk within the steep valleys of the Kootenay region.

2.4 Current Community Engagement

As with many places in BC there are numerous overlapping values and resources on the landscape. Residents of Area A demand to be involved in ensuring these values are maintained. To meet this requirement, this CWPP has been developed with considerable engagement across the community. This includes consultation with resource professionals, local government staff, resident associations, water user groups, forest licensees and MFLNRORD staff. This approach to engagement is consistent with community expectations and, when matched at the prescription development and treatment implementation phases, has resulted in broad public support for wildfire hazard reduction work.

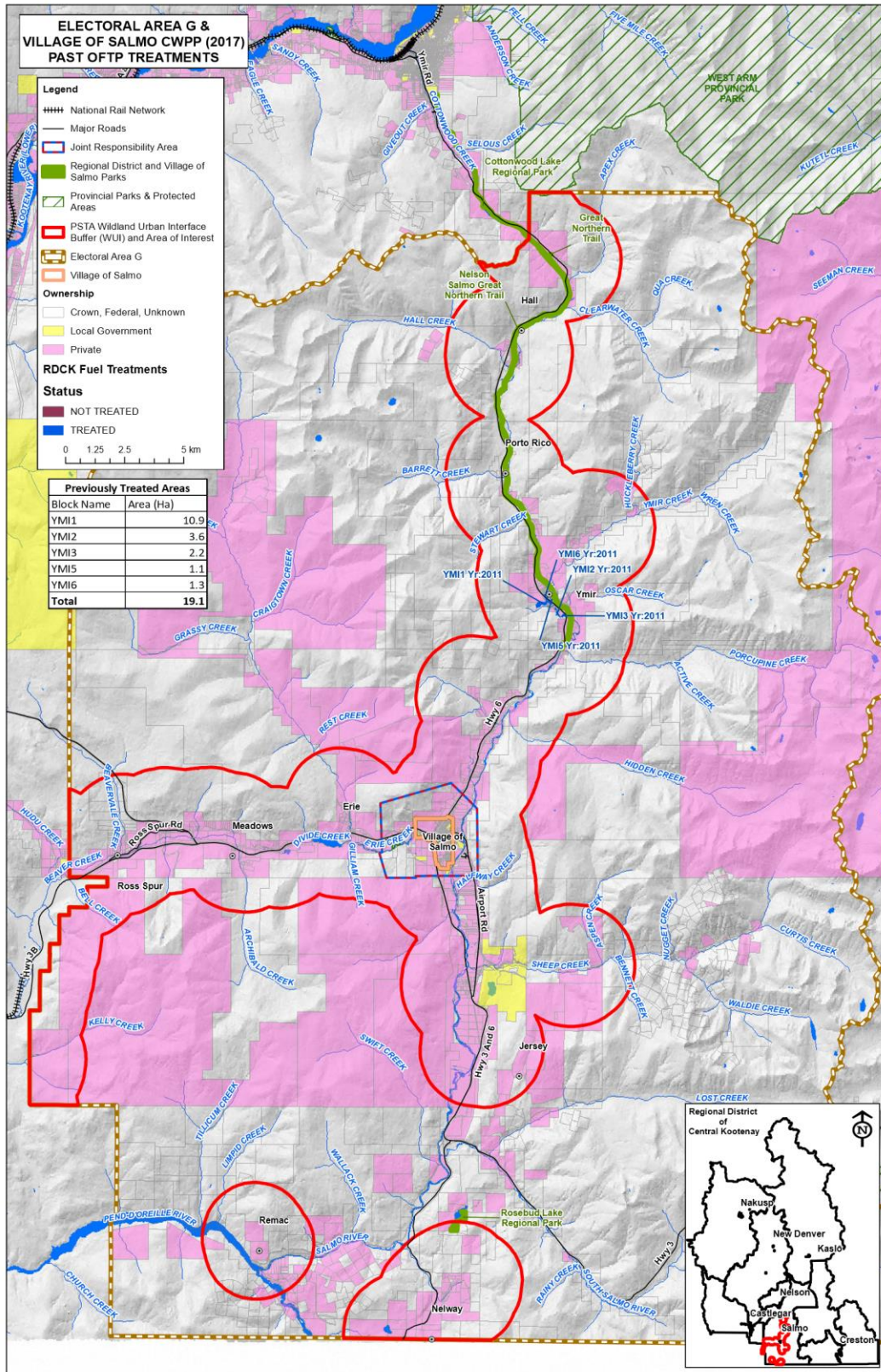
In the area of communications and education, the RDCK is working with BC Parks, local communities, forest licensees, MFLNRORD, and other stakeholders to develop an effective set of tools to educate and communicate the principles of FireSmart to the public. Consequently, some specific outreach tools recommended in the 2008 CWPPs are no longer considered to be effective by the RDCK. The RDCK website provides links to BCWS resources including open burning guidelines, restrictions, and fire prevention resources. They also direct residents towards the FireSmart program and homeowner's manual, with links to the home assessment and Community FireSmart recognition program.

The RDCK has improved its ability to provide emergency notification to the public through a Web Blocker on the website that directs users to critical emergency information prior to allowing access to the regular website information. Additionally, the RDCK uses the Emergency Alerts system to residents in the event of an evacuation. Signage regarding current fire danger is updated along major routes throughout the RDCK. Additionally, an effective line of communication exists between BCWS and RDCK Fire Departments through the Zone 4 BC Fire Chiefs Association, Central Kootenay Fire Chiefs Association and individual meetings between Fire Halls and Regional Staff. Communications include daily fire weather updates from the BCWS.

The RDCK has also made progress in the area of structure protection, having acquired multiple Structure Protection Units (SPUs) to assist in the protection of rural/ interface homes.

The RDCK has been active with respect to community wildfire planning and has implemented, or is in the process of implementing, many of the 2008 CWPP's recommendations and other initiatives. A complete list of the status of the recommendations from 2008 can be found in Appendix 4. Much of this 2008 work is still ongoing and has been cross-referenced to the current recommendations in this CWPP Update.

Fuel treatments have been completed on approximately 19.07 ha of high priority land in the Study Area (map 3).



Map 3: Status of previous Treatment Units from the 2008 CWPP

The UBCM/SWPI has funded much of this work. These treatments have reduced the risk profile of Area G but will require additional treatments to maintain effectiveness (Table 2). As an outcome of this CWPP update, the RDCK is working with stakeholders to plan and implement a fuel treatment program at the landscape level.

RDCK staff and community members have widespread awareness of the threats posed by wildfire and the importance of hazard mitigation activities. Broad community engagement played a key role in developing this CWPP. The following consultation was undertaken to ensure community support:

Table 2. Consultations undertaken during the development of the CWPP update.

Group	Activity	Outcome
Meeting with Electoral Area Director Hans Cunningham	Introduction and discussion on CWPP outcomes, and field work to date.	Shared understanding on project scope, objectives and outcomes. Community consultation plans initiated. Comments reviewed and integrated into CWPP. Invitation to participate and review a final draft.
Wynndel Irrigation Society	Discussed water availability and management for the Wynndel region. Introduced CWPP work.	Recognition of necessary board member, Ron Piva, to continue further discussion on water management in the Wynndel area.
Public Meeting #1 and #3	September 5 th and September 27 th 2018. Ymir public presentations on proposed treatment units to date, FireSmart, and community level planning around public and crown land fuel management.	Community engagement was increased. Response to the fuel mitigation planning was positive.
Public Meeting #2	September 6 th 2018. Salmo public presentation on proposed treatment units to date, FireSmart, and community level planning around public and crown land fuel management.	Community engagement was increased. Response to the fuel mitigation planning was positive. Collaborative presentation with licensee allowing for shared understandings on project scope and outcomes.
Ymir Volunteer Fire Department Fire Chief David Gould	October 24 th 2018. Discussed logistics and challenges faced by the department. Access and evacuation, communication and awareness, critical infrastructure, and a follow up on the 2008 CWPP.	Comments reviewed and incorporated into CWPP. Priority areas for proposed treatment units discussed and incorporated into CWPP. Identification of critical infrastructure within the Fire Protection Area.

Group	Activity	Outcome
Salmo City Council	November 27 th , 2018. Presentation at Salmo City Council Meeting.	Shared progress and results of the CWPP to the Salmo City Council as well as attending citizens.
Kalesnikoff Lumber Company	Ongoing discussions with Licensee	Shared understanding on project scope, objectives and outcomes. Comments received. Collaborative discussions on strategic forest management to achieve the desired outcomes for both parties.
First Nations	Ongoing Consultations with First Nations with an interest in Area G and adjacent Areas: Shuswap Indian Band, Akisqnuq First Nation, Lower Kootenay Band, St. Mary's Indian Band, Tobacco Plains Indian Band, Ktunaxa Nation, Osoyoos Indian Band, Okanagan Nation Alliance, Okanagan Indian Band, Upper Nicola Indian Band, Penticton Indian Band, Lower Similkameen Indian Band, Neskonlith Indian Band, Adams Lake Indian Band, and Splots'in First Nation,	Invitation for comment and review of the CWPP, its outcomes and objectives as well as the proposed treatment units within the Electoral Area.
Local government, FLNRORD staff, BC Wildfire Service, BC Parks, forestry licensees	December 20 th – February 10 th . Solicited feedback on the final draft of this CWPP.	Feedback incorporated into the final version of the CWPP.

Combined, these various engagement opportunities have generated a shared understanding of the CWPP objectives, project timelines, and expected outcomes among local government, stakeholders, residents and land managers.

2.5 Linkages to Other Plans and Policies

Local government policy and bylaws are tools available to mitigate wildfire risk to the RDCK. All levels of government (municipal, regional district, provincial, and federal) and individual landowners need to work together to successfully reduce their risk. Local and regional governments can educate the public on the associated risks, and show leadership to help reduce that risk to the RDCK and the individual community members, their homes, properties, and other values at risk.

To ensure consistency among plan documents, a review was conducted of existing plans that may impact or be impacted by this CWPP. These include: the Selkirk Resource District Fire Management Plan; higher level plans such as the Kootenay Boundary Higher Level Plan, as well as bylaws that pertain to or affect wildfire hazard mitigation in the area

2.5.1 Local Authority Emergency Plan

All municipalities and regions in the RDCK, except for the City of Castlegar, are included in the RDCK Emergency Response and Recovery Plan.

2.5.2 Affiliated CWPPs

CWPP's are being prepared for the surrounding electoral areas in conjunction with this CWPP. As a result, a landscape level approach is being applied to all communities in the RDCK. As the majority of treatment units are planned immediately adjacent to communities, there is little overlap in management activities between communities. This does however generate opportunities to form partnerships across Electoral Area boundaries.

2.5.3 Local Government and First Nation Plans and Policies

The Selkirk Resource District Kootenay Lake Fire Management Plan (FMP) (MFLNRORD, 2016) identifies values at risk on the landscape and prioritizes broad categories of values as 'themes' for categorizing response through the Resource Strategic Wildfire Allocation Protocol (RSWAP). The four themes are

- 1) Human Life and Safety,
- 2) Property and Critical Infrastructure,
- 3) High Environmental and Cultural Values, and
- 4) Other resource values (timber, rangelands, etc.).

The organization of values is intended to provide the information needed to make appropriate fire response decisions in complex emergency situations. The Selkirk Resource District FMP was reviewed and this CWPP Update is consistent with the FMP prioritization framework.

The development of FMPs is the responsibility of each MFLNRORD Resource District. The FMPs recognize the importance of CWPP-defined risk areas and fuel management recommendations within communities, which can augment other treatments on a landscape scale. The Selkirk Resource District FMP has some linkages to the RDCK's 2008 CWPP. Additionally, the strategic direction presented in the District-wide FMP planning processes must be considered for future fuel treatments, as these FMPs and, specifically, landscape level fuel breaks and fuel treatments, are further developed and made available publicly and through consultations with the Resource District.

The RDCK does not have burning bylaws. Within specified areas of the RDCK development permits are required to ensure that new development is consistent with the applicable OCP. However, the RDCK does not have development permit areas for wildfire hazard.

Local policies and guidelines and relevant bylaws include:

- The RDCK Emergency Management Regulatory Bylaw No. 2210, 2011², which was enacted to establish and maintain an emergency management framework for the Regional District Area G, and the Central Kootenay Emergency Management Plan (described below).
- Bylaw No. 2170, 2010³, which provides for the operation and regulation of Volunteer Fire Departments for fire protection services, including, but not limited to limits of service and scope of the respective RDCK fire departments.
- The Water Bylaw No. 2470, 2015⁴ which applies to all water service areas of the RDCK including setting out ownership, responsibility and access to water systems including fire hydrants and standpipes.

The Central Kootenay Emergency Management Plan describes the organization, roles, procedure and other higher-level factors in managing emergencies. The potential emergencies and disasters are characterized in Annex B. 'Fire - Urban and Rural' is ranked the most likely hazard, and 'Wildfire' is rated third. In terms of severity, wildfire is ranked highest.

The RDCK also has Emergency Management Procedures (Regional District Central Kootenay, 2018) that coordinate the response to, and recovery from, an emergency or disaster. Recommended actions are suggested for the different types of emergencies. An interface fire should be managed using unified command between the BC Wildfire Service and the local fire departments. If no fire department covers the area involved in a wildfire within the interface, the RDCK Emergency Operations Centre will handle the response in coordination with the BC Wildfire Service. If the interface fire occurs outside of a Fire Protection Area, BC Wildfire Service will request assistance from the office of the Fire Commissioner, the local authority and local area fire departments. The Central Kootenay Emergency Program supports the affected local authority and stakeholders in all wildfire interface incidents. The local authority is responsible for any Declaration of Local State of Emergency and associated Evacuation Alerts and Orders.

2.5.4 Higher Level Plans and Relevant Legislation

Area G falls within the Kootenay Boundary Higher Level Plan (KBHLP). Area G is within the Kootenay Lake Resource Management Zone, within which are defined Biodiversity Emphasis areas, Old and Mature forests, green up requirements, Grizzly bear habitat and connectivity corridors, consumptive use streams, enhanced resource development zones for timber, fire-maintained ecosystems, visuals, and social and economic stability. It must be noted that many of the KBHLP objectives have been replaced with other legislation such as Government Actions Regulation (GAR) for special management of certain forest values including caribou habitat. The remaining objectives not provided special management under other legislation are carried forward in the KBHLP. The fire-maintained ecosystem provision in the KBHLP allows the possibility to restore and maintain the ecological integrity

2 http://www.rdck.ca/assets/Government/Bylaws/Emergency-Services/Bylaw%202210-Emergency_Bylaw.pdf

3 <http://www.rdck.ca/assets/Government/Bylaws/Fire/Bylaw%202170%20Fire%20Dept%20CONS.pdf>

4 <http://www.rdck.ca/assets/Government/Bylaws/Water/2470-Water.pdf>

of fire-maintained ecosystems, providing for treatments that will restore shrubland, open range, open forest, and managed forest ecosystem components.

On the Provincial level, relevant legislation includes:

Wildfire Act and Wildfire Regulation: dedicated to wildfire management in BC. Key objective of the legislation is to specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation.

Forest and Range Practices Act and Forest Planning and Practices Regulation: operational planning, forest practices and resource protection. This legislation provides the power to authorize the destruction or damage of Crown timber for wildfire hazard reduction purposes. The Regulation stipulates minimum forest practices to protect resources.

Park Act: gives power to prohibit or control the use of fire within Parks.

Environmental Management Act: governs waste emissions including particulate matter (smoke). The Open Burning Smoke Control Regulation regulates open burning including favorable conditions for smoke dispersion.

Emergency Program Management Regulation: provides the guiding principles to the Provincial Emergency Program by identifying roles and responsibilities, and has the responsibility to identify potential emergencies and disasters, and the requirement to provide advice and assistance in the event of emergency.

Other: (Hydro and Power Authority Act, Special Accounts Appropriation and Control Act, Annual Rent Regulation)

2.5.5 Ministry or Industry Plans

Ensuring an effective and proactive approach to the CWPP planning process necessitates incorporating as many forest management planning initiatives as feasible.

All forest licensees in Area G have Forest Stewardship Plans (FSPs), that detail how each licensee will achieve Forest and Range Practices Act objectives, as well as those in the KBHLP.

The RDCK is actively working with forest licensees and other land managers to align community wildfire protection activities with forest management activities. This includes developing modified WUI stocking standards, aligning timber harvest and fuel management operations, and exploring impacts of fuel management on timber supply.

2.5.6 Key Contact, Funding, and Partnership Opportunities

There are key funding opportunities, partnership opportunities, and key contacts that are specific to RDCK Area A. These are summarized in 3.

Table 3. Funding sources, partnership opportunities, and key contacts for the RDCK

Partnership Organization	Key Contact	Partnership Opportunity
Union of BC Municipalities, Strategic Wildfire Protection Initiative	Peter Ronald, Programs Officer pronald@ubcm.ca http://www.ubcm.ca/EN/main/funding/lgps/strategic-wildfire-prevention.html	CRI provides direct funding to local governments for development of CWPPs, Fuel Modification Prescriptions, Operational Treatments and Demonstration Projects
Union of BC Municipalities, Community Resiliency Investment Program	Peter Ronald, Programs Officer pronald@ubcm.ca https://www.ubcm.ca/EN/main/funding/lgps/community-resiliency-investment.html	CRI is a new provincial program intended to reduce the risk and impact of wildfire to communities in BC through community funding, supports and priority fuel management activities on provincial Crown land
Forest Enhancement Society of BC (FESBC)	Gord Pratt, Operations Manager gpratt@fesbc.ca	FESBC provides funding through the Forest Enhancement Program (FEP) to local governments and licensees to prevent and mitigate wildfire impacts and/or improve wildlife habitat and damaged forests.
Columbia Basin Trust (CBT)	Tim Hicks, Senior Manager, Delivery of Benefits	CBT has provided 50% of local government funding for RDCK and City of Nelson SWPI projects

Additionally, there are other sources of funding or support that may become available:

Provincial Government

- BC Parks: Champions Lake Provincial Park and the former Erie Lake Provincial Park are part of Area G. There are also Provincial recreation sites including Clearwater, Salmo Riverside, Barrett Lake, Huckleberry Hut, and Erie Creek. These areas pose significant wildfire threat to Area AG. In addition, these parks are at risk from fires starting within Area G. The RDCK may wish to further strengthen partnerships with BC Parks.
- Other Crown land areas that are not currently high threat may increase with time, as these areas revegetate and recover from previous large-scale forest fires and the mountain pine beetle outbreak (CRI and FESBCP funding are applicable).

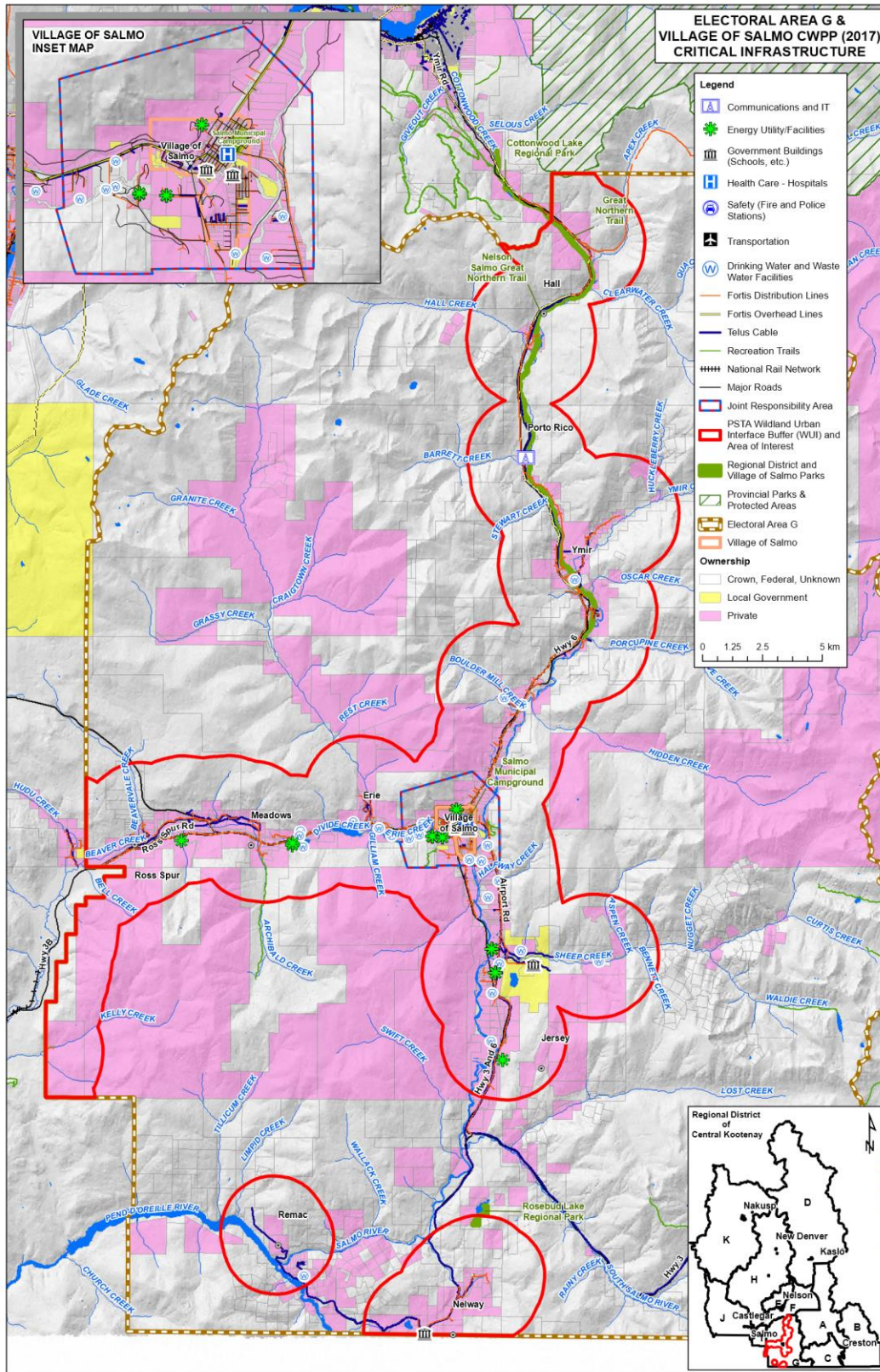
Utility companies: Right of way clearing and fuel hazard should be discussed with BC Hydro and Fortis BC. These companies should be encouraged to maintain rights of way in a low hazard state through frequent brushing, with brushed material removed prior to curing.

Forestry Licensees: BCTS-Kootenay, Canfor, Kalesnikoff, and Crown Woodlots. Partnership opportunities may exist for commercial harvest of hazardous areas that may not qualify under the FESBC or CRI programs, such as areas too far from infrastructure, but which may still pose a spotting risk to the community or could be leveraged into a landscape level fuel break.

SECTION 3: VALUES AT RISK

Area G is in a heavily forested valley with many small communities surrounded by forest. As a result, wildfires have a high potential to threaten human safety, property, critical infrastructure, environmental and cultural values, as well as resource opportunities. Area G and surrounding areas provide a range of outdoor activities for tourists and residents. There are also strong First Nation cultural values throughout Area G. These interests include fish bearing habitat, hunting grounds, archaeological sites, and sites of other cultural significance.

There are many resource values in the Study Area that are outlined in KBLUP. KBLUP is the guiding document for other plans for the area, including the RDCK Official Community Plans and licensee Forest Stewardship Plans. Within the Study Area potential fuel management activities are constrained mainly by steep and difficult terrain, the need to accommodate a wide range of recreational users and the requirement for multi-agency coordination of fuel treatments. A collaborative WUI Group comprised of senior staff from the RDCK, City of Nelson and BC Parks is committed to the coordinated planning and implementation of wildfire management activities at the landscape level in the West Arm. The RDCK is working to establish a similar collaborative initiative across the RDCK.



Map 4: Critical infrastructure at risk in the Study Area

3.1 Human Life and Safety

The primary goal of the CWPP is to enhance the safety of human life and property. While these goals diverge in some planning aspects, from a risk mitigation and planning perspective they occur spatially intertwined. According to the 2016 census, most of the population in Area G is clustered around population centers such as Ymir (245 people), and Salmo (1140). However, many residents live in smaller population centers or communities, some of which are surrounded by forest and have neighbourhoods with limited evacuation routes to the highway

3.2 Critical Infrastructure

Protection of infrastructure during a wildfire event is vital to ensuring emergency response is as effective as possible, coordinated evacuation can occur, and essential services can be maintained and restored quickly. Critical infrastructure includes emergency and medical services, water, electricity, transportation, major water infrastructure, and communications infrastructure. The RDCK maintains a database of the critical infrastructure within Area G; the locations are shown on Map 4 above. Many other physical structures, systems, and facilities are extremely valuable and required for healthy efficient functioning of the economy and RDCK.

Establishing a FireSmart community will reduce losses and impacts related to wildfire. For this CWPP two classes of structures were considered: critical infrastructure and residential / commercial infrastructure. Critical infrastructure provides important services that may be required during a wildfire event or may require additional considerations or protection. As outlined in Appendix 1, FireSmart principles are important when reducing wildfire risk to both classes of structure and are reflected in the recommendations. The structure protection objectives for RDCK are to:

- Enhance protection of critical infrastructure from wildfire; and
- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.

The two main avenues for implementing FireSmart include:

- Change the vegetation type, density and setback from the structure; and
- Change the structure (where feasible) to reduce vulnerability to fire and reduce the potential for fire to spread to or from a structure.

Critical infrastructure is important to consider when planning for a wildfire event. The use of construction materials, building design and landscaping must be considered for all structures when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart recommendations.

Detailed FireSmart assessments were not completed for critical infrastructure. The RDCK Fire departments in Area G and Salmo should consult with District staff to systematically assess critical infrastructure in interface areas and to provide FireSmart recommendations based on their findings.

As noted in the 2008 CWPP, water is a critical suppression resource that is dependent on water service. This recommendation is still valid and implementation is ongoing. Other recommendations include: installing reservoir or hydrant systems in areas of poor water availability, identifying and mapping alternative water sources where feasible and ensuring new developments have sufficient water service and hydrant coverage. RDCK staff and Fire Departments in Area G should review hydrant coverage and locations. Improving water availability in identified areas and mapping alternative water sources is ongoing and should continue.

A full assessment of the water availability and vulnerability of water sources was not possible under the scope of this report. Back-up power sources should be installed for all critical infrastructure to ensure the RDCK can continue to operate at an acceptable level during a wildfire event in Area G and Salmo. The RDCK and Salmo

should complete a Fire Flow and Water Supply Vulnerability Assessment for each water system to identify those areas that may have insufficient or unreliable water supplies.

Table 4. Summary of Recommendations for Protection of Critical Infrastructure.

Structure Protection and Planning			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Enhance protection of critical infrastructure from wildfire.			
1.	High	Complete a fire flow / water vulnerability assessment for each water system and identify and map all alternative water sources (reservoirs, streams, lakes, etc.). Identify which areas may have insufficient or unreliable water supplies and provide recommendations to reduce vulnerability in Area G. Explore collaboration with other agencies including Columbia Basin Trust, Ministry of Environment, Ministry of Transportation and Infrastructure and Interior Health Authority.	\$20,000
2.	High	Complete a vulnerability assessment of all critical infrastructure (not only RDCK critical infrastructure) including water infrastructure in interface areas with FireSmart recommendations.	\$20,000
3.	High	Develop alternative, back-up water sources for fire protection, including determining the suitability of additional reservoirs, and the establishment of standpipes as required.	Based on assessments
4.	High	Complete a detailed review of back-up power source options for all critical infrastructure and upgrade as required.	Review: \$20,000 Upgrade: Based on review
5.	High	Complete more detailed hazard assessments and developing, in collaboration with other available government funding, response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods.	\$25,000

3.2.1 Electrical Power

A large fire has the potential to impact electrical service by causing a disruption in network distribution through direct or indirect means. For example, heat from the flames or fallen trees associated with a fire event may cause power outages. Consideration must be given to protecting this critical service and providing power back up at key

facilities to ensure that the emergency response functions are reliable. Additionally, the loss of this utility would greatly hinder recovery efforts. Electrical service is less critical where water supply is gravity fed.

BC Hydro and Fortis BC provide utility services through large transmission corridors which run from facilities along the Pend O'Reille.

3.2.2 Communications, Pipelines and Municipal Buildings

Telus infrastructure in the region is poorly maintained. Telephone and internet is provided by cell towers at Cottonwood Lake and Kapak road. High speed internet access is unavailable in the communities of Rosebud Lake and Nelway as of 2017. Infrastructure is concentrated along the highways running through the Study Area (Map 4).

3.2.3 Water and Sewage

Water facilities, intakes, lines, and other infrastructure are clustered with the communities of Area G along Highway 3 and 6. There are approximately 338 registered point of diversion water connections in the Study Area. Drought vulnerability varies widely, however the lake provides a stable source when infrastructure permits.

Ymir has a RDCK owned and managed water system. Groundwater wells or surface water licensing provide domestic and irrigation supply. Such small water systems and individual sources are particularly vulnerable to drinking advisories or over drawing. There are no other proposed RDCK water systems within Area G.

No publicly owned sewage treatment services in the area. Disposal is accomplished through a mixture of septic and waste water treatment plants.

There are approximately 338 groundwater wells registered with the RDCK in Area G. While they are prevalent throughout much of the area, they are predominantly located in and around Crawford Bay. Groundwater is drought tolerant compared to stream water, but has a slower replenishment. As a result, each water system has unique capacities for flow and storage.

There are approximately 29 creek, stream, and spring intakes registered with the RDCK in Area G. Thorough assessments of the vulnerability to drought was outside the scope of this project; each source will vary based on local topography.

Salmo draws their water from an aquifer through two ground water wells. Water use during summer months is much higher due to irrigation and watering of lawns and other recreation spaces. As of 2016 restrictions requiring residents to water on different days based on address were implemented. Large aquifers are often a stable source of water; however, their replenishment rate can vary greatly. A full assessment of the aquifer is outside the scope of this project.

Many Area G communities and Salmo are situated nearby the Salmo river, presenting the opportunity for firefighters to draft. However, a lack of infrastructure prevents this in many locations.

3.3 High Environmental and Cultural values

The following identifies some of the particularly important environmental and cultural values. These values are high throughout the Study Area as a result of proximity to infrastructure and communities.

3.3.1 Drinking Water Supply Area and Community Watersheds

In the event of a wildfire burning a large area of the watersheds within the Study Area, potential for vulnerability to post-wildfire debris flows and floods exists where creeks drain steep slopes and in particular, in rural areas in the Study Area that are built on the alluvial fans of these creeks (Jordan, 2016). Extensive research by MFLNRORD

elsewhere in the RDCK has found that the likelihood of debris flows and other landslides in susceptible terrain are significantly increased following severe wildfire in the snow-dominated environment of the southern interior of BC. Jordan P. has done a large body of work regarding slope instability in the region, further details can be found in the references section. Specifically, numerous debris flow incidents have occurred in the West Kootenays following 2003 and 2007 wildfires including Sitkum Creek West of the Study Area. MFLNRORD routinely conducts post-wildfire risk analyses where large wildfires have occurred above inhabited areas or in community watersheds (Hope et al., 2015). ⁵Post wildfire risk analysis reports are posted on the RDCK's website under Post-Emergency Hazard Reports⁶.

Water quality is not likely to be significantly impacted by a wildfire in the study area, according to research conducted elsewhere in the RDCK. Based on a watershed-scale study of three post-wildfire study sites in southeastern BC near Nelson, Slocan and Trail, effects on water quality were found to be minimal.

However, given the size and diversity of the RDCK, these studies may not be directly comparable to the Study Area. The RDCK should consider completing more detailed hazard assessments and developing response plans for these sub-drainages. It was noted in the 2008 CWPPs that the water supply in all RDCK Area G Fire Protection Areas is vulnerable to watershed disturbance and recommendations for stabilization and rehabilitation of burn areas were provided. While floodplains and non-standard flood and erosion areas as well as potential slide hazard areas are identified on the RDCK's Central Kootenay Web Map and have been identified in the Flood Management Bylaw (Bylaw No. 2080, 2009⁷) this does not specifically address watershed vulnerability to wildfire disturbance.

The RDCK owned Sanca water system draws overland flow from Sanca Creek. This water source is already challenged by contamination and persistent slope stability and turbidity issues. It can be expected that a wildfire in the watershed has the potential to contribute to increased erosion. A more detailed evaluation of the risk at this site is needed to determine the potential for degradation.

3.3.2 Cultural Values

There are five first nation groups within the Kootenay Lake TSA – the Lower Kootenay Indian Band, Shuswap Indian Band, Ktunaxa Nation Council, Okanagan Nation Alliance, and Shuswap Nation Tribal Council. The Lower Kootenay Indian Band and the Shuswap Indian Band have Forest and Range Agreements with the Province. The Ktunaxa Nation is currently involved in the BC Commission Treaty process.

Archaeological sites in BC are protected by the Heritage Conservation Act (HCA), which applies on both private and public lands. Archaeological remains in the Province of British Columbia are protected from disturbance, intentional and inadvertent, by the Heritage Conservation Act (HCA). Archaeological sites that pre-date 1846 are automatically ⁸ protected under the Heritage Conservation Act whether on public or private land. Sites that are of an unknown age that have a likely probability of dating prior to 1846 (e.g., lithic scatters) as well as Aboriginal

5 Hope et al. 2015.

6 <http://www.rdck.ca/EN/main/services/emergency-management/geotechnical-hazards.html>

7 http://www.rdck.ca/assets/Government/Bylaws/Land-Use-Planning/2080_Floodplain-2.pdf

8 Snetsinger, 2010.

pictographs, petroglyphs, and burials (which are likely not as old but are still considered to have historical or archaeological value) are also automatically protected. Under the HCA, protected sites may not be damaged, altered or moved in any way without a permit. It is a Best Practice that cultural heritage resources such as culturally modified tree (CMT) sites be inventoried and considered in both operational and strategic planning.

Prior to stand modification for fire hazard reduction, and depending on treatment location, preliminary reconnaissance surveys may be undertaken to ensure that cultural heritage features are not inadvertently damaged or destroyed. Pile burning and the use of machinery have the potential to damage artifacts that may be buried in the upper soil horizons. Above ground archeological resources may include features such as Culturally Modified Trees, which could be damaged or accidentally harvested during fire hazard reduction activities. Prior and during fuel management prescription development the professional forester will request archaeological site records for the specific area and if either cultural or archaeological values are identified then prior to operational fuel treatment activities commencing, the project supervisor must commission a reconnaissance survey (or if required) an Archaeological Impact Assessments. Due to site sensitivity, the locations of archaeological sites may not be made publicly available. The RDCK should apply for direct access to Remote Access to Archaeological Data (RAAD), which will allow the RDCK to look up or track any archeological sites in the area⁹.

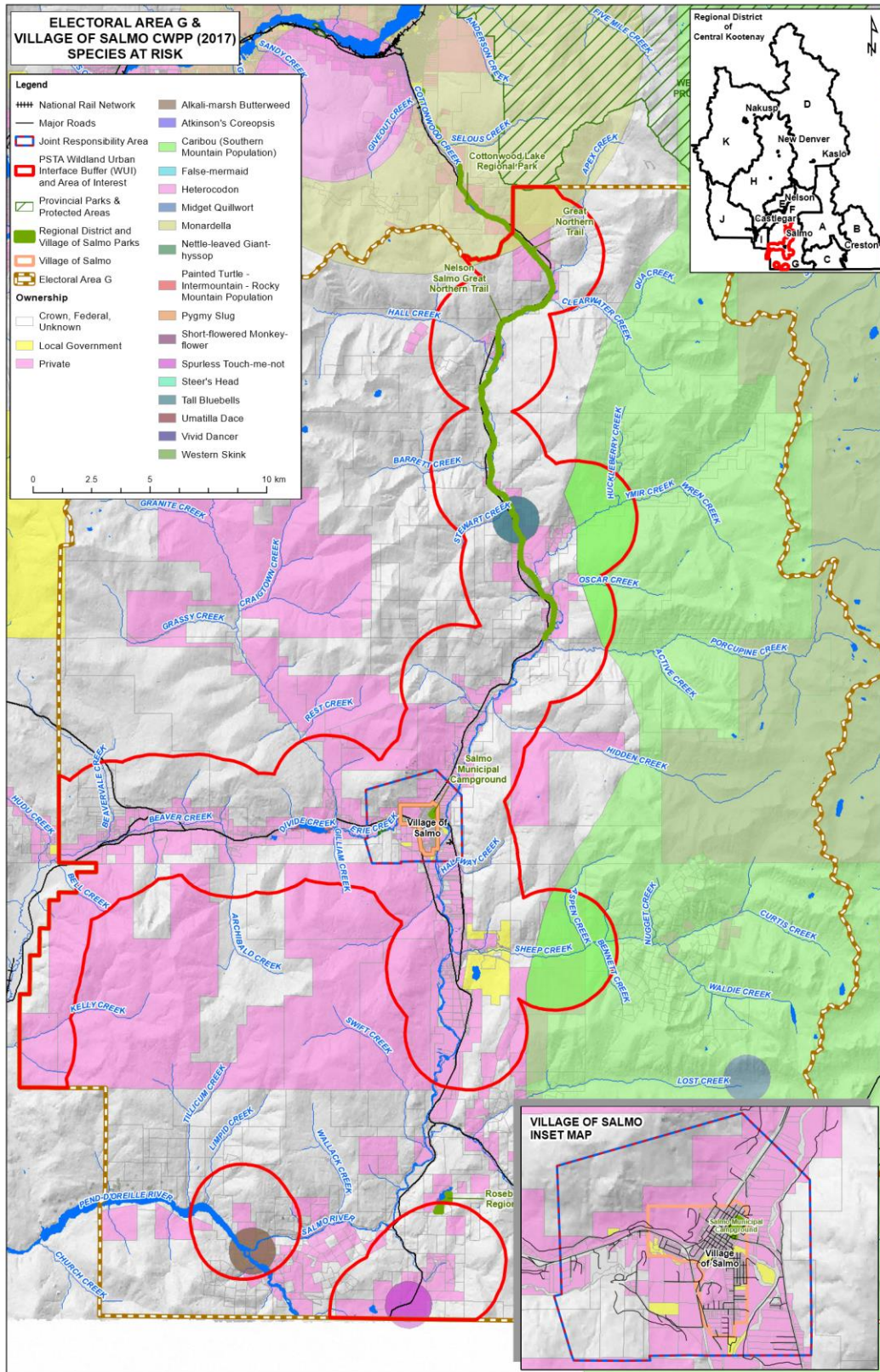
First Nations consultation for treatments on Crown Land would be required with all identified First Nations at the detailed assessment and prescription stage before any future fuel management treatments proceed and as directed by the Selkirk Resource District.

3.3.3 High Environmental Values

The Conservation Data Centre (CDC), which is part of the Environmental Stewardship Division in the Ministry of Environment, is the repository for information related to plants, animals and ecosystems at risk in BC. The CDC database was used to identify species and ecosystems at risk within Area G. The CDC keeps two classes of data: non-sensitive occurrences for which species and ecosystems at risk and their locations are available, and masked sensitive occurrences where only generalized location information is available.

Within Area G there are one masked and 18 publicly available species at risk; 11 plants, and 2 invertebrates, and 5 vertebrates. Some cross over exists for these species between lacustrine, palustrine, and terrestrial. A list of these species is provided in Appendix 3. The Painted Turtle is a notable palustrine species at risk occupying herbaceous wetland habitats and is not likely to be impacted by fire hazard mitigation activities. Site level, operational plans must determine through consultation with the CDC and a biologist or qualified professional if fuel management or other wildfire mitigation activities will impact these occurrences. All future fuel treatment activities and those associated with recommendations made in this CWPP should consider the presence of, and impact upon, potentially affected species. Additionally, all site level operational plans should consult the most recent data available to ensure that any new occurrences or relevant masked occurrences are known and considered in the operational plan to mitigate any potential impacts on species at risk.

⁹ https://www.for.gov.bc.ca/archaeology/accessing_archaeological_data/obtaining_access.htm



Map 5: Species at Risk in the Study Area

3.4 Other Resource Values

Area G is in the Kootenay Lake Timber Supply Area administered by the Selkirk Natural Resource District, as well as the Arrow Timber Supply Area. The current Allowable Annual Cut (AAC) is 640,000 and 500,000 cubic meters per year respectively. The last Timber Supply Review (TSR) was completed in 2010. The TSR determined that the land base contributing to harvesting is 199,282 and 186,466 hectares, removing parks and protected areas, old growth management areas, inoperable areas, uneconomic areas, low timber productivity areas, problem forest types, caribou no-harvest habitat, sensitive terrain areas, riparian areas, roads and trails, railways and transmission lines from 'forested areas'¹⁰.

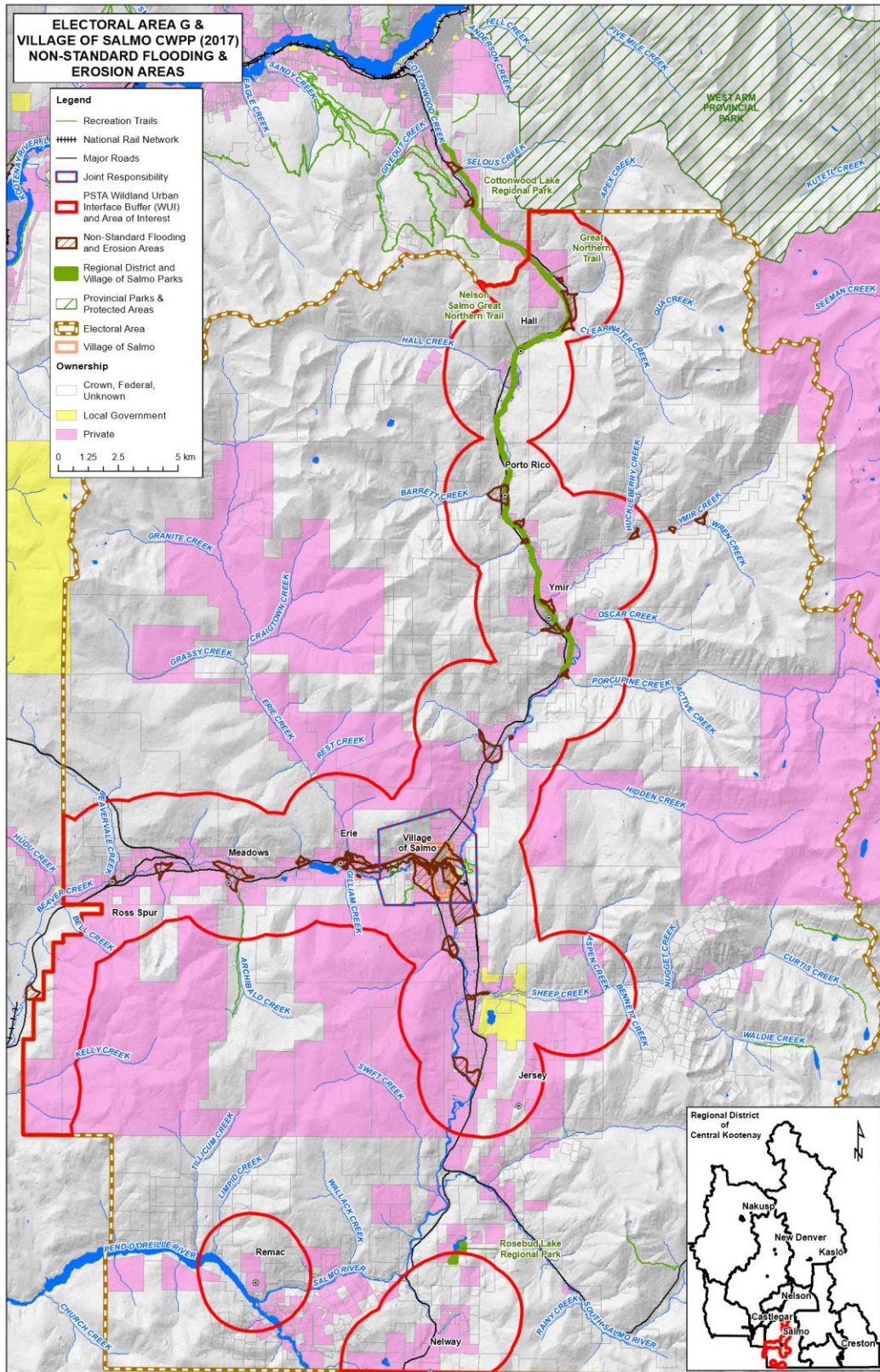
There are several forest licensees operating within Area G: Kalesnikoff Lumber, Atco Lumber Ltd, BC Timber Sales, and several crown woodlots.

Fuel reduction treatments are not anticipated to have a measurable effect on the timber harvesting land base. Typically, forest stands identified for fuels treatments are highly constrained for conventional logging, and are often in undesirable or uneconomic stand types. The opportunity exists to work with local licensees on commercial thinning projects that meet fuels management objectives. This has been explored with local licensees. See Section 7.0 (Recommendations) for opportunities to build relationships with forest industry licensees.

3.5 Hazardous Values

There is risk of flooding and erosion as seen in Map 6 below.

¹⁰ Snetsinger, 2010



Map 6: Non-standard flooding and erosion areas in the Study Area

SECTION 4: WILDFIRE THREAT AND RISK

Area G inhabits a naturally fire dominated ecosystem. This is evidenced by the number and size of historical fires in the area. Fire perimeters and fire ignition points provided in the PSTA data package were reviewed for this CWPP. This data show that many large fires burned in the earlier part of the last century. Most (54% on average) fire ignition points in the Kootenays are attributed to lightning, with the remainder due to human causes.

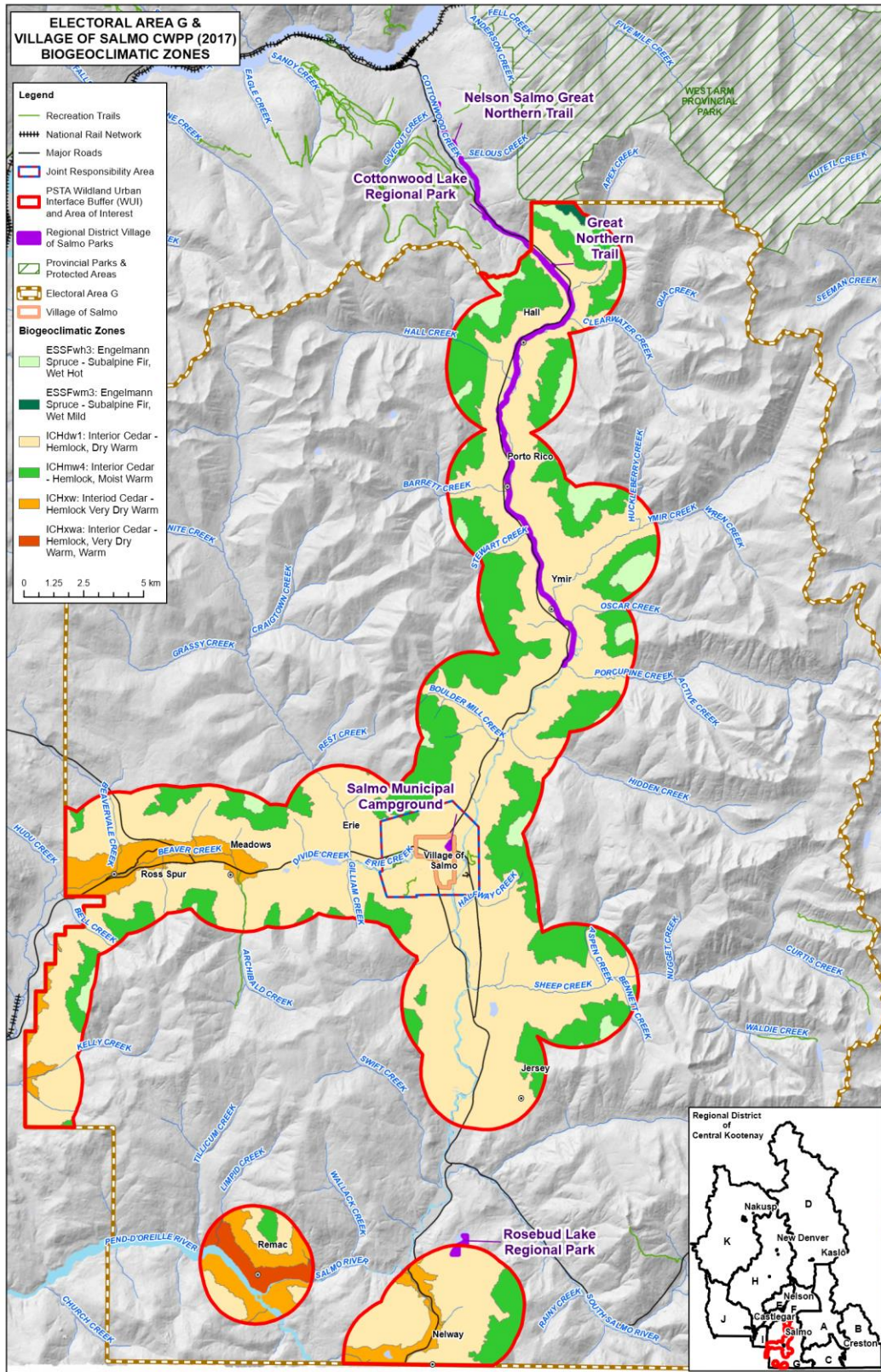
As part of the field assessment completed for this CWPP, the wildfire threat was determined surrounding or within the community area by establishing fuel types based on the Canadian Forest Fire Danger Rating System, CFFDRS classification system, and by completing Wildland Urban Interface Threat Assessments.

4.1 Fire Regime, Fire Danger Days, and Climate Change

Factors which contribute to the fire wildfire risk within the Study Area are summarized below. This includes fire regime and ecology, fire weather rating, and climate change.

4.1.1 Fire Regime

The Biogeoclimatic Ecosystem Classification (BEC) system describes zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. Area G is in the ecologically diverse West Kootenay Region. The natural forest succession in this region provides for a mosaic of successional stages and species composition. See Table 5 for a breakdown of Area G by BEC zone, as well as Map 7 below for the spatial distribution of these Zones in Area G.



Map 7: Biogeoclimatic zones in the Study Area

Table 5. Biogeoclimatic Zones and Natural Disturbance Types in the Study Area.

Biogeoclimatic Zone	Natural Disturbance Type	Area (ha)	Percent (%)
ICHxw : Interior Cedar Hemlock -- Very Dry, Warm	NDT4	2948	8%
ICHmw4 : Interior Cedar Hemlock – Moist, Warm	NDT2	9097	24%
ESSFwh3 : Engelmann Spruce - Subalpine Fir, wet hot	NDT2	1505	4%
ESSFwm3 : Engelmann Spruce - Subalpine Fir, Wet Mild	NDT1	56	<1%
ICHdw1 : Interior Cedar - Hemlock, Dry Mild	NDT3	24,191	64%
TOTAL		37,797	100%

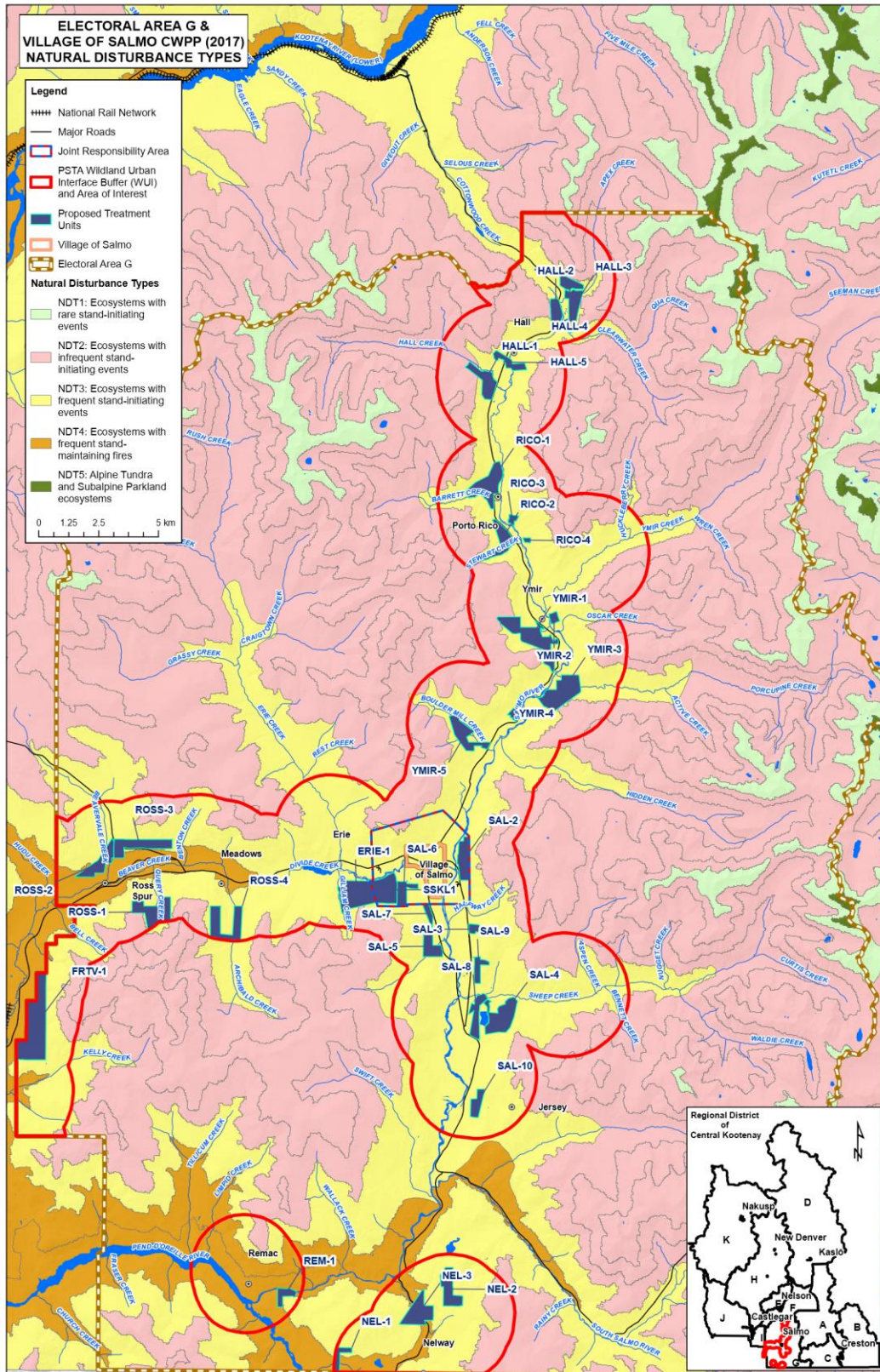
By far the largest amount of area lies within the ICHdw1. The ICHdw is an ecosystem typified by hot moist summers and very mild winters. Major growth limiting factors include moisture on dry sites, and frost on some low elevation sites. Climax forest stands are composed of western red cedar and western hemlock. Seral stands are mixed with Douglas-fir, paper birch, western larch and white pine, and provide important habitat for ungulate winter range. This is the most diverse subzone in the province in terms of trees, containing 14 commercial species. In this area fire-origin stands composed of Douglas fir and larch are common, many of these stands originating from burning during mining activity at the turn of the century (Braumandl & Curran, 1992).

BEC zones have been used to classify the Province into five Natural Disturbance Types (NDTs). NDTs have influenced the vegetation dynamics and ecological functions and pathways that determine many of the characteristics of our natural systems. The physical and temporal patterns, structural complexity, vegetation communities, and other resultant attributes should be used to help design fuel treatments, and where possible, to help ensure that treatments are ecologically and socially acceptable (Province of British Columbia, 1995).

64% of the Study Area is NDT3. These are ecosystems with frequent stand initiating fires. They are characterized by the high frequency of wildfire ranging in size from small spot fires to tens of thousands of ha. The average size varies greatly by topography and stand composition, but varies between 300-6000 ha. The largest fires in BC occur in NDT3 type forests, and often exceed 100,000 ha and sometimes 200,000 (Hall, 2010). Mean interval of fire return for this type of NDT3 ecosystem is estimated at every 150 years.

28% of the Study Area is NDT2. These ecosystems experience infrequent stand initiating events. These stands have extended post fire regeneration periods and can be generalized as even aged stands. As a result, left undisturbed they tend towards multi-story forest canopies, most notably Engelmann Spruce – Subalpine Fir ecosystems. Wildfire size tends to be between 20 to 1000 ha, with sheltering terrain, higher moisture, or chance allowing for areas of unburned forest to remain. As the mean return interval for fire disturbance is approximately 200 years, on the landscape level patches of young forest surrounded by extensive mature forest is common. Drought can however alter this regime in a short span of time.

8% of the Study Area is NDT4. These ecosystems experience frequent stand-maintaining fires, and can include forests which typically have frequent fire of low intensity, shrublands, and grasslands. Fire at this low intensity can prevent most woody shrubs and trees from establishing, and limits encroachment by species into NDT4 ecosystems. Wetter sites typically have thick fire resistant bark due to open forests of large and old trees. Species which lack fire resistance are found growing in NDT4 locations which have avoided fire for some time. This leads to a patchy network of unevenly aged stands with a fire return interval of 4-50 years (Hall, 2010).



Map 8: Study Area Natural Disturbance Type (NDT) classification in the Study Area

4.1.2 Fire Weather Rating

As seen in Figure 1, fire weather rating increases dramatically during summer months. Fire risk is elevated between June and October.

4.1.3 Climate Change

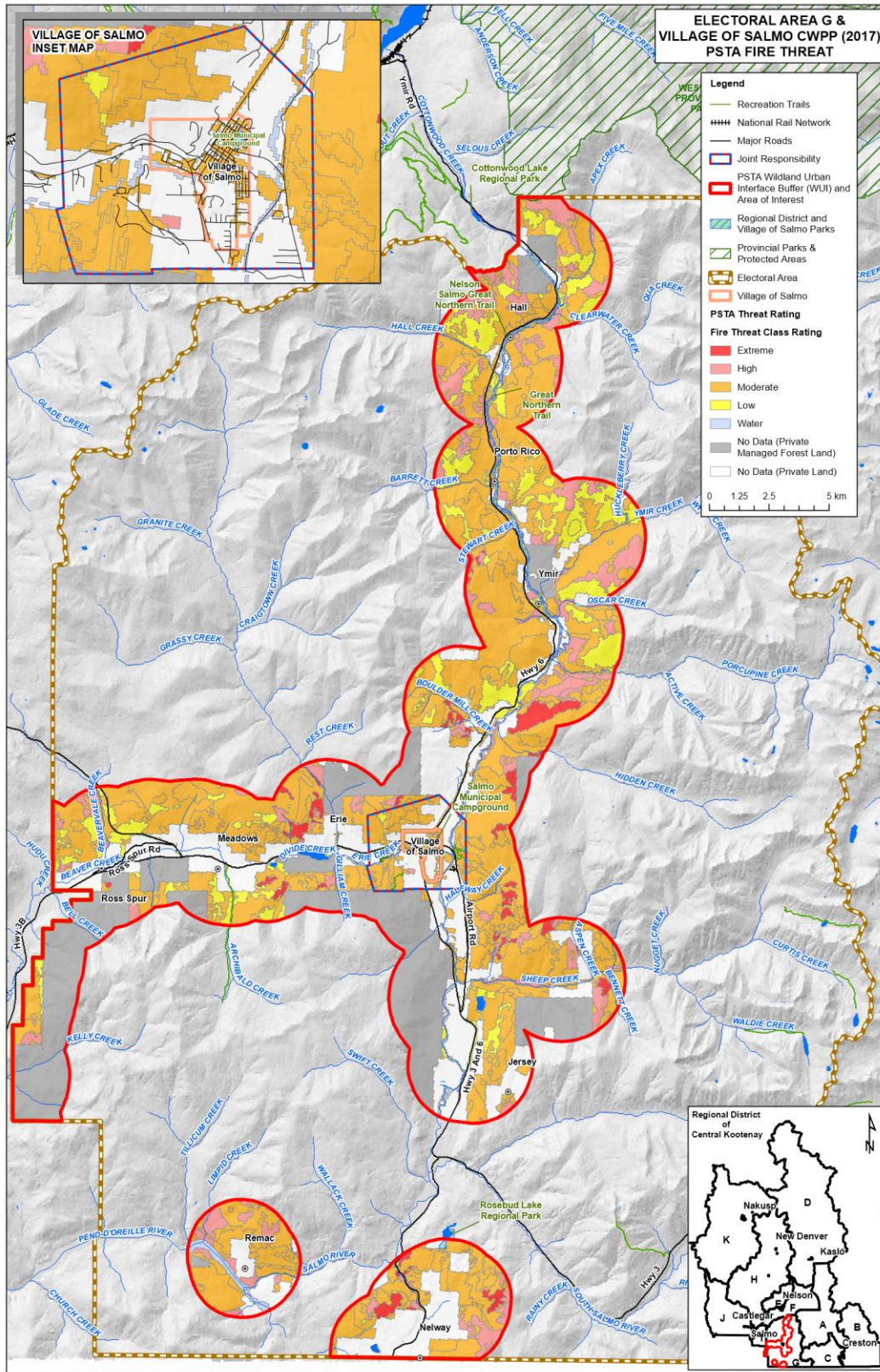
Climate change is anticipated to have largely negative impacts to forest health, especially within the interface areas. Tree stress caused by drought and greater windthrow are expected to allow insect populations to increase in weakened mature stands. This is particularly the case with Douglas-fir beetle, western balsam beetle, spruce beetle and western hemlock looper. Immature stands may see increases of spruce leader weevil, white pine blister rust, stem rusts of lodgepole pine, foliar diseases of lodgepole pine and larch, and Armillaria root disease. Lodgepole pine stands in particular are at elevated risk of insect and disease impacts with climate change (Holt, Utzig, Pinnell and Pearce, 2012)

One of the most prevalent forest health issues in the Kootenay Lake Timber Supply Area are bark beetles; primarily mountain pine beetle and western balsam bark beetle, and to a lesser degree, Douglas-fir beetle, and spruce beetle. The 2017 Forest Health Aerial Overview Survey (FLNRO, 2017) found that the mountain pine beetle mortality in the Kootenay Lake Timber Supply Area (TSA) were small and widely scattered, accounting for 2,934 ha. Balsam bark beetle infestations remained steady at approximately 2,945 ha. Douglas fir beetle was observed in 373 ha, and dispersed spruce beetle damage affected 383 ha. Aspen Serpentine leaf miners have been fairly stable at 6,018 but growing and causing significant problems in the Arrow Lake TSA. They are the most widespread damaging agent of deciduous trees in the TSA, with widespread reported around Nelson. The birch leaf miner continues to affect paper birch trees. Other damaging agents noted are larch needle blight (in scattered small pockets), wildfire, drought mortality (mixed Douglas-fir-lodgepole pine plantations), flooding, and windthrow.

4.2 Provincial Strategic Threat Analysis (PSTA)

The Provincial Strategic Threat Analysis (PSTA) is a rough spatial representation of wildfire threats across BC based off of multiple data sets. Further information is available in Appendix 2. The PSTA Wildfire Threat Analysis (WTA) is a result of the combination of three inputs:

1. Spotting impact: the capacity for embers / firebrands to be broadcast outside of the fire perimeter or in front of the wildfire. Spotting is the primary cause of structural loss, and is associated with high intensity crown fires in coniferous species. For the purposes of the PSTA Wildfire Threat Analysis, potential spotting impact is estimated as a function of the distance from surrounding fuels up to 2 km. Spotting can occur over longer distances but is rare and difficult to estimate.
2. Head fire intensity (HFI): directly related to the leading edge of the fire and its spread rate, fuel consumption, and flame length, HFI is a measure of the energy output (intensity in kW/m) of the flame front. Head fire intensity is an important measure for assessing suppression response and danger to wildfire personnel.
3. Historic fire density: the potential for fire to start and spread as a function of historic fire patterns and density.



Map 9: Provincial Strategic Threat Analysis

4.2.1 PSTA Final Wildfire Threat Rating

As shown in Table 6 below, 46.3% of the Study Area is classified between moderate and extreme for fire risk. However due to population being concentrated, 22.6% of the Study Area represents a moderate to extreme risk to Area G communities.

Table 6: Updated PSTA threat classes

Fire Behaviour Threat Class	Area (ha) in Study Area	Percent of Study Area		WUI Threat Class	Area (ha) in Study Area	Percent of Study Area
Extreme	1504.2	4.0%		Extreme	282.0	<1%
High	7034.3	18.6%		High	1167.8	3.1%
Moderate	8963.9	23.7%		Moderate	6018.1	15.9%
Low	6890.5	18.2%		Low	1070.6	2.8%
Very Low	349.3	1.0%		N/A	29,513.3	
No Data	13,309.5	35.2%		Total	8538	22.6%
Total	38,501	100%				

4.2.2 Spotting Impact

Burning material lofted by fire plumes and associated rising air patterns can rapidly spread fire downwind. The range of spotting related ignition is linked to topography, fuel potential, and weather patterns. Under some conditions this can occur over a distance of kilometers. The spotting potential of various fuel types is described in Table 7 below.

Table 7: Fuel Type Categories and Crown Fire Spot Potential

Fuel Type Categories	Fuel Type - Crown Fire/ Spot Potential
1: C1, C2, C4, M3-M4 (>50% C/DF)	High
2: C3, C7, M3-M4 (<50% C/DF) M1-M2 >50% Conifer	Moderate
3: C5, C6, O1a/b, S1- S3 ¹ M1-M2 (26-49% Conifer)	Low
4: D1, D2, M1-M2 (<26% Conifer)	Very Low

4.2.3 Head Fire Intensity

As shown in Table 8, head fire intensity contributes largely to fire behavior and flame length.

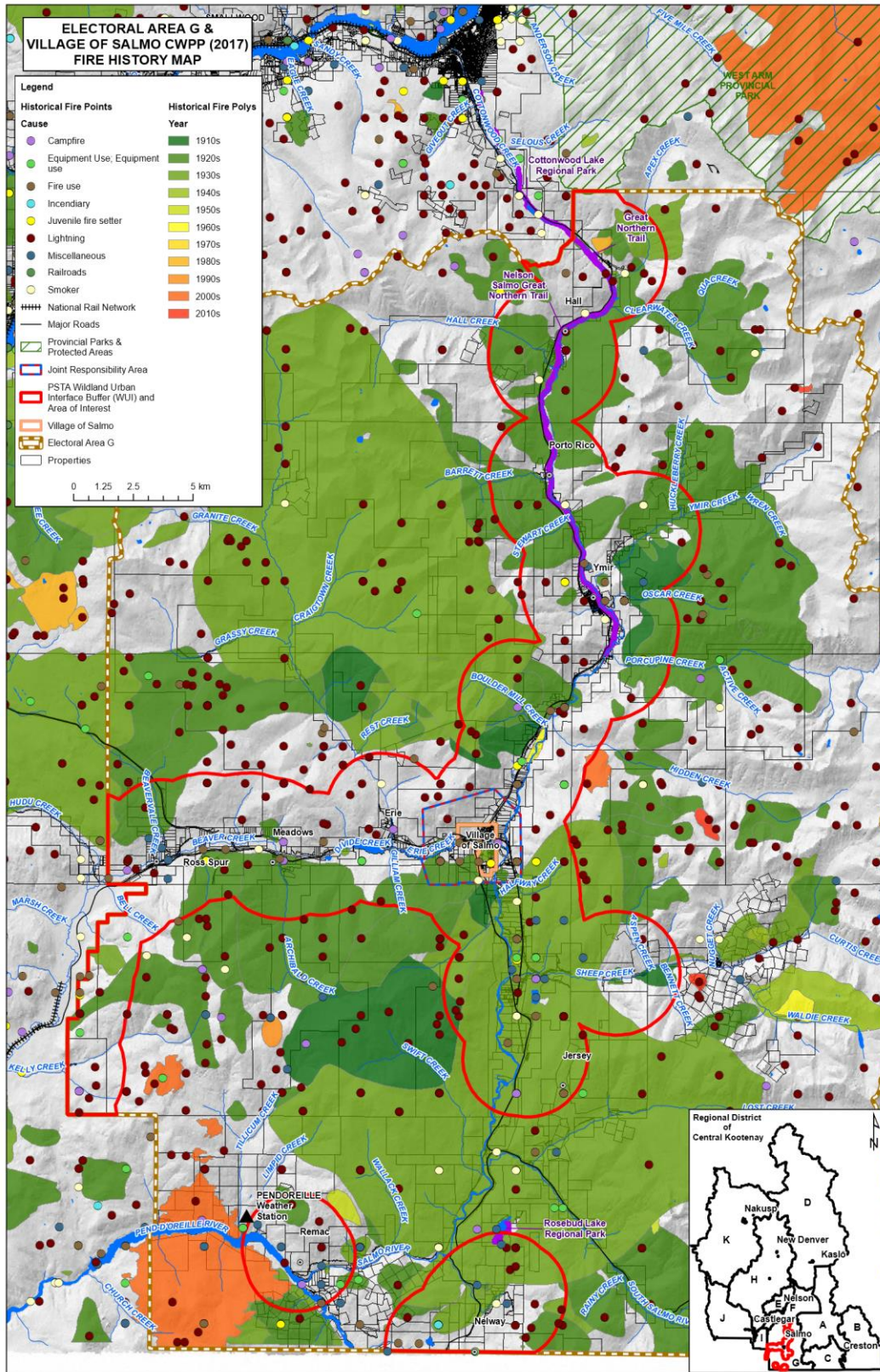
Table 8: head fire intensity classes and associated fire behaviour

PSTA – HFI Class	Fire Intensity kW / m	Fire Intensity Class	Flame Length (meters)	Likely Fire Behaviour
1	0.01 – 1,000	2	<1.8	Smoldering surface fire
2	1,000.01 – 2,000	3	1.8-2.5	Moderate vigour surface fire
3	2,000.01 – 4,000	4	2.5-3.5	Vigorous surface fire
4	4000.01 - 6000	5	3.5-4.2	Vigorous surface fire with occasional torching
5	6,000.01 – 10,000	5	4.2-5.3	Vigorous surface fire with intermittent crowning
6	10,000.01 – 18,000	6	12.3-18.2	Highly vigorous surface fire with torching and/or continuous crown fire
7	18,000.01 – 30,000	6	18.2-25.6	Extremely vigorous surface fire and continuous crown fire
8	30,000.01 – 60,000	6	>25.6	Extremely vigorous surface fire and continuous crown fire and aggressive fire behaviour
9	60,000.01 – 100,000	6	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour

10	>100,000	w6	>25.6	Blowup or conflagration, extreme and aggressive fire behaviour
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4.2.4 Fire History

During the early 1900's, miners burned much of the Kootenays in order to increase their access and viewability of the underlying geology. Area G is no exception to this, and most fires of note occurred between 1920-1940. The exception to this is the 3000 ha which burned near Remac in 2007 from lightning. Due to fire suppression limiting burning, fuel loading has continued. This greatly increases the likelihood of future wildfires developing into difficult to combat crown fires which have the potential to spread quickly.



Map 10: Fire History in the Study Area

4.3 Local Wildfire Threat Assessment

The Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. A network of fire weather stations during the fire season are maintained by the Ministry of Forests, Lands and Natural Resource Operations (MFLNRORD) and are used to determine fire danger, represented by Fire Danger Classes, on forestlands within a community. The information can be obtained from the MFLNRORD British Columbia Wildfire Service (BCWS) and is most commonly utilized by municipalities and regional districts to monitor fire weather, and to determine hazard ratings, associated with bans and closures.

Fire Danger Classes provide a relative index of how easy it is to ignite a fire and how difficult control is likely to be. The BC Wildfire Act [BC 2004] and Wildfire Regulation [BC Reg. 38/2005] specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation, and restrict high-risk activities based on these classes. Fire Danger Classes are defined as follows:

- **Class 1 (Very Low):** Fires are likely to be self-extinguishing and new ignitions are unlikely. Any existing fires are limited to smoldering in deep, drier layers.
- **Class 2 (Low):** Creeping or gentle surface fires. Ground crews easily contain fires with pumps and hand tools.
- **Class 3 (Moderate):** Moderate to vigorous surface fires with intermittent crown involvement. They are challenging for ground crews to handle; heavy equipment (bulldozers, tanker trucks, and aircraft) are often required to contain these fires.
- **Class 4 (High):** High-intensity fires with partial to full crown involvement. Head fire conditions are beyond the ability of ground crews; air attack with retardant is required to effectively attack the fire's head.
- **Class 5 (Extreme):** Fires with fast spreading, high-intensity crown fire. These fires are very difficult to control. Suppression actions are limited to flanks, with only indirect actions possible against the fire's head.

It is important for the development of appropriate prevention programs that the average exposure to periods of high fire danger is determined. 'High fire danger' is considered as Danger Class ratings of 4 (High) and 5 (Extreme). Danger class days were summarized from two weather stations to provide an indication of the fire weather in Area G. The fire danger in Area G can vary from year to year and from season to season. Considering fire danger varies from year to year, historical weather data provides information on the number and distribution of days when Area G is typically subject to high fire danger conditions. This is useful information in assessing fire risk.

The fire weather data for the Pend O'rielle Creek weather station shows that on average (from 2003 to 2012), moderate, high, and extreme fire danger days are prevalent in July, August, and September. Average danger class days for each month of the fire season (April – October) are shown in Figure . The location of the Pend O'rielle weather station is illustrated in Map 11.

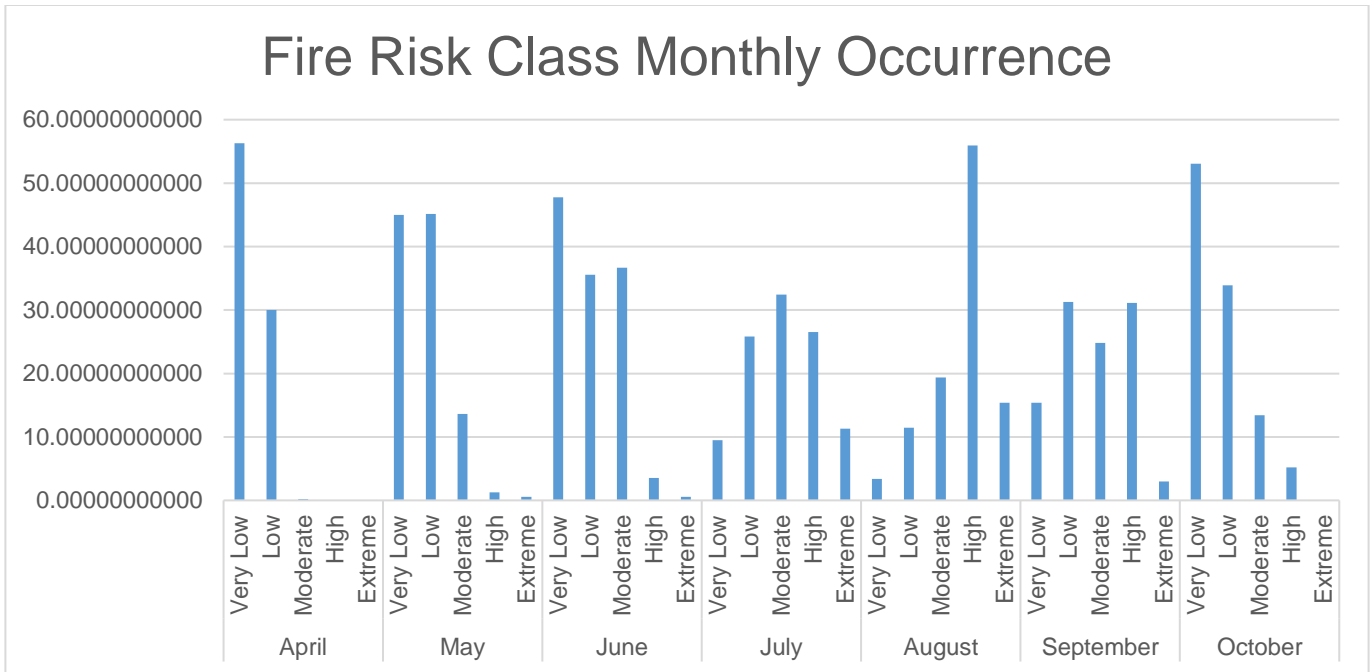
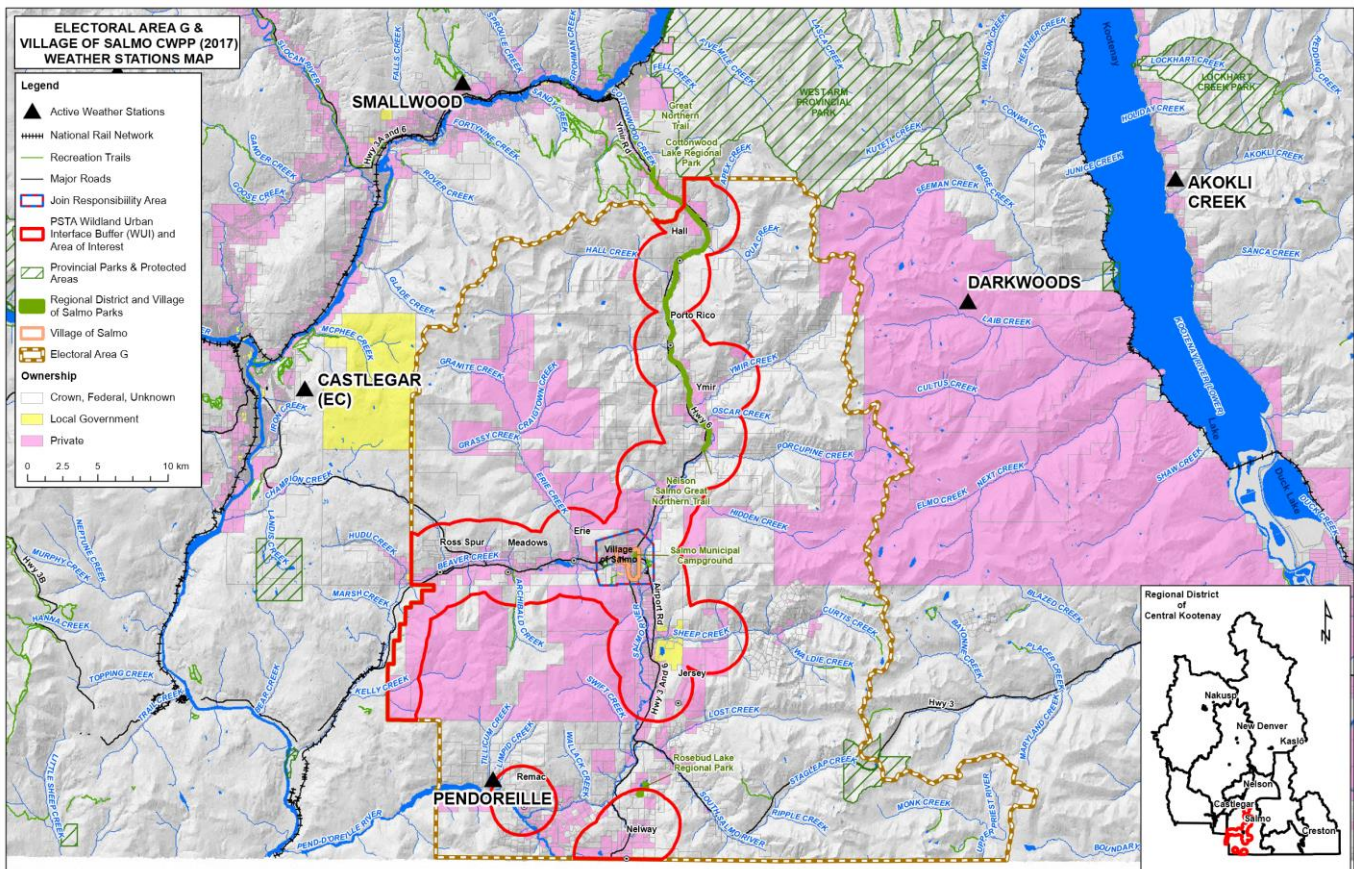


Figure 1: Average Fire Danger Class days per month in RDCK Area G recorded at the Pend O'rielle weather station.



Map 11: weather stations

4.3.1 Fuel Type Verification

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and 16 fuel types based on characteristic fire behaviour under defined conditions (Forestry Canada Fire Danger Group, 1992).

The initial starting point for Study Area fuel typing is the 2015 Provincial Strategic Threat Analysis (PSTA), which is based on the FBP fuel typing system. PSTA data is limited by the accuracy and availability of information within the Vegetation Resource Inventory (VRI) provincial data; confidence in fuel type provincial fuel type data is low on private land. For the above reasons, fuel types from the PSTA data have been updated using orthophotographs of Area G and Salmo and with field fuel type verification as illustrated in Map 10.

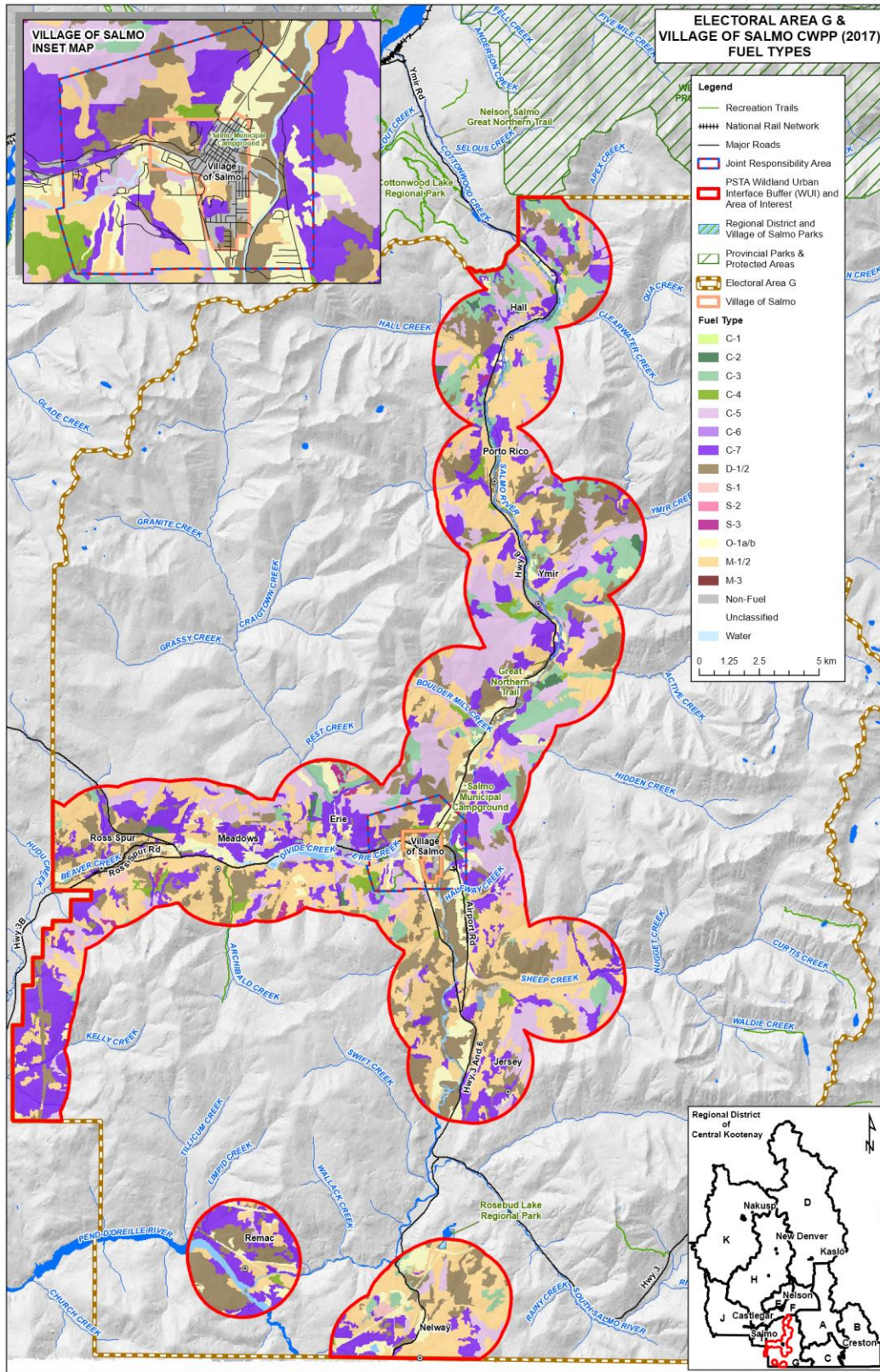
Overall, fuel types designated in the PSTA dataset were notably different from the corrected fuel typing, and extensive field and photo interpretation validation was required prior to spatial analysis. Table 9 summarizes the fuel types by general fire behaviour and total area for the Study Area.

Table 9: The fuel types occurring within the Study Area.

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level	Area (ha) in Study Area	Percent of Study Area
C-2	Plantations older than 20 years. High density with high canopy and low crowns.	Almost always crown fire, high to very high fire intensity and rate of spread.	173.1	<1%
C-3	Fully stocked, mature forest, crowns separated from ground	Surface and crown fire, low to very high fire intensity and rate of spread	2683.9	7.1%
C-4	Dense pole-sapling forest, heavy dead and down, dead woody fuel, vertical crown fuel continuity	Almost always crown fire, high to very high fire intensity and rate of spread.	441.3	1.1%
C-5	Well-stocked mature forest, crowns separated from ground	Low to moderately fast spreading, low to moderate intensity surface fire.	6037.4	16.0%
C-7	Open, mature forest.	Surface fire spread, torching of individual trees, rarely crowning (usually limited to slopes > 30%), moderate to high intensity and rate of spread	6780.7	18.0%
D-1/2	Moderately well-stocked deciduous stands (D1 leafless or D2 green)	Always a surface fire, low to moderate rate of spread and fire intensity		

Fuel Type	Description	Wildfire Behaviour Under High Wildfire Danger Level	Area (ha) in Study Area	Percent of Study Area
M-1/2	Moderately well-stocked mixed stand of conifer and deciduous species, low to moderate dead, down woody fuels, crowns nearly to ground (M1 – leafless, M2 – in leaf)	Surface, torching and crowning, moderate to very high intensity and spread rate (depending on slope and percent conifer and season (in leaf vs leafless))	11,734.0	31.0%
M-3/4	Moderately well stocked mixed stands of conifer and deciduous species, where the conifer species may be dead, in varying percentage. Not typically used in BC except as red-phase MPB-attacked pine stand. M4 (leafless) not used in BC (Perrakis and Eade, 2015)	Rapid spreading, high to very high fire intensity and rate of spread (M3)		
O1a/b	Shrub type with volatile species, matted or standing grass	Rapid spreading, intense surface fire	2149.2	5.7%
S1/S2/S ₃	Continuous and uncompacted slash type with large fuel loads and deep slash depth. Varies depending on species composition of slash.	Ranges from surface fire, low to moderate intensity to moderate to high rate of spread and high to very high intensity surface fire.	527.1	14.0%
W	Water	N/A	444.9	
NF	Non-fuel	N/A		
Total			30,971	93%

Developed areas have been accurately identified as non-fuel areas, as they do not fit into the classification system that is only appropriate to classify forested lands. The assignment of non-fuel should not be interpreted as areas representing low, or no hazard, as planted landscaping and other vegetation, planted and naturally regenerating, on private lands and within a developed matrix may present extreme hazard. This is particularly relevant, as planted landscaping on private lands can present a considerable hazard in interface areas.



Map 12: Updated Fuel Type in the Study Area

4.3.2 Proximity of Fuel to the Community

The Wildland Urban Interface (WUI) is generally defined as the place where the forest meets the community. There are different WUI conditions, which are variations on 'perimeter interface' and 'intermix'. A perimeter interface condition is generally where there is a clean transition from urban development to forest lands. Smaller, more isolated developments that are embedded within the forest are referred to as intermixed areas. An example of interface and intermixed areas is illustrated in Figure 5.

In interface and intermixed communities, fire has the ability to spread from the forest into the community or from the community out into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk. Regardless of which scenario occurs, there will be consequences for the community and this will have an impact on the way in which the community plans and prepares for interface fires.

Fires spreading into the WUI from the forest can impact homes in two distinct ways:

1. From sparks or burning embers carried by the wind, or convection that starts new fires beyond the zone of direct ignition (main advancing fire front), and alight on vulnerable construction materials or adjacent flammable landscaping (i.e. roofing, siding, decks, juniper, etc.)
2. From direct flame contact, convective heating, conductive heating or radiant heating along the edge of a burning fire front (burning forest), or through structure-to-structure contact. Fire can ignite a vulnerable structure when the structure is in close proximity (within 10 meters of the flame) to either the forest edge or a burning house.

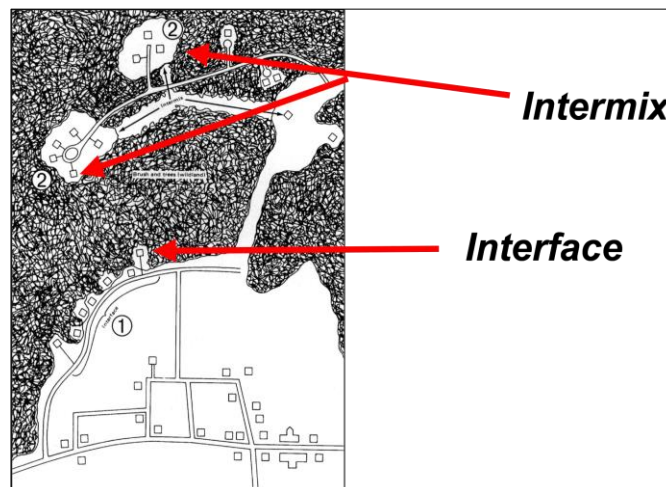


Figure 2: Illustration of intermix and interface areas.

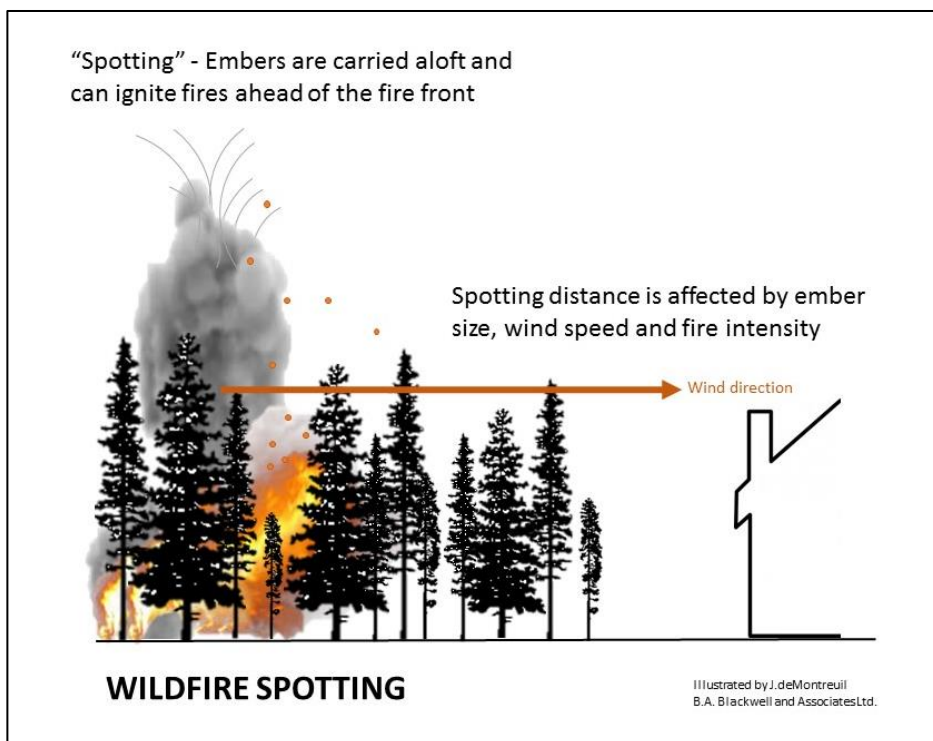


Figure 3: Wildfire spotting in the interface

4.3.3 Fire Spread Patterns (i.e. ISI Roses)

Wildfire trajectory and rate of spread depend on a wide variety of factors, the most significant of which are wind speed, wind direction, and condition of fine fuel moisture. As such, fuel mitigation measures have been designed to account for the dominant direction of wind flow.

The wind rose data is compiled hourly by the MFLNRORD This data provides an estimate of prevailing wind directions and wind speed in the area of the weather station. For the Pend O’rielle Creek weather station, the prevailing wind direction is from the southeast, east, and southwest. (Figure 4). The wind rose indicates that the majority of winds are less than 10 km/hr, with a small percentage of the prevailing winds between 10 and 17.9 km/hr.

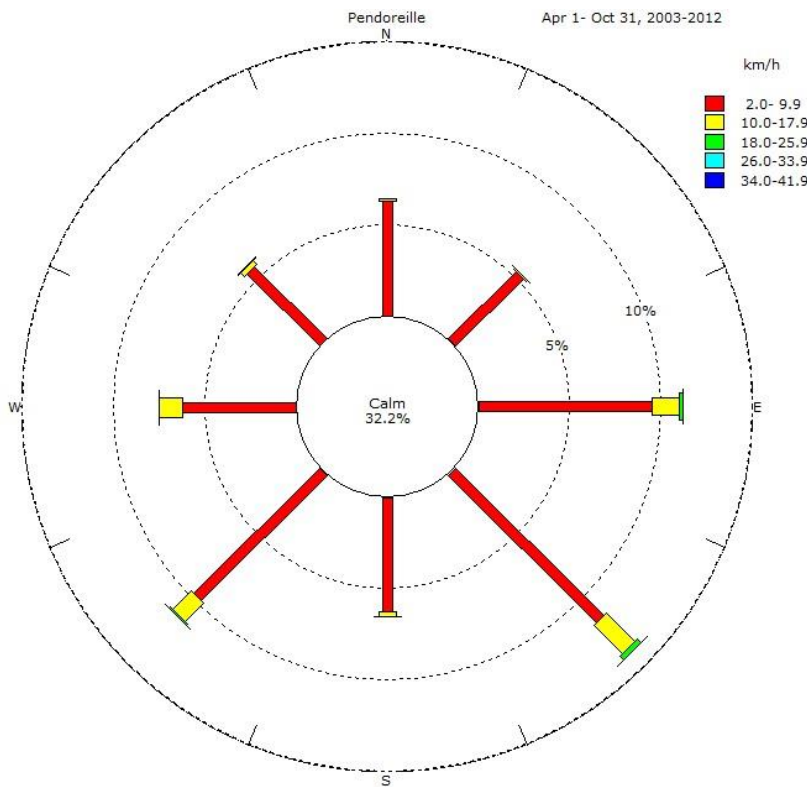


Figure 4: Wind rose data for Pend O’rielle weather station.

For the Castlegar weather station, the prevailing wind direction is from the south, with winds from the north and northwest being common patterns as well (Figure 5). The wind rose indicates that there are high levels of wind in this area, with significant portions being between 23 – 30 km/hr. Wind patterns and strength can vary greatly due to local topography.

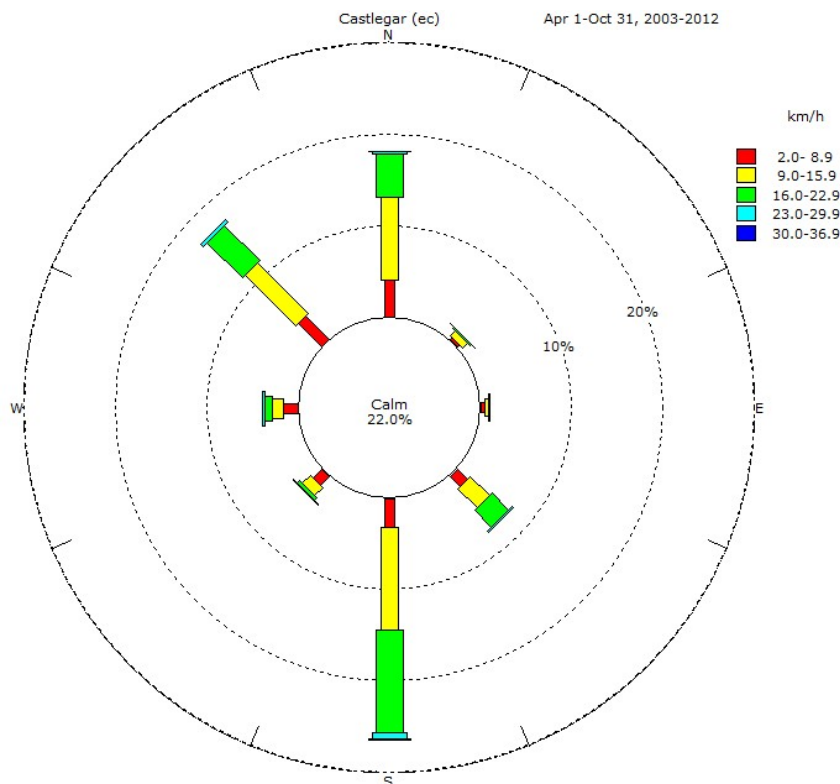


Figure 5: Wind rose data for Castlegar weather station. 15 years of hourly data.

4.3.4 Topography

One of the most important environmental components to anticipating the behaviour of fire is topography. The two most important factors are how steep (slope percentage) and the slope position. Trajectory and rate of spread are strongly influenced by the slope percentage, while the slope position can be used to anticipate the ability and potential to gain momentum uphill. Aspect, configuration of land, and elevation.

Table 10: Slope Percentage and Fire Behaviour.

Slope	Area of Interest (%)	Fire Behaviour Implications
<20%	24.9	Normal rate of spread. Minimal fuel and flame interaction caused by slope.
21-30%	14.2	Rate of spread increased. Fuel is preheated due to upwards flame tilt.
31-45%	26.3	High rate of spread. Fuel is preheated by flame tilt, and flames begin to reach fuel.

Slope	Area of Interest (%)	Fire Behaviour Implications
46-60%	20.7	Very high rate of spread. Fuel is preheated by flame tilt, and flames reach fuel.
>60%	13.7	Extreme rate of spread. Fuel is preheated by flame tilt, and flames reach fuel well upslope.

Table 11: Slope position and fire behaviour.

Slope Position	Fire Behaviour
Valley Bottom / Bottom of Slope	Normal rates of spread, little to no preheating.
Bench - Mid Slope	Increased rates of spread. Preheating may be reduced due to bench position being offset from slope.
Continuous – Mid Slope	Fast rates of spread. Lack of terrain features braking preheating and flames tilting into new fuel.
Top 30% of slope	Extreme spread rates. Preheating and flames tilting into new fuel causing risk of a large continuous fire run.

4.3.5 Local Wildfire Threat Classification

WUI threat assessments were completed predominantly during the early part of the field season of 2016 and 2017, from March to July, in conjunction with verification of fuel types. WUI Threat Assessments were completed in the

interface areas of Area G, in order to support development of priority treatment areas, and in order to confidently ascribe threat to polygons which may not have been visited or plotted, but which have similar fuel, topographic, and proximity to structure characteristics to those that were. To assess risk on treated and untreated polygons, the Provincial WUI Wildfire Threat Rating Worksheets (worksheet) were used, as required by UBCM¹¹ in addition to professional judgment. The worksheet provides point ratings for four components that contribute to wildfire risk. These components include fuels, weather, topography and structural values at risk. The original WUI threat plot forms have been submitted as a separate document.

A total of 36 WUI threat plots were completed in Area G. The data collected and field observations recorded from the plots and field stops inform much of this document. Area G overall has 'high' fire behaviour threat class ratings, and a range of WUI threat ratings, as shown in Table 12 below. Map 13 shows the location of each threat classification plot.

Table 12: Wildland Urban Interface Threat Assessments completed in the Study Area. Data currently being analyzed.

Plot	General Location	Fire Behaviour Score	Fire Behaviour Class	WUI Threat Score	WUI Threat Class
1.	Ymir (YMIR1)	122/240	High	23/55	Moderate
2.	Ymir (YMIR2)	123/240	High	33/55	High
3.	Ymir (YMIR3)	136/240	High	33/55	High
4.	Ymir (YMIR4)	122/240	High	14/55	Moderate
5.	Ymir (YMIR5)	135/240	High	22/55	Moderate
6.	Ymir (YMIR6)	122/240	High	14/55	Moderate
7.	Ymir (YMIR8)	127/240	High	14/55	Moderate
8.	Porto Rico (RICO1)	142/240	High	25/55	Moderate
9.	Porto Rico (RICO2)	150/240	Extreme	23/55	Moderate
10.	Porto Rico (RICO3)	159/240	Extreme	23/55	Moderate
11.	Erie / Salmo Ski Hill (ERIE1)	127/240	High	9/55	Low

¹¹ <http://www.ubcm.ca/assets/Funding~Programs/LGPS/SWPI/Resources/swpi-WUI-WTA-Guide-201High2-Update.pdf>

Plot	General Location	Fire Behaviour Score	Fire Behaviour Class	WUI Threat Score	WUI Threat Class
12.	Erie (ERIE2)	127/240	High	20/55	Moderate
13.	Fruitville (FRTV1)	144/240	High	20/55	Moderate
14.	Hall (HALL1)	119/240	High	23/55	Moderate
15.	Hall (HALL2)	134/240	High	11/55	Low
16.	Hall (HALL3)	130/240	High	23/55	Moderate
17.	Hall (HALL4)	131/240	High	38/55	High
18.	Hall (HALL5)	105/240	High	30/55	High
19.	Nelway (NEL1)	119/240	High	16/55	Moderate
20.	Nelway (NEL2)	104/240	High	25/55	Moderate
21.	Nelway (NEL3)	97/240	High	14/55	Moderate
22.	Remac (REM1)	144/240	High	40/55	Extreme
23.	Ross Spur (ROSS1)	140/240	High	11/55	Low
24.	Ross Spur (ROSS2)	129/240	High	20/55	Moderate
25.	Ross Spur (ROSS3)	143/240	High	30/55	High
26.	Ross Spur (ROSS4)	138/240	High	16/55	Moderate
27.	Salmo (SAL2)	115/240	High	30/55	High
28.	Salmo (SAL3)	142/240	High	20/55	Moderate
29.	Salmo (SAL4)	124/240	High	42/55	Extreme
30.	Salmo (SAL5)	127/240	High	35/55	High
31.	Salmo (SAL6)	104/240	High	38/55	High
32.	Salmo (SAL7)	127/240	High	30/55	High
33.	Salmo (SAL8)	132/240	High	35/55	High
34.	Salmo (SAL9)	119/240	High	30/55	High

Plot	General Location	Fire Behaviour Score	Fire Behaviour Class	WUI Threat Score	WUI Threat Class
35.	Salmo Ski Hill (SSK11)	126/240	High	11/55	Low
36.	Erie (ERIE3)	108/240	High	20/55	Moderate

There are two main components of the threat rating system: the wildfire behaviour threat class (fuels, weather and topography sub-components) and the WUI threat class (structural sub-component). The map below shows the Fire Behaviour and Fire Threat (WUI Threat class), determined as a result of a spatial data analysis (for methodology see Appendix 2).

The result of the analysis shows large tracts of landscape that have high or extreme fire behavior potential. Areas of high or extreme WUI threat are limited to those areas that have a high or extreme fire behavior rating and are in close proximity to homes.

SECTION 5: RISK MANAGEMENT AND MITIGATION FACTORS

Successful risk management and mitigation strategies must consider the presence of fuel types in terms of their presence and proximity to communities, private land, ecological values, terrain formations and hazards, and First Nations and local government capacities. A proactive and co-operative approach among local, provincial, and federal government is required due to the complexity and scale needed for wildfire risk mitigation. Implementation is dependent on identifying and prioritizing hazards within communities, forest fuel levels, human use factors, and other influences. As a result, communities become more fire resilient while the surrounding risk reduces. Broadly, the specific actionable items to achieve this are:

1. Fuel management (reduction in fire behavior potential)
2. FireSmart (reduce fire spread into community and potential degradation of values)
3. Communication and education (increase knowledge, awareness, and support; build stronger communities)

5.1 Fuel Management

Also called vegetation management, fuel treatment, or fuel mitigation, is key to wildfire risk reduction. Several fuel treatments have been carried out with the study area based on the recommendations of the 2008 CWPPs. Fuel management objectives are to:

- Reduce threat to public and private land from wildfire
- Create more fire resilient landscapes through enhancing fire containment and lowering wildfire damage through reduction in fire intensity, rate of growth, and spotting / embers.

Public sources of funding such as the Union of British Columbia Municipalities (UBCM) and the Forest Enhancement Society of BC (FESBC) are eligible to be used on crown lands only, thus directly treating private land is outside the scope of this project. Many landowners are enthusiastic about lowering wildfire risk to themselves and their communities, and are willing to direct their own resources towards fuel modification. Urging compliance with FireSmart guidelines is the most effective way to ensure efficacy of treatments conducted on private land.

The main outcome of interface fuel management is often not to completely stop fire, but to decrease intensity to limit fire damage, and to maximize ability for structural protection and firefighters to operate effectively. Tools to achieve this include fuel removal, thinning, stand conversion, and controlled burns. Thinning ladder fuels from

below decreases likelihood of crown fires developing, and thus largely eliminates spotting and embers. Longer term fuel reduction patterns involve shifting the species composition from flammable conifers such as Cedar, Lodgepole pine, and Spruce towards less flammable Ponderosa, Douglas fir, larch, and deciduous species.

5.1.1 Burning and Smoke Management

Prescribed fire, when used properly and in appropriate circumstances, is an extremely important, and effective, tool for mitigating hazard and reducing fuels. Air curtain burners, piling and burning, and prescribed broadcast burning are methods of fuel reduction/debris management that should be considered during fuel reduction activities and, when implemented properly, can be completed with low emissions and little impact on air quality: much less smoke and particulates than is released in a wildfire.

Smoke Management

Smoke management is integral to the success of any burning operation. Site, or area specific, smoke management plans should be in place to ensure that emissions are minimized and are operations are compliant with all relevant legislation such as the Operational Burning and Smoke Control Regulation. Strategies to minimize impacts of smoke include:

- Burn under acceptable venting, wind and weather conditions only;
- Light a test pile before burning to ensure that local conditions match published venting conditions;
- Practice concurrent burning, also called hot-fed piles (piling and burning at the same time to achieve a moderate level of fuel compaction and a good mixture of small and large diameter wood);
- Utilize tools, such as leaf blowers, to maintain a hotter fire with more complete combustion;
- Stop burns immediately should venting, weather, or wind conditions become undesirable;
- Utilize trained and knowledgeable personnel;
- Time burns when the least amount of people will be impacted (e.g. during school holidays); and
- Notify the public and offer alternatives for those with serious health concerns.

Burning completed by knowledgeable and competent personnel, guided by a smoke management plan, and directed by an experienced professional can often be completed with minimal impacts to public health or air quality.

Air Curtain Burners

Air curtain burners are wood incinerators. By providing high-velocity air to wood waste in either an earthen or metal fire box, wood waste is able to be burned with more complete combustion and less smoke emissions. Air curtain burners require a flat and wide location; forest fuels must be yarded to a road and/or transported to the burner location.

Pile Burning

Pile burning is an effective use of fire in locations where access is limited, making chipping or fuel removal impossible or too costly. Smoke management and control during pile burning has improved in recent years and there are a number of strategies that can be employed to reduce smoke emissions to an acceptable level. They include: checking local venting indices prior to burning; lighting a small test pile to check venting prior to starting larger operations; burning concurrently (lighting small piles and continually adding to the pile throughout the day, rather than accumulating large piles to burn); adding oxygen through the use of leaf blowers, or similar hand-held devices to encourage more complete combustion.

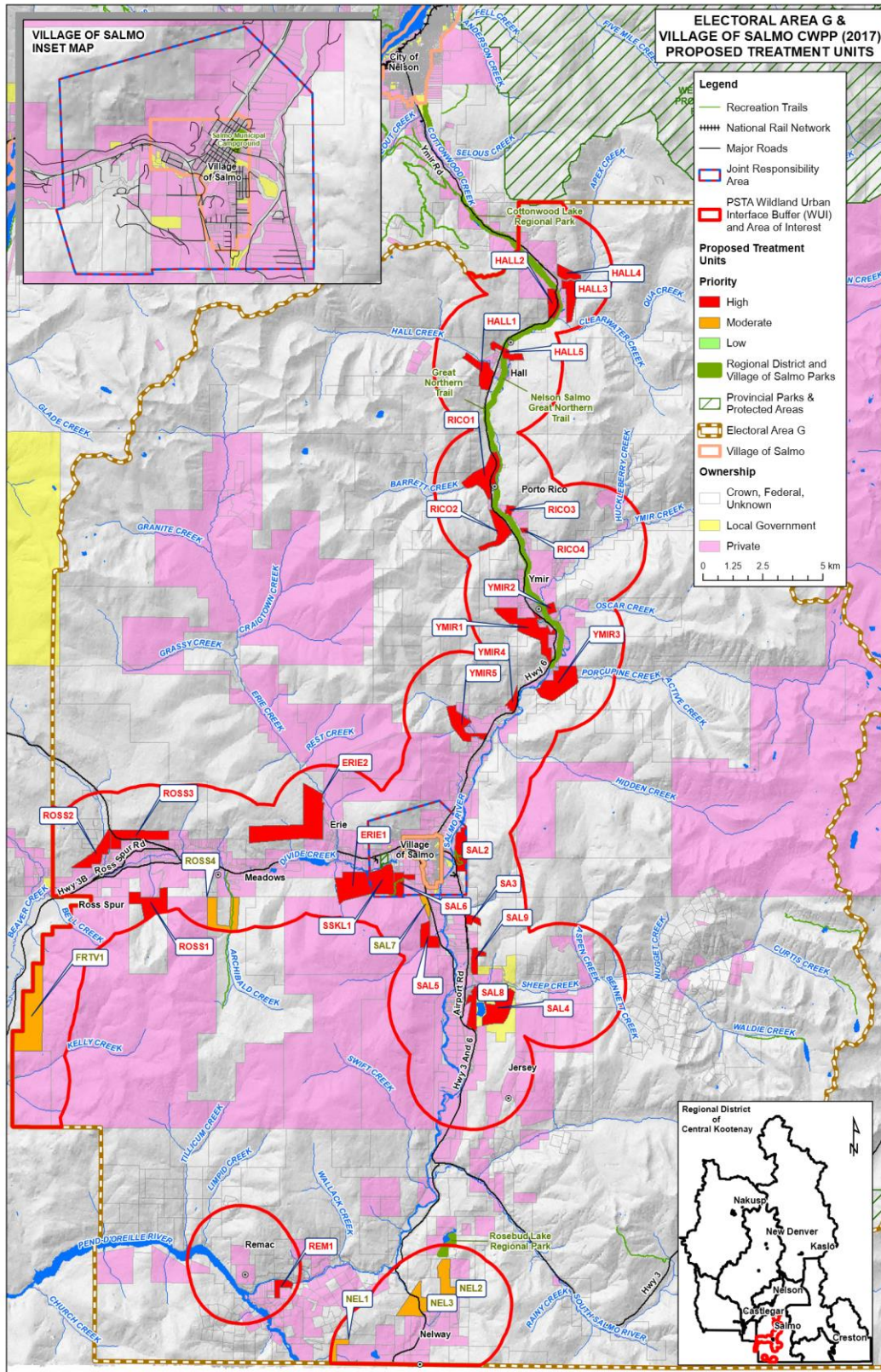
Prescribed burning is just one method of woody debris management and fuel reduction and can be used in combination with other methods, such as chipping, mulching, or scattering fuels, in the same treatment unit to further reduce emissions. The utilization of woody fuels commercially should be considered in all projects. For example, chips can be used as biofuel. Local market demand for these products will dictate the availability of commercial utilization for fuels treatment projects.

5.1.2 List of Priority Treatment areas

Wildfire threat must be reduced throughout the Wildland Urban Interface by ensuring that road building and harvesting does not increase the level of risk. Additionally, proactive fuel management treatments are recommended to mitigate wildfire threat in the WUI. To prioritize this threat reduction, 33 priority treatment areas are recommended for initial fuel management activities totaling 2970 ha. These are detailed in Table 13 below. These new treatment polygons represent areas of predominantly high, to extreme fire behaviour threat that are close to values at risk. These proposed treatment areas are priority areas of interest for focused mitigation activities; however, the implementation of fuel management activities is subject to detailed prior assessment.

Funding opportunities are currently limited to Crown Provincial, Regional District, or Municipal land. As such, priority treatment areas are limited to Crown land that is eligible for current funding opportunities. Recommended treatment types are thinning such as conifer understory and overstory, surface fuel reduction, pruning, removal of dead trees, and removal of surface fuels.

Site-specific operational challenges exist in almost all treatment areas. Debris disposal and management are constrained by access limitations that pose challenges to implementation and increase operational costs. Many polygons are located on steep slopes that may not easily be accessible by machinery, and pose limits to manual labour. Private land often surrounds or isolates proposed treatment areas. Additionally, proximity to structures will impact the possibility of using pile burning as a cost-effective method of debris disposal; pile burning must comply with the Open Burning Smoke Control Regulations that sets out minimum distances from institutions and residences.



Map 13: Priority Treatment Areas and Wildfire Urban Interface Threat Assessment Plot Locations in the Study Area

Table 13: List of Priority Treatment Areas.

Treatment Polygon	WUI Threat Plot (Wildfire Behaviour Threat Score)	Priority	Fuel Type	Area (ha)	Recommended Treatment Type
HALL 1	HALL 1 (High)	High	C-4	79.7	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Collaborate with Licensee on previously logged areas to manage regrowth
HALL 2	HALL 2 (High)	High	C-4	51.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure
HALL 3	HALL 3 (High)	High	C-4	75.7	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure
HALL 4	HALL 4 (High)	High	C-5	38.8	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure
HALL 5	RICO1 (High)	High	C-5	42.0	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure
RICO 1	RICO1 (High)	High	C-4 intermixed with M1/2	132.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Consult Nelson Rod and Gun club. Shooting range is within the

					<p>polygon.</p>
RICO 2	RICO2 (Extreme)	High	C-4 inter-mixed C-5 areas	78.2	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure
RICO 3	RICO3 (Extreme)	High	C-4	12.39	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Possible demonstration treatment for the community
RICO 4	RICO3 (Extreme)	High	C-4	5.6	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Possible demonstration treatment for the community
YMIR1	YMIR1 (High) YMIR2 (High)	High	C-5 inter-mixed: C-3 and C-4	174.9	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Ymir community watershed concerns
YMIR2	YMIR3 (High)	High	C-4	15.4	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Good demonstration treatment
YMIR 3	YMIR8 (High) YMIR6 (High)	High	C-4 unlogged and C-2	149.5	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Consult licensee on slash management and silviculture management plan

YMIR 4	YMIR4 (High)	High	C-5 with C-7, M1/2 inter-mixed	25.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown
YMIR 5	YMIR5 (high)	High	C-4 with S-1 and C-3 areas	92.6	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Consult licensee on slash management and silviculture management plan
SAL 2	SAL2 (High)	High	C-7, C-3, and C-4	75.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Steep rocky bluffs, non mechanized. Treatment unit will need to be stratified, identifying access and operable terrain.
SA 3	SAL3 (High)	High	C-5, C-4, and C-7 inter-mixed	21.6	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Steep rocky terrain, non mechanized terrain.
SAL 4	SAL4 (High)	High	C-4	129.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Consult RDCK and village of Salmo. Access through gated roads.
SAL 5	SAL5 (High)	High	C-4	60.3	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown
SAL 6	SAL6 (High)	High	C-5, C-4 areas	50.9	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Salmo Ski Hill

SAL 7	SAL7 (High)	Moderate	C-5	19.8	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Limited access: Hell Roaring Inn Rd.
Sal 8	SAL8 (High)	High	C-7 / C-3 dominant with M1/2	66.1	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Little access, non mechanized steep rocky terrain in southern half.
SAL 9	SAL9 (High)	High	C-7	35.4	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Treatment would be minimal as the area is steep rocky bluffs with limited access and low density forest type.
SSKL 1	SSKL1 (High)	High	C-4	108.2	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Assess ski hill runs for fire hazard. Collaborate with Salmo Ski Hill Society.
ERIE 1	ERIE1 (High)	High	C-3 / C-5	149.9	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown
ERIE2	ERIE2 (High)	High	C-3, Areas of C-4 and C-2	114.8	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown • Consult licensee on slash management and silviculture management plan
REM 1	REM1 (High)	High	C-4	84.49	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown

					<ul style="list-style-type: none"> Area has previously burned, killing most of the understory. Fire risk is still high.
ROSS 1	ROSS1 (High)	High	C-4	109.1	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown
ROSS2	ROSS2 (High)	Moderate	M1/2 with C-4 inter-mixed	115.0	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown
ROSS3	ROSS2 (High)	Moderate	C-2 previously logged	277.2	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown
ROSS4	ROSS4 (High)	Moderate	C-4	30.5	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown
FRTV 1	FRTV1 (High)	Moderate	Mosaic of D1/2 logged areas, C-2 plantations, C-4 and C-7 intact stands	88.7	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown Polygon contains access to Fruitvale water intake, transmission lines
NEL 1	NEL1 (High)	Moderate	C-4	105.8	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown Lots of road reactivation access available Transmission lines bisecting unit
NEL 2	NEL2 (High)	Moderate	C-5 and M1/2	34.0	<ul style="list-style-type: none"> Prune trees to 3m; Reduce woody surface fuels Thin dense patches to 40% crown Mechanized treatment potential

NEL 3	NEL3 (High)	Moderate	C-5	319.1	<ul style="list-style-type: none"> • Prune trees to 3m; • Reduce woody surface fuels • Thin dense patches to 40% crown closure • Transmission lines bisect unit
TOTAL AREA				2970	

5.1.3 Maintenance of Existing Treatment Areas

The RDCK has shown leadership in completing fuel management projects within Area G to reduce the associated hazard. These activities started with the completion of the Village of Ymir and Salmo CWPPs in 2008, and with fuel treatments starting in 2009. Since then, fuel treatments have been completed on approximately 19.08 ha of land. These polygons are in various states of hazard and some of them will require additional fuel management activities in order to maintain or to achieve moderate threat ratings. Furthermore, maintenance is recommended for all future treatments based on polygon ecosystem and productivity.

Based on 2017 and 2018 field visits of representative existing treatments, no maintenance is required until approximately 15-20 years from date of treatment, with the exception of a localized blowdown area as indicated in Table below. This generalized schedule (for previously treated areas and future treatment areas) should be confirmed by reviewing the maintenance schedule in the original treatments prescriptions. Additionally, the maintenance schedule is subject to inspection of all existing treatment units within 10 years of treatment. Areas that have experienced significant blowdown should be maintained as soon as possible provided funding is available. Currently, only minor blowdown has been observed.

Maintenance activities may include such tasks as removing blowdown debris and brushing to remove regenerating conifers and woody shrub species.

Table 14. Estimated maintenance schedule for previously treated polygons within the Study Area.

Treatment Unit Name	Community	Year	Area (ha)	Field Verified (Y/N)	Priority for Maintenance	Target Timeline	Comment
YMI1	Ymir south	2011	10.89	Y	LOW	2022 (Inspection)	Prescription fully implemented. Minor in growth and blowdown observed
YMI2	Ymir south	2011	3.64	Y	LOW	2022 (Inspection)	Prescription fully implemented. Minor in growth and blowdown observed
YMI3	Ymir south	2011	2.17	Y	LOW	2022 (Inspection)	Prescription fully implemented.

Treatment Unit Name	Community	Year	Area (ha)	Field Verified (Y/N)	Priority for Maintenance	Target Timeline	Comment
YMI5	Ymir south	2011	1.10	Y	LOW	2022 (Inspection)	Prescription fully implemented. Minor in growth and blowdown observed
YMI6	Ymir south	2011	1.28	Y	LOW	2022 (Inspection)	Prescription fully implemented. Minor in growth and blowdown observed
Total Area:			19.08				

Table 15: Summary of Fuel Management Recommendations.

Fuel Management			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Reduce wildfire threat on private and public lands through fuel management.			
6.	High	Proceed with detailed assessment, prescription development and treatment of hazardous fuel units identified in this CWPP. Collaboration with BCTS, and other licensees and BC Parks may facilitate larger projects.	UBCM CRI Funding / FESBC Funding as available
7.	High	Prioritize Areas of Interest across Electoral Areas with updated CWPPs to ensure effective and objective treatment	Within current operating costs
Objective: Maintain treated areas under an acceptable level of wildfire fire threat (moderate).			
8.	Moderate	As treatments are implemented, complete monitoring within 10 years of treatment (subject to site conditions) and maintenance every 15-20 years (subject to prescription and site conditions) on previously treated areas. Treated areas should be assessed by a Registered Professional Forester, specific to actions required in order to maintain treated areas in a moderate or lower hazard.	UBCM CRI Funding / Municipal Funding

5.2 FireSmart Planning and Activities

This section summarizes the current implementation of FireSmart, its goals and objectives, key aspects for local governments, and priority areas for implementation.

5.2.1 FireSmart Goals and Objectives

FireSmart is a national initiative that seeks to assist communities on a property owner level in reducing wildfire hazard in their private property interface. This focus on structural protection offers a vital step in protecting human safety and property. Techniques to achieve this focus on the 10 meters directly around the structure and include; clearing all plants and vegetation, removing any fuel from overhanging roofs, encouraging fire smart landscaping and species. One of the largest risks to home is typically the ember shower as it penetrates gaps into roofs, decks, and other gaps which may hold flammable fine fuels. Strategies such as covering these gaps with a fine mesh are successful in mitigating these dangers. Each community in Area G has access to a FireSmart representative, who can at no cost to the homeowner assess private dwellings for these shortcomings in fire safety.

5.2.2 Key Aspects of FireSmart for Local Governments

Another way to encourage change is through education and increased awareness of fire hazard on private property using tools such as the Home Partners Program or the FireSmart Home Assessment. The reduction of wildfire hazards on private lands generally depends on the homeowner. This includes choices in exterior building materials, setbacks from forest edges and landscaping. In other jurisdictions, notably Colorado Springs, Colorado¹² and Whistler, BC, programs to increase awareness of fire hazard and spur homeowner action have been implemented successfully. In these jurisdictions, fire hazard assessments were completed for homes in the Wildland Urban Interface. The results of the assessments were shared with the homeowner / property owner at the time of assessment. The results of the hazard assessments were compiled into a geo-spatial database and made available to the public. Each home and property owner could look up to see the hazard of their property, as well as their neighbours' (Figure 5). This database may be useful for the Fire Departments in Area G in targeting educational efforts, triage assessments and as an aid in suppression planning.

¹² <http://gis.coloradosprings.gov/Html5Viewer/?viewer=wildfiremitigation>.

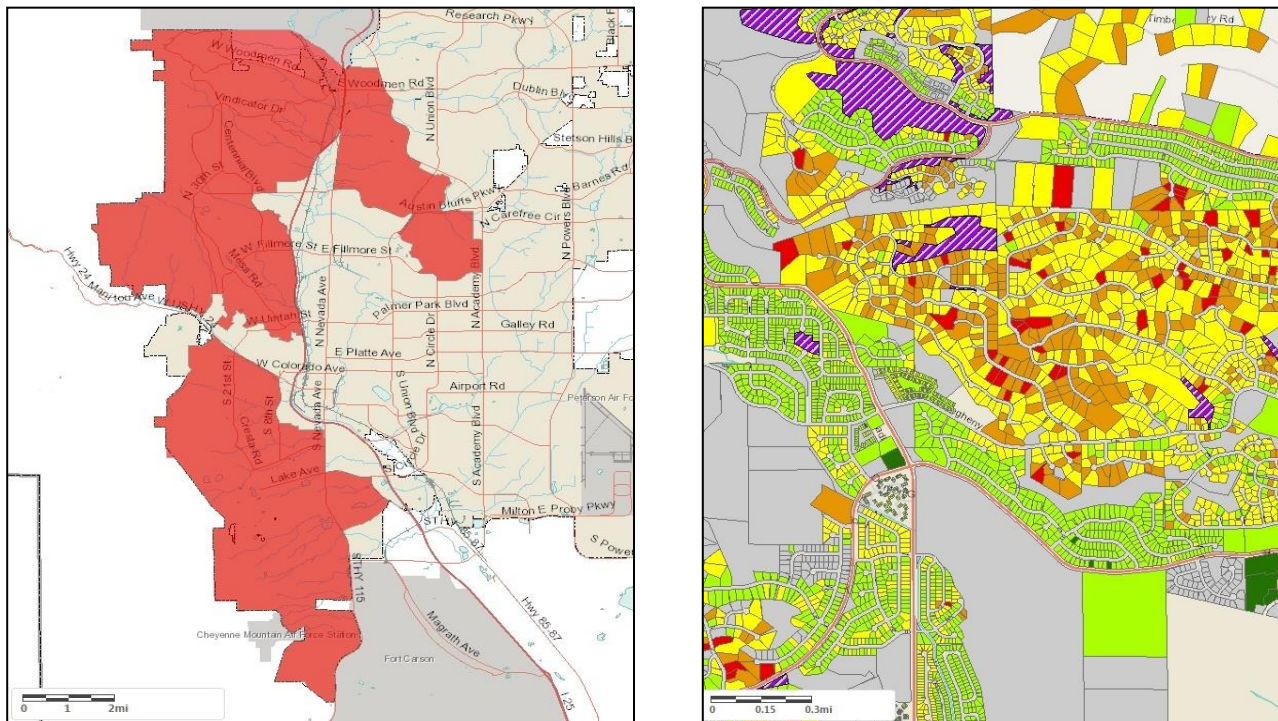


Figure 6: Screen captures of Colorado Springs, Colorado public internet mapping service.

The left figure displays the WUI area in red in which fire hazard assessments were completed. The right figure displays a neighbourhood within the WUI area and the fire hazard for each individual property. In these diagrams red is extreme, orange is very high, yellow is high, bright green is moderate and dark green is low risk.

The RDCK should consider developing a similar fire hazard assessment program. Individual properties within an established Wildfire Development Permit (DP) Area should be assessed using the Home Partners Program or a FireSmart site and structure assessment form. The results and opportunities for hazard mitigation could be provided to the property owner/resident. The Central Kootenay Web Map could then make available to the public the fire hazard results by property. Property owners could then request a re-assessment upon completion of various mitigative actions and updates posted periodically on the mapping site.

This program could be combined with other initiatives, such as free yard waste drop-off at transfer stations and a scheduled garden debris-burning weekend. This could also include distribution of additional educational materials, such as FireSmart landscaping design and FireSmart plant selection information. The program will be most effective if it evaluates hazard, as well as provides property owners the information they need to effectively reduce the hazard and methods to dispose of materials removed.

This program could come at considerable cost to the RDCK. This work needs to be done to a professional standard, but opportunities for savings may include options such as using a student or work experience program participant to complete the assessments, retaining a consultant, and/or involve volunteer fire departments to complete the work, or targeting the program to the highest priority (highest threat) neighbourhoods and expanding as resources allow.

The recently launched UBCM CRI FireSmart Grant Program provides funding of up to \$100,000 to undertake FireSmart planning activities for private lands. The RDCK should stay up to date on all UBCM / CRI funding initiatives, in order to leverage FireSmart funding for this and other FireSmart programs, as funding becomes available.

Table 16: Summary of Recommendations for Structure Protection and Planning.

Structure Protection and Planning			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.			
9.	High	Support homeowners with professionals to provide the Home Partners Program or WUI Site and Structure Hazard Assessments for interface homes and provide information to homeowners on specific steps that they can take to reduce fire hazards on their property. Homeowners should not be charged for these assessments.	\$250 per house

A development permit should be developed to address the risk of interface wildfire. Using the threat mapping from the CWPP, a Wildfire Hazard Development Permit Area could be defined. Within this area, guidelines could be developed for building materials. The scope of guidelines could be expanded to include landscaping and building siting to strengthen this permit process.

The wildfire hazard development permit process can most effectively advance the objective of developing FireSmart communities through the following strategies:

- Increasing the number of homes and properties in the interface that are FireSmart compliant (building materials, design, and landscaping) and are thus less vulnerable to ignition through radiant heat or ember spotting. This can be achieved by extending the reach and scope of the Development Permit.
- Ensure that future development is completed with public safety and property protection in mind (road network facilitates suppression and emergency vehicles and public evacuation in the case of wildfire, water availability is sufficient for suppression activities, sufficient setbacks from forested edge and top of slope).
- Ensure that natural lands turned over to RDCK and adjacent to new development are a moderate threat rating or lower.
- Ensure that the natural lands turned over to RDCK are accessible to fire crews, as well as for future maintenance activities to keep the areas at a moderate or lower threat rating.

A review of other jurisdictions’ successfully implemented DP processes suggests that DPs can be used effectively to gradually phase in FireSmart practices on private land, both in sub-division and individual lot re-development phase. The District of North Vancouver has a robust Wildfire Hazard Development Permit process, which could serve as a model for opportunities to improve current practices for RDCK. Within the Wildfire Hazard DP area in the District of North Vancouver, DPs are triggered at the building permit phase. Bonds collected by the District of North Vancouver are not returned to the homeowner or developer until a Qualified Professional (QP) has provided a post-

development inspection sign off and photographs to ensure that recommendations regarding landscaping, setbacks, and building materials were met. Through this process, the new lots and existing housing stock within the District of North Vancouver is rapidly converting to meeting FireSmart standards in both building materials and landscaping.

Section 5 of the Building Act provides local governments the authority to set local building bylaws for unrestricted and temporarily unrestricted matters, such as exterior design and finish of buildings in relation to wildfire hazard and within a development permit area. Until revisions of the Building Code to include requirements specific to prevention of wildfire spread are completed, local governments have the ability to set exterior requirements within the development permit area.¹³ It is recommended that the RDCK seek legal advice regarding the Building Act and to mandate and enforce within the Development Permit process that exterior building materials are FireSmart compliant to the extent legally possible. It is also recommended that RDCK work with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the development permit areas to prevent the spread of wildfire.

Many landscaping designs include highly flammable vegetation such as cedar hedging. This increases fire hazard on private properties and immediately adjacent to homes (priority zone 1). The RDCK should consider developing a landscaping standard to be applied within the DP area to all new properties and upon existing properties when building permits are requested for new builds, retrofits or major renovations. If enforcement is not possible with currently available resources, the RDCK should consider requiring a bond and post-development sign-off from a Qualified Professional to reduce enforcement costs. As an alternative, education and incentives for homeowners to plan and implement FireSmart landscaping should be considered.

¹³ Building and Safety Standards Branch. 2016. Bulletin No. BA 16-01 Building Act Information Bulletin: Update for Local Governments.

Table 17: Summary of Recommendations for Local Government Policy

Local Government Policy			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: To reduce wildfire hazard on private land and increase FireSmart compliance.			
10.	High	Complete OCP review and implement and / or strengthen zoning to expand reach of the existing.	Within current operating costs
11.	High	Develop Wildfire Hazard Development Permit (DP) Areas for major retrofits / renovations or new builds (building permits), collecting bonds to be returned upon evidence of completing development and landscaping according to wildfire hazard assessment. Review District of North Vancouver and Kelowna DP processes, with particular attention to implementation, enforcement, affordability and associated liabilities. Explore proactive incentives, such as tax reductions and reduced building permit fees.	\$25,000
12.	High	Obtain legal advice regarding the Building Act, specifically regarding the temporarily unrestricted matters and local government authority to set exterior building materials requirements. Use local government authority to mandate FireSmart construction materials beyond BC Building Code in wildfire hazard development permit area, as allowed.	\$10,000
13.	High	Develop a landscaping standard to be applied in interface / DP areas. The standard should list flammable non-compliant vegetation, non-flammable drought and pest resistant alternatives, and tips on landscape design to reduce maintenance, watering requirements, and reduce wildfire hazard. Include meeting landscaping standard as a requirement of Development Permit. Review District of North Vancouver and Kelowna DP processes, with particular attention to implementation, enforcement, affordability and associated liabilities. Explore proactive incentives, such as tax reductions and reduced building permit fees.	Within current operating costs
14.	High	Proactively enforce wildfire covenants requiring owners to maintain their properties hazard free on all properties in Development Permit areas. Enforcement will serve to minimize fuel risks on problematic private properties that have allowed hazardous accumulation of fuels and provide improved protection to adjacent lands.	Budget required for additional bylaw enforcement capacity

Local Government Policy			
15.	High	Develop a landscaping standard to be applied in interface / DP areas to ensure that developers leave building set backs on private land so that there is a minimum of 10 m distance between buildings and forest interface.	Within current operating costs
16.	High	Consider developing an outdoor burning bylaw specifying requirements for and limitations to outdoor burning and, in conjunction with the Fire Chief, implement the bylaw at times of high fire danger when provincial bans are not in place. The bylaw should consider effective and efficient enforcement measures and powers.	Develop bylaw within current operating costs Budget required for additional bylaw enforcement capacity
17.	Moderate	Work with the Building and Safety Standards Branch to provide input into the Building Code revisions that would apply within the interface to prevent the spread of wildfire.	Within current operating costs

5.2.3 Identify Priority Areas Within the Area of Interest for FireSmart

Establishing a FireSmart community will reduce losses and impacts related to wildfire. For this CWPP two classes of structures were considered: critical infrastructure and residential / commercial infrastructure. Critical infrastructure provides important services that may be required during a wildfire event or may require additional considerations or protection. As outlined in Appendix 1, FireSmart principles are important when reducing wildfire risk to both classes of structure and are reflected in the recommendations. The structure protection objectives for RDCK are to:

- Enhance protection of critical infrastructure from wildfire; and
- Encourage private homeowners to voluntarily adopt FireSmart principles on their properties.

The two main avenues for implementing FireSmart are to:

- Change the vegetation type, density and setback from the structure; and
- Change the structure (where feasible) to reduce vulnerability to fire and reduce the potential for fire to spread to or from a structure.

Critical infrastructure is important to consider when planning for a wildfire event. The use of construction materials, building design and landscaping must be considered for all structures when completing upgrades or establishing new infrastructure. Additionally, vegetation setbacks around critical infrastructure should be compliant with FireSmart recommendations.

Detailed FireSmart assessments were not completed for critical infrastructure. The RDCK Fire departments in Area G should consult with District staff to systematically assess critical infrastructure in interface areas and to provide FireSmart recommendations based on their findings.

Table 18: Summary of Recommendations for Protection of Critical Infrastructure.

Structure Protection and Planning			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: Enhance protection of critical infrastructure from wildfire.			
18.	High	Complete a fire flow / water vulnerability assessment for each water system and identify and map all alternative water sources (reservoirs, streams, lakes, etc.). Identify which areas may have insufficient or unreliable water supplies and provide recommendations to reduce vulnerability in Area A. Explore collaboration with other agencies including Columbia Basin Trust, Ministry of Environment, Ministry of Transportation and Infrastructure and Interior Health Authority.	\$20,000
19.	High	Complete a vulnerability assessment of all critical infrastructure including water infrastructure in interface areas with FireSmart recommendations.	\$20,000
20.	High	Develop alternative, back-up water sources for fire protection, and the establishment of standpipes as required.	Based on assessments
21.	High	Complete a detailed review of back-up power source options for all critical infrastructure and upgrade as required.	Review: \$20,000 Upgrade: Based on review
22.	High	Complete more detailed hazard assessments and developing, in collaboration with other available government funding, response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods.	\$25,000
23.	High	Establish a Joint Responsibility Area around the Village of Salmo in which Salmo and the RDCK will collaborate for wildfire response and initiatives.	

5.3 Community Communication and Education

Awareness and understanding support the adoption of tools to reduce fire risk. In communities where the dangers of wildfire are understood there is increased support and interest in reducing fire risk. The establishment of tools to reduce fire risk is one of the keystones to building a FireSmart community. A more detailed discussion of nationally accepted FireSmart principles is provided in Appendix 1. Without the support of the community, the efforts of public officials, fire departments, and others to reduce wildfire will be hindered. In many communities there is generally a lack of understanding about interface fire and the simple steps that can be taken to minimize risk. Additionally, public perception of fire is often underdeveloped due to public confidence and reliance on local and provincial fire rescue services.

Based on the consultation completed during development of this CWPP it is evident that the RDCK has a good level of awareness of fire risk in the interface in Area G; however, field observations highlighted the need to further educate the community on what private landowners can do to contribute to a FireSmart community. The Communication and Education objectives for Area G are:

- improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner/landowner responsibility; and
- enhance the awareness of elected officials, protection staff and stakeholders about the resources required to mitigate fire risk.

The two principal goals for RDCK Area G and to enhance wildfire related Communication and Education should be to:

- Reduce human caused fire ignitions; and
- Reduce fire risk on private property and critical infrastructure.

Communicating effectively is the key aspect of education. Communication materials must be audience specific, and delivered in a format and through mediums that reach the target audience. Audiences should include home and landowners, school students, local businesses, elected officials, District staff, local utilities, and forest tenure holders. Education and communication messages should be simple yet comprehensive. A basic level of background information is required to enable a solid understanding of fire risk issues and the level of complexity and detail of the message should be specific to the target audience.

The RDCK has undertaken some public education and FireSmart and fire prevention initiatives in the community. In 2015 to 2018 Queens Bay continues to receive Community FireSmart Recognition through FireSmart Canada. Many small communities elsewhere in the RDCK are working on becoming certified. FireSmart resources are also provided on the Regional District's website. These initiatives can be expanded upon and/or adapted to further enhance wildfire preparedness and education. The RDCK Fire Service should consider providing or expanding fire education programs in schools to include wildfire prevention and preparedness, and to be presented annually. Programming could include volunteer/advocacy work from professional foresters, wildland firefighters or prevention officers, and District staff. RDCK should consider holding a wildland specific Fire Prevention Week or Day, or similarly formatted event, in the spring prior to the wildfire season. Timely educational materials to increase preparedness would be most effective immediately prior to the fire season.

Provincial funding for fuel management is only provided for public lands. It is important for homeowners to understand what they can do to reduce the risk of wildfire damage to their property or adjacent residences. In particular, property owners need to be aware of their responsibility to implement FireSmart mitigation measures on their properties and also understand how their contributions benefit community wildfire safety.

FireSmart information material is readily available and simple for municipalities to disseminate. It provides concise and easy-to-use guidance that allows homeowners to evaluate their homes and take measures to reduce fire risk. However, the information needs to be supported by locally relevant information that illustrates the vulnerability of

individual houses to wildfire. As per the 2008 CWPP, educational material should be made available to all private landowners.

Bringing organizations together to address wildfire issues that overlap physical, jurisdictional or organizational boundaries is a good way to help develop interagency structures and mechanisms to reduce wildfire risk. Engagement of various stakeholders can help with identifying valuable information about the landscape and also help provide unique and local solutions to reducing wildfire risk. The RDCK should consider strengthening the effectiveness of the West Arm Interface Steering Committee to coordinate wildfire risk reduction efforts across the Regional District. Coordination of fuel management activities with forest licensees could significantly aid in the establishment of large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas.

Table 19: Summary of Recommendations for Communication and Education.

Communication and Education			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: To improve public understanding of fire risk and personal responsibility by increasing resident awareness of the wildfire threat in their community and to establish a sense of homeowner responsibility.			
24.	High	Establish a school education program to engage youth in wildfire management. Consult ABCFP, BCWS (the zone) and RDCK Fire Service to facilitate and recruit volunteer teachers and experts to help with curriculum development to be delivered in elementary and/or secondary schools. Educational programming can be done in conjunction with any currently running fire prevention education programs.	\$5,000
25.	High	Make summaries of this report and associated maps publicly available through webpage, social media, and public FireSmart meetings. Add fire threat spatial data to the interactive web-mapping tool to allow residents to find their property and the associated threat of wildfire.	Within current operating costs
26.	Moderate	Participate in the National Wildfire Community Preparedness day, typically in May each year.	\$2,500
27.	High	Expand door-to-door FireSmart assessment and/or Home Partner Program within the electoral area in order to educate residents and to quantify the level of risk in the interface.	\$20,000

Communication and Education			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: To enhance the awareness of elected officials and stakeholders regarding the resources required to reduce fire risk.			
28.	High	Develop regional development permit standards and align local government bylaws.	\$30,000
29.	High	Provide a group voice to the Building and Safety Standards Branch and other provincial entities,	Within current operating costs
29.	High	Develop a coordinated approach to fuel management and hazard reduction within and adjacent to the Study Area by coordinating with stakeholders including conservation organizations, communities, forest licensees, Ministry of Transportation and Infrastructure and utility companies, to aid in the establishment of FireSmart activities and large, landscape-level fuel breaks or compliment current or proposed fuel treatment areas.	\$25,000

SECTION 6: WILDFIRE RESPONSE RESOURCES

6.1 Local Government and First Nation Firefighting Resources

The RDCK Fire Services and Emergency Management, Ymir Volunteer Fire Department, Salmo Volunteer Fire Department, First Responders, Salmo Community Health Centre, Salmo RCMP, B.C. Ambulance, and groups such as South Columbia Search and Rescue are critical to emergency response service in Area G. However, in the event of a localized emergency within Area G, other adjacent jurisdictions with health care and emergency response facilities may also be able to provide emergency response. Fire Departments, BC Wildfire Service, and RCMP provide the foundation for incident response during a large fire event and therefore must be prepared to deal with large and complex situations. The Regional Emergency Operation Centre is another key piece of infrastructure that will be integral in coordinating response efforts.

Numerous initiatives have either been completed, planned, or are in progress. Emergency response coordination between the RDCK and BCWS has been formalized through the implementation of the provincial mutual aid agreement. The local authority is responsible for state of local emergencies and evacuations. The RDCK operates a Regional Emergency Operations Centre and supports Area G locally. The structure for establishing and operating the EOC is outlined in the RDCK's recently developed Emergency Management Procedures.

FIRE SERVICES AND EMERGENCY MANAGEMENT ORGANIZATIONAL CHART

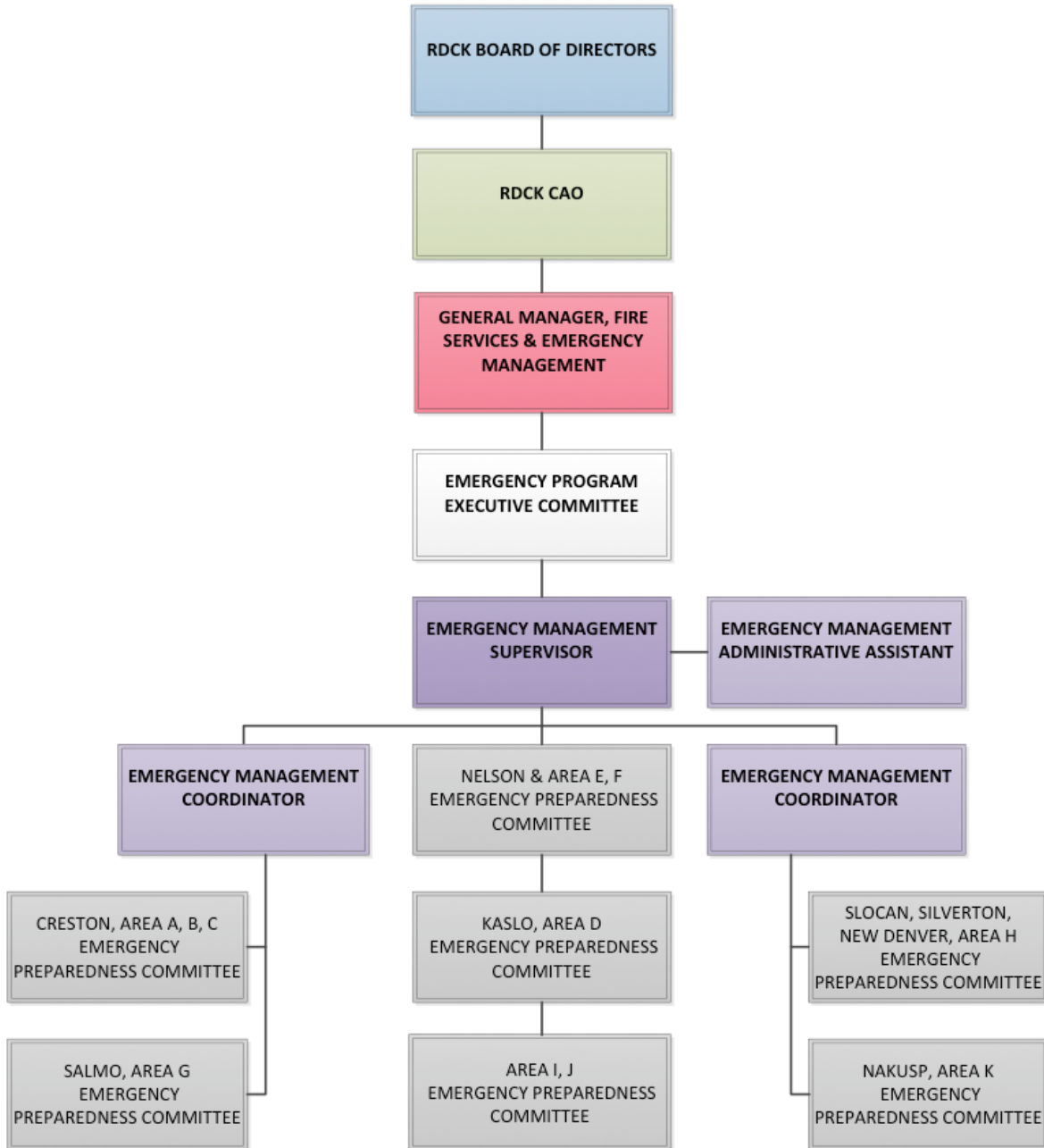


Figure 7: RDCK Fire Services and Emergency Management organizational chart

6.1.1 Fire Departments and Equipment

There are two volunteer fire departments in Area G. The Salmo fire department is fairly centrally located, and the Ymir volunteer fire department is in the Northern half. All pump/tank measurements are in Imperial gallons.

Ymir:

- Engine 1 - 2004 Sterling Acterra / Superior (1250/?)
- Tender 1 - 1992 Peterbilt / Anderson (1050/1800/100F)
- Mini 1 - 1990 Ford F384 / Pierce (250/200)
- Rescue 1 - 1994 GMC Top Kick / Demers.
- 1993 Ford F350 4X4 / Superior mini-pumper (250/200)

Deficiencies: currently 10 volunteers as of November 2018, optimal minimum of 15-20 members. No deficiency due to mutual aid with Salmo, Nelson, and other RDCK departments. Needs more hose and connectors. RDCK should consider establishing a sprinkler system (structural and wildfire).

Salmo:

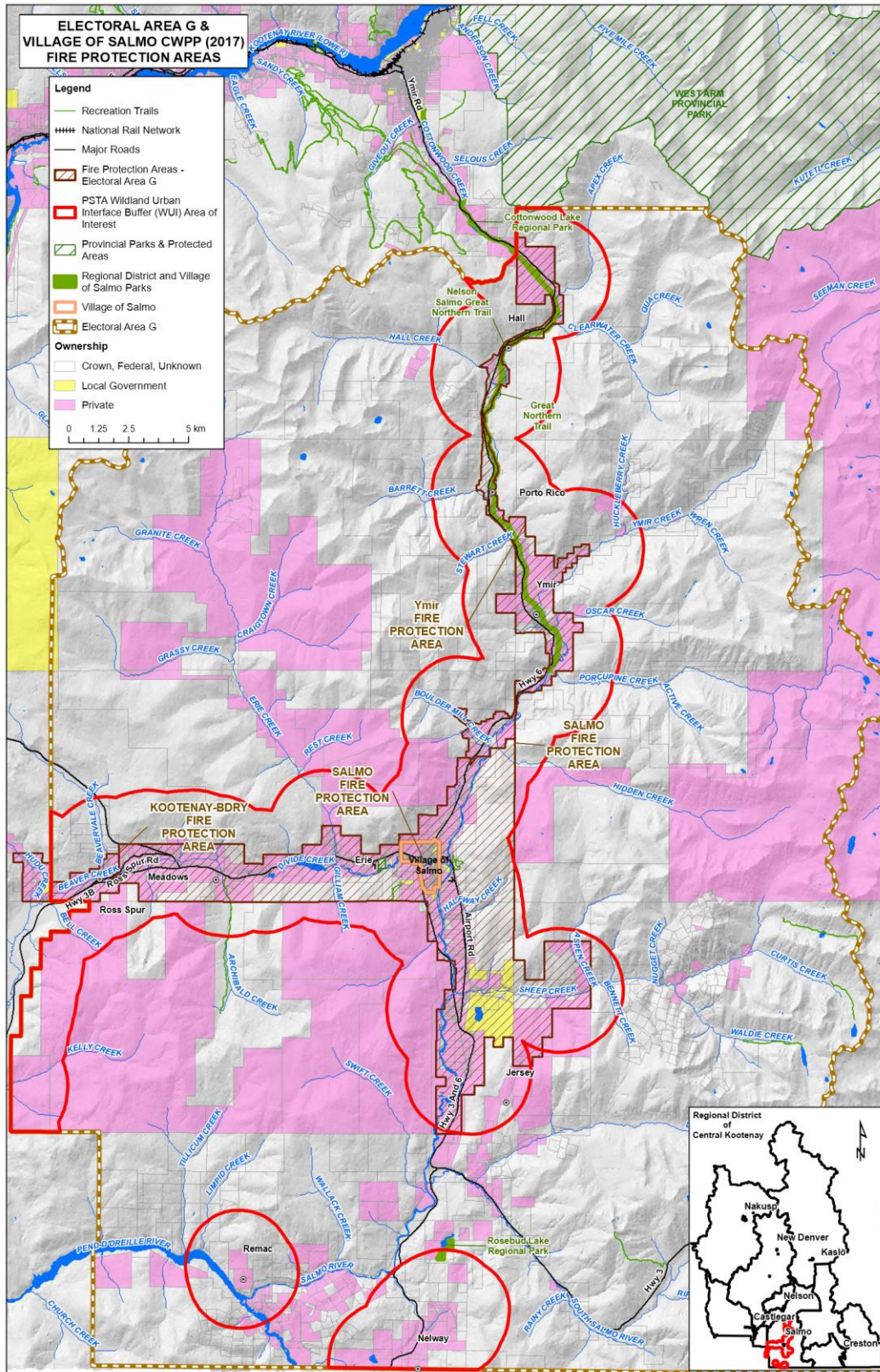
- Engine 1 - 1962 GMC 960 / Thibault pumper (500/500)
- Tender 1 - 1999 International 4900 / Valew Welding and Fabrication (port./1800)
- Rescue 1 - 2000 Ford F-350 walk-in rescue (former US ambulance)
- Engine 5 - 2001 International 4900 / Hub (1050/1000/20F)
- Engine 6 - 2012 International DuraStar / Hub (1050/1000/25F)
- 2015 Ford F-550 / Hub mini-pumper (?/250)

Deficiencies: Nothing significant

The RDCK owns three Structural Protection Units (SPUs). The UBCM owns four complete SPUs, each equipped to protect 30 to 35 structures. The UBCM SPUs are deployed by the Office of the Fire Commissioner and are placed strategically across the province during the fire season based on fire weather conditions and fire potential. The RDCK SPUs can be deployed regionally at the request of a fire department the Office of the Fire Commissioner, the BCWS and the local authority. When the RDCK owned SPUs are not used, they may be utilized by fire departments for training exercises. SPUs can be useful tools in the protection of rural / interface homes in the event of a wildfire. The RDCK should stay up to date on the request process for a UBCM-owned SPU in the event of a wildfire where SPUs would be an effective structural protection tool.

The Fire Departments in Area G and Salmo are well trained, highly organized, and able to provide high quality emergency and public safety services to Area G and the surrounding area. As the departments are well organized, the main objectives for recommendations in regards to Emergency Preparedness are to provide additional resources to increase the level of training and equipment for department fire fighters to utilize in an interface fire situation. There are 400 firefighters within the RDCK Fire Service, with close to 10 in Ymir and 28 in the Salmo department. All firefighters within the RDCK fire service are volunteer with the exception of a career Regional Chief and Deputy Chief. With these numbers there is little to no capacity for mutual aid to come from Ymir.

The Ymir and Salmo fire departments have mutual aid agreements with each other and fire departments throughout the RDCK. Mutual aid from Nelson is typically for their water tender. Further RDCK mutual aid is available through dispatch. Aid is requested during structural fires, but most calls are for vehicle extraction. Ymir experiences 12 calls annually on average, with one structural fire call per year. The rest are mostly motor vehicle incidents. A busy year would be two dozen calls.



Map 14: Fire Protection Areas in the Study Area

The RDCK responds to wildfires within Fire Protection Areas. The provincial mutual aid agreement provides for assistance from the BCWS on larger incidents. Under this agreement, the RDCK may be requested to assist the BCWS outside of RDCK Fire Protection Areas.

The majority of training for the RDCK Fire Service focuses on structural firefighting, but does include annual wildland interface training as part of the training curriculum. Some RDCK Fire Service members participate in EOC training which involves multiple agencies. There has been some recent cross-training with MFLNRORD BCWS (usually conducted annually at the start of each fire season). All RDCK Fire Service members should at a minimum have SPPWFF level 1 training. The RDCK should coordinate annual cross-training events with the BCWFS, for example a joint wildfire simulation exercise. This could be completed in cooperation with other area Fire Departments (RDCK) to further strengthen regional emergency response training.

Emergency preparedness and response is managed regionally through cooperation with the Regional District of Central Kootenay and member communities as set out in Figure 6. The Central Kootenay Emergency Management Plan 2018 details the program structure, jurisdictional boundaries, guiding principles, and the overall planning and response to emergencies including risk assessments, mitigation, response and response levels, and recovery. The identification of a regional EOC facility is outlined in this document. Area G is grouped operationally with the RDCK Electoral Areas B, C, and G & Salmo, with Fire Services sharing an Emergency Program Coordinator and each service having a dedicated Emergency Preparedness Committee. This report recommends that the RDCK utilize this existing structure, and ensure the Wildfire Mitigation Coordinator liaises between the Emergency Preparedness Committee and any collaborative interface planning efforts.

6.1.2 Water Availability for Wildfire Suppression

As noted in the 2008 CWPP, water is a critical suppression resource that is dependent on water service. This recommendation is still valid and implementation is ongoing. Other recommendations include: installing reservoir or hydrant systems in areas of poor water availability, identifying and mapping alternative water sources where feasible, and ensuring new developments have sufficient water service and hydrant coverage. District staff and Fire Departments in Area G should review hydrant coverage and locations. Improving water availability in identified areas and mapping alternative water sources is ongoing and should continue.

A full assessment of the water availability and vulnerability of water sources was not possible under the scope of this report. Back-up power sources should be installed for all critical infrastructure to ensure the RDCK can continue to operate at an acceptable level during a wildfire event in Area G. The RDCK should complete a Fire Flow / Water Supply Vulnerability Assessment for each water system in Area G to identify those areas that may have insufficient or unreliable water supplies.

Emergency response for a wildland fire in the event of a large-scale emergency is dependent to a large degree on electrical and water service within the Study Area.

The RDCK owns and operates a water system in Ymir servicing 107 active connections. The intake is located in Quartz Creek which is designated as a Community Watershed. A new treatment plant was installed in 2009 ending a 14 year boil water advisory. There is a small 600,000 litre intake reservoir at the concrete dam across Quartz Creek, and the system also has a 273,000 litre steel tank to hold treated water. The distribution system has been replaced in a series of recent upgrades, and includes approximately 4.8 km of PVC pipe. Standardized requirements for fire protection are met with the system's water pressure and storage capacity. This network is connected to 16 fire hydrants and has been recognized since 1986 as having a Dwelling Protection Grade by the Fire Underwriters Survey. Planned for 2019 is a minor hydrant upgrade and infill project. Grant funding under the Federation of Canadian Municipalities has been made available to the RDCK to develop a risk and criticality assessment model for this distribution network in order to prioritize upgrade work and asset replacement. All Ymir volunteer fire department vehicles are equipped with piss cans, rakes, shovels, and chainsaws.

The Village of Salmo has three aquifers near its boundaries, but relies 100% on aquifer 496. This is pumped from the two main Village wells of Sayward and Glendale. The water is pure and does not require treatment, as a result the storage capacity is linked entirely to aquifer characteristics. This aquifer has been identified as vulnerable, and fluctuates with the water table as it is hydrologically connected to surface water. This aquifer ranges in depth from 1-7.6 meters below the surface, and has an estimated well yield of 0.45-4.4 litres per second. The Village intends to conduct studies to determine the resiliency of their aquifer, including an assessment begun in 2016 by Waterline Resources Inc. Hydrant access is good, but there are limited drafting opportunities close to Salmo. The Village pumps are all on generator.

Water availability elsewhere in Area G varies greatly depending on local water systems, with many being surface water systems or small wells vulnerable to drought. Drafting from the Salmo river or other sources may be an option depending on available infrastructure permitting access.

6.1.3 Access and Evacuation

Road networks in a community serve several purposes including providing access for emergency vehicles, providing evacuation routes for residents, and creating fuel breaks. Access and evacuation during a wildfire emergency often must happen simultaneously and road networks should have the capacity to handle both. Access throughout Area G is generally excellent due to Highway 3 and 6 running throughout the communities of the area.

There are communities within Area G that are accessed by cul-de-sac or dead-end roads; these neighbourhoods are of particular concern for fire suppression, emergency response, and evacuation and were identified in the 2008 CWPP. Identified areas of concern have been updated from the 2008 CWPP, and are displayed below in a map adapted from the 2008 CWPP map. These areas should be reviewed for secondary access options where possible. Of particular note are areas such as Ymir Creek and Wildhorse Forest Service Road which have limited highway access. These sites represent 20-25 houses in the Ymir area. The RDCK has Emergency Services meetings every few months, and Ymir has conducted an infrastructure inventory. This has not been used to identify property ownership or dwelling status.

Emergency access and evacuation planning is of particular importance in the event of a wildfire event or other large-scale emergency. An evacuation plan should:

- Map and identify safe zones, marshaling points and aerial evacuation locations;
- Plan traffic control and accident management;
- Identify volunteers that can assist during and/or after evacuation;
- Create an education/communication strategy to deliver emergency evacuation procedures to residents.

Recreation trails built to support ATVs can provide access for ground crews and act as fuel breaks for ground fires, particularly in natural areas. Strategic recreational trail development to a standard that supports ATVs can be used by local fire departments to access interface area. Gates can minimize access by unauthorized users.

The creation of a map book or spatial file that displays the trail network available for the District to access during an emergency or for fire suppression planning must accompany any fire access trail building activities. In order to effectively use the trails as crew access or as fuel breaks during suppression efforts, The District should develop a Parks Access Plan, or Total Access Plan. This plan should be made available to Fire Halls in Area G and the BCWS in the event that they are aiding suppression efforts on an interface fire in Area G. The plan should include maps and spatial data, identify the type of access available for each access route, identify those trails that are gated or have barriers, and provide information as to how to unlock / remove barriers. The plan should also identify those natural areas where access is insufficient. Access assessment should consider land ownership, proximity of values at risk, wildfire threat, opportunities for use as fuel break / control lines, and requirements for future maintenance activities such as operational access for fuel treatments and other hazard reduction activities.

In addition to providing the safest, quickest, and easiest access routes for emergency crews, a Total Access Plan would minimize the need for using machinery or motorized access in an otherwise undisturbed area. This would reduce the risk of soil disturbance and other environmental damage, as well as reduce rehabilitation costs.

Table 20: Summary of recommendations for emergency evacuation and access.

Emergency Response (Evacuation and Access)			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: To improve access and egress to neighbourhoods at risk and natural areas within RDCK.			
30.	High	Develop a Total Access Plan to create, map and inventory trail and road network in natural areas for suppression planning, identification of areas with insufficient access and to aid in strategic planning. Fire threat mapping from this CWPP should be included. The plan should be updated every five years, or more regularly, as needed to incorporate additions or changes.	\$8,000 + updating
31.	High	Require that all new interface developments have access for evacuation and sufficient capacity for emergency vehicles.	Within current operating costs
32.	Moderate	Facilitate completion of emergency evacuation plans for interface neighbourhoods with limited access	Within current operating costs

6.1.4 Training

Volunteer fire fighting staff are all trained in SPU's, and some are trained in S-100, and Spp-114. There isn't any cross training with the MFLNRO WMB, just the standard mutual aid agreement with BCWS for wildland fires, and annual Fire Chief meetings with BCWS to discuss equipment and response plans.

Many homes could benefit from preplan assessments to ensure accessibility and safety for firefighters. Fire triage is an important tool used by fire suppression crews to improve the potential for structures to survive a fire event. The process involves determining which houses have the greatest likelihood of surviving a wildfire and therefore should be prioritized for additional protective measures such as setting sprinklers or spraying retardant. Triage assessments are dependent on five main factors that include: firefighter safety, structure design and material, fuels around the structure, fire behavior, and available resources. Conducting assessments of housing in the WUI prior to a fire can assist in suppression efforts. The assessments can also be used to educate homeowners as to what protection they might receive during a fire event and what changes they can make to improve the probability of their home surviving a fire event. See Section 4 for details regarding WUI wildfire hazard assessments and associated recommendations.

Table 21: Summary of recommendations for emergency response and planning

Emergency Response and Planning			
Item	Priority	Recommendation	Estimated Cost (\$)
Objective: To improve structural and wildfire equipment and training available to RDCK Fire and Rescue.			
33.	High	Conduct annual mutual aid training with MFLNRORD and BCWS including completion of a mock wildfire simulation in coordination with BCWS and safety training specific to wildland fire and risks inherent with natural areas. As part of the training, conduct annual reviews to ensure PPE and wildland equipment resources are complete, in working order, and the crews are well versed in their set-up and use. Wildfire training should be in compliance with Office of the Fire Commissioner standards.	Within current operating costs
34.	High	Ensure RDCK Wildfire Mitigation Coordinator act as liaison between the RDCK Collaborative Planning Group and the Emergency Preparedness Committee for Area A. Coordination and information sharing are crucial to the development of a community well prepared for wildfire.	Within current operating budget.
35.	Moderate	Review and clarify SPU request procedures with RDCK fire Chiefs and ensure robust SPP115 training for fire fighters.	Within current operating budget.
36.	Moderate	Develop Regional Service to fund additional SPUs and maintain existing SPUs.	\$50,000 (Annually)
37.	Moderate	Explore opportunities to collaborate with BCWS and within RDCK fire service to coordinate discount volumes of hose for interface fires, reducing costs and logistics to local fire departments	Within current operating costs
38.	High	Explore opportunities to ensure a duty officer is in place in each Fire Protection Area to provide coverage for periods of high or extreme hazard.	To be determined based on current rates.
39.	Moderate	Conduct fire preplan assessment for key interface areas in Area A. Other jurisdictions have completed assessments that prioritize fire department-specific variables, such as distance to hydrants, response time from nearest fire station, etc. to produce local risk ratings.	\$5,000

6.2 Structure Protection

The RDCK has obtained approximately 20 Sprinkler Protection Units (SPU's), each capable of protecting approximately 20 houses. Volunteer Fire Departments in the region largely practice for structural fires, which involve many of the same tasks as structure protection.

6.3 Summary of Recommendations

This 2017 update to the 2008 CWPP reflects existing RDCK priorities and the current provincial standard methodology and baseline data for hazard and threat analysis. This CWPP Update takes into account the considerable new development that has occurred in the WUI and provides an assessment or reassessment of the hazard associated with these development changes, as well as other changes in the community. Specifically, it accounts for changes to forest fuel types due to forest growth, forest health (i.e., mountain pine beetle impacts), windthrow, forest harvesting, and forest fires, in addition to new developments.

Another significant change since 2008 is the formation of the Interface Working Group with the RDCK, the City of Nelson and BC Parks to collaboratively plan and implement fire hazard mitigation works. RDCK Electoral Area A should work to join this Collaborative Group.

The 2008 CWPP Study Area was defined by a 2 km buffer around Fire Protection Areas within the RDCK whereas this 2017 CWPP Update is focused on the PSTA WUI and associated density criteria and municipal and critical infrastructure. As a result, the area under study is reduced and more focused in this Update.

In addition, methods for assessing wildfire threat have evolved since 2008. This update uses the provincially accepted standard methodology and new BC Provincial Strategic Threat Analysis baseline data for hazard and threat analysis. Due to the PSTA updates, altered Study Area and changes in the RDCK, 18200 ha have now been identified as hazardous fuels. Category C-5 fuel type was included in this analysis as our Threat Class for the vast majority of C-5 fuel types stands was "High" based on WUI threat plot analysis (See Table 6 and Table 12).

The RDCK and Area A have made significant progress at implementing recommendations from the 2008 CWPP and has shown provincial leadership in many aspects of wildfire mitigation activities.

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APPENDIX 1: FIRESMART

One of the most important areas with respect to forest fire ignition and the damages associated with a wildfire is the zone adjacent to buildings and homes. *FireSmart, Protecting Your Community from Wildfire*¹⁴ is a guide developed by Partners in Protection that provides practical tools and information on how to reduce the risk of loss from interface fires. The FireSmart website can be visited at: <https://www.firesmartcanada.ca/resources-library/protecting-your-community-from-wildfire>

Wildfire is often considered an external threat to residences; however, in many cases fire can originate as a house fire and spread into the interface. In both cases, fire coming from the forest to a building or spreading from a building to the forest, home owners and businesses can take steps to reduce the probability of this occurring. There are two main avenues to FireSmart a home: 1) change the vegetation type, density, and setback from the building (fuel treatments and landscaping) and 2) change the structure to reduce vulnerability to fire and the potential for fire to spread to or from a building.

FIRESMART BUILDING MATERIALS AND DESIGN

An important consideration in protecting the WUI zone from fire is ensuring that homes can withstand an interface fire event. Often, it is a burning ember traveling some distance and landing on vulnerable housing materials (spotting), rather than direct flame contact (vegetation to house) or radiative heat that ignites a structure. Alternatively, the convective or radiant heating produced by one structure may ignite an adjacent structure if it is in close proximity. Structure protection is focused on ensuring that building materials and construction standards are appropriate to protect individual homes from interface fire. Materials and construction standards used in roofing, exterior siding, window and door glazing, eaves, vents, openings, balconies, decks, and porches are primary considerations in developing FireSmart neighbourhoods. Housing built using appropriate construction techniques and materials are less likely to be impacted by interface fires.

While many BC communities established to date were built without significant consideration with regard to interface fire, there are still ways to reduce home vulnerability. Changes to roofing materials, siding, and decking can be achieved over the long-term through changes in bylaws and building codes.

The FireSmart approach has been adopted by a wide range of governments and is a recognized template for reducing and managing fire risk in the wildland urban interface. The most important components of the FireSmart approach are the adoption of the hazard assessment systems for wildfire, site and structure hazard assessment, and the proposed solutions outlined for vegetation management, structure protection, and infrastructure. Where fire risk is moderate or greater, at a minimum, the FireSmart principles should be applied to new subdivision and structure developments and, wherever possible, the principles should be integrated into existing subdivisions and built up areas when renovations occur or landscaping is changed.

The following link accesses an excellent four-minute video demonstrating the importance of FireSmart building practices during a simulated ember shower: <http://www.youtube.com/watch?v=Vh4cQdH26g>.

¹⁴ For further information regarding the FireSmart program see www.pep.bc.ca/hazard_preparedness/FireSmart-BC4.pdf

Roofing Material:

Roofing material is one of the most important characteristics influencing a home's vulnerability to fire. Roofing materials that can be ignited by burning embers increases the probability of fire related damage to a home during an interface fire event.

In many communities, there is no fire vulnerability standard for roofing material. Homes are often constructed with unrated materials that are considered a major hazard during a large fire event. In addition to the vulnerability of roofing materials, adjacent vegetation may be in contact with roofs, or roof surfaces may be covered with litter fall from adjacent trees. This increases the hazard by increasing the ignitable surfaces and potentially enabling direct flame contact between vegetation and structures.

Building Exterior - Siding Material:

Building exteriors constructed of vinyl or wood are considered the second highest contributor to structural hazard after roofing material. These materials are vulnerable to direct flame or may ignite when sufficiently heated by nearby burning fuels. Winds caused by convection will transport burning embers, which may lodge against siding materials. Brick, stucco, or heavy timber materials offer much better resistance to fire. While wood may not be the best choice for use in the WUI, other values from economic and environmental perspectives must also be considered. It is significantly cheaper than many other materials, supplies a great deal of employment in BC, and is a renewable resource. New treatments and paints are now available for wood, which increase its resistance to fire and they should be considered for use.

Balconies and Decking:

Open balconies and decks increase fire vulnerability through their ability to trap rising heat, by permitting the entry of sparks and embers, and by enabling fire access to these areas. Closing these structures off limits ember access to these areas and reduces fire vulnerability.

Combustible Materials:

Combustible materials stored within 10 m of residences are also considered a significant issue. Woodpiles, propane tanks and other flammable materials adjacent to the home provide fuel and ignitable surfaces for embers. Locating these fuels away from structures helps to reduce structural fire hazards and makes it easier and safer for suppression crews to protect a house.

FIRESMART TREATMENTS

One effective method of reducing how easily fire can move to and from a home is by altering the vegetation around the home. The following information regarding fuel treatments is based on the FireSmart Manual (Partners in Protection 2002).

Priority Zone 1 is a 10 m fuel free zone around structures. This ensures that direct flame contact with the building cannot occur and reduces the potential for radiative heat to ignite the building. While creating this zone is not always possible, landscaping choices should reflect the use of less flammable vegetation such as deciduous bushes, herbs and other species with low flammability. Coniferous vegetation such as juniper or cedar bushes and hedges should be avoided, as these are highly flammable. Any vegetation in this zone should be widely spaced and well setback from the house.

Priority Zone 2 extends from 10 to 30 m from the structure. In this zone, trees should be widely spaced 5 to 10 m apart, depending on size and species. Tree crowns should not touch or overlap. Deciduous trees have much lower

volatility than coniferous trees, so where possible deciduous trees should be preferred for retention or planting. Trees in this area should be pruned as high as possible (without compromising tree health), especially where long limbs extend towards buildings. This helps to prevent a fire on the ground from moving up into the crown of the tree or spreading to a structure. Any downed wood or other flammable material should also be cleaned up in this zone to reduce the ability of fire to move along the ground.

Priority Zone 3 extends from 30 to 100 m from the home. The main threat posed by trees in this zone is spotting, the transmission of fire through embers carried aloft and deposited on the building or adjacent flammable vegetation. To reduce this threat, cleanup of surface fuels as well as pruning and spacing of trees should be completed in this zone (Partners in Protection).

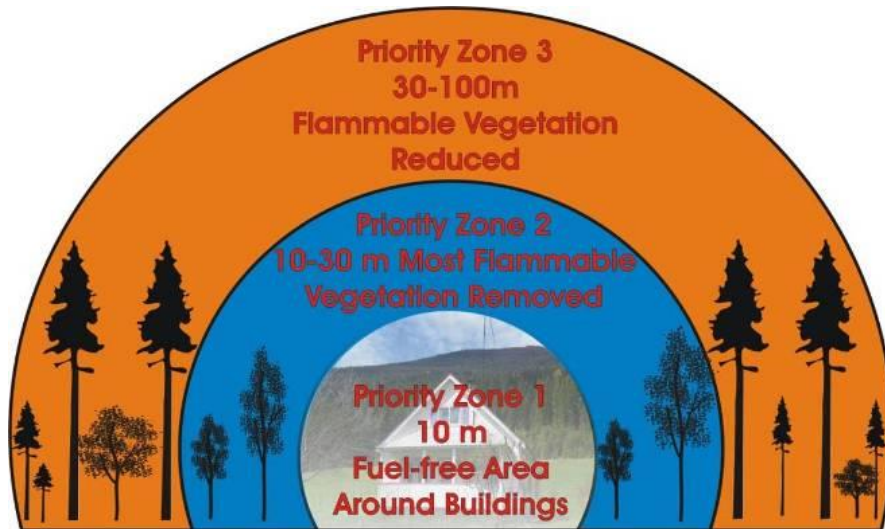


Figure 8: Illustration of FireSmart zones.

APPENDIX 2: FIRE THREAT METHODOLOGY

As part of the CWPP process, spatial data submissions are required to meet the defined standards in the Program and Application Guide. As part of the program, proponents completing a CWPP or CWPP update are provided with the Provincial Strategic Threat Analysis (PSTA) dataset. This dataset includes:

- Current Fire Points
- Current Fire Polygons
- Fuel Type
- Historical Fire Points
- Historical Fire Polygons
- Mountain pine beetle polygons
- PSTA Head Fire Intensity
- PSTA Historical Fire Density
- PSTA Spotting Impact
- PSTA Threat Rating
- Structure Density
- Structures (sometimes not included)
- Wildland Urban Interface Buffer Area

The required components for the spatial data submission are detailed in the Program and Application Guide Spatial Appendix – these include:

- AOI
- Fire Threat
- Fuel Type
- Photo Location
- Proposed Treatment
- Structures
- Threat Plot
- Wildland Urban Interface

The provided PSTA data does not necessarily transfer directly into the geodatabase for submission, and several PSTA feature classes require extensive updating or correction. In addition, the Fire Threat determined in the PSTA is fundamentally different than the Fire Threat feature class that must be submitted in the spatial data package. The Fire Threat in the PSTA is based on provincial scale inputs - fire density; spotting impact; and head fire intensity, while the spatial submission Fire Threat is based on the components of the Wildland Urban Interface Threat Assessment Worksheet. For the scope of this project, completion of WUI Threat Assessment plots on the entire AOI (Study Area) is not possible, and therefore an analytical model has been built to assume Fire Threat based on spatially explicit variables that correspond to the WUI Threat Assessment worksheet.

FIELD DATA COLLECTION

The primary goals of field data collection are to confirm or correct the provincial fuel type, complete WUI Threat Assessment Plots, and assess other features of interest to the development of the CWPP. This was accomplished by traversing as much of Area G as possible (within time, budget and access constraints). Threat Assessment plots were completed on the latest version (2013) form, and as per the Wildland Urban Interface Threat Assessment Guide.

For clarity, the final threat ratings for Area were determined through the completion of the following methodological steps:

1. Updated fuel-typing using orthophotography and field verification.
2. Updated structural data using critical infrastructure data provided by the client and orthophotography.
3. Completed fieldwork to ground-truth fuel typing and threat ratings (completed 54 WUI threat plots, and hundreds of field stops within the Area G Study Area).
4. Threat assessment analysis using field data collected and rating results of WUI threat plots – see next section.

SPATIAL ANALYSIS

Not all attributes on the WUI Threat Assessment form can be determined using a GIS analysis on a landscape/polygon level. To emulate as closely as possible the threat categorization that would be determined using the Threat Assessment form, the variables in Table 23 were used as the basis for building the analytical model. The features chosen are those that are spatially explicit, available from existing and reliable spatial data or field data, and able to be confidently extrapolated to large polygons.

Table 23: WUI Threat Sheet attributes used in the spatial analysis.

WUI Threat Sheet Attribute	Used in analysis?	Explanation
Fuel		
Duff depth and Moisture Regime	No	Many of these attributes assumed by using 'fuel type' as a component of the Fire Threat analysis. Most of these components are not easily extrapolated to a landscape or polygon scale, or the data available to estimate over large areas (VRI) is unreliable.
Surface Fuel continuity	No	
Vegetation Fuel Composition	No	
Fine Woody Debris Continuity	No	
Large Woody Debris Continuity	No	
Live and Dead Coniferous Crown	No	

WUI Threat Sheet Attribute	Used in analysis?	Explanation
Closure		
Live Deciduous Crown Closure	No	
Live and Dead Conifer Crown Base height	No	
Live and Dead suppressed and Understory Conifers	No	
Forest health	No	
Continuous forest/slash cover within 2km	No	
Weather		
BEC Zone	Yes	Although included, these are broad classifications, meaning most polygons in Area A will have the same value
Historical Fire Weather Occurrence	Yes	
Topography		
Aspect	Yes	
Slope	Yes	Elevation model was used to determine slope.
Terrain	No	
Landscape/topographic Limitations to Wildfire Spread	No	
Structural		

WUI Threat Sheet Attribute	Used in analysis?	Explanation
Position of Structure/Community on slope	No	Too difficult to quantify – this is a relative value.
Type of development	No	Too difficult to analyze spatially.
Position of assessment area relative to values	Yes	Only distance to structures is used in this analysis. Being above, below or sidehill is too difficult to analyze spatially.

The field data was used to correct the fuel type polygon attributes provided in the PSTA. This corrected fuel type layer was then used as part of the spatial analysis process. The other components were developed using spatial data (BEC zone, fire history zone) or spatial analysis (aspect, slope). A scoring system was developed to categorize resultant polygons as having relatively low, moderate, high or extreme Fire Threat, or Low, Moderate, High or Extreme WUI Threat. Table 22 below summarizes the components and scores to determine the Fire Behaviour Threat.

Table 24: Components of Fire Threat Analysis

Attribute	Indicator	Score
Fuel Type	C-1	35
	C-2	
	C-3	
	C-4	
	M-3/4, >50% dead fir	20
	C-7	
	M-1/2, >50% conifer	
	M-3/4, <50% dead fir	

Attribute	Indicator	Score
	C-5	5
	C-6	
	M-1/2, <50% conifer	
	O-1a/b	10
	S-1	
	S-2	
	S-3	0
	D-1/2	
	W	
	N	0
Weather - BEC Zone	AT, irrigated	1
	CWH, CDF, MH	3
	ICH, SBS, ESSF	7
	IDF, MS, SBPS, CWHsds1 & ds2, BWBS, SWB	10
	PP, BG	15
Historical Fire Occurrence Zone	G5, R1, R2, G6, V5, R9, V9, V3, R5, R8, V7	1
	G3, G8, R3, R4, V6, G1, G9, V8	5
	G7, C5, G4, C4, V1, C1, N6	8

Attribute	Indicator	Score
	K1, K5, K3, C2, C3, N5, K6, N4, K7, N2	10
	N7, K4	15
Slope	<16	1
	16-29 (max N slopes)	5
	30-44	10
	45-54	12
	>55	15
Aspect (>15% slope)	North	0
	East	5
	<16% slope, all aspect	10
	West	12
	South	15

These attributes were combined to produce polygons with a final Fire Behaviour Threat Score. To determine the Wildland Urban Interface Score, only the distance to structures was used. Buffer distances were established as per the WUI Threat Assessment worksheet (<200, 200-500 and >500) for polygons that have a 'high' or 'extreme' Fire Behaviour Threat score. Polygons with structures within 200m were rated as 'extreme', within 500m were rated as 'high', within 2km are 'moderate', and distances over that were rated 'low'.

There are obvious limitations in this method, most notably that not all components of the threat assessment worksheet are scalable to a GIS model, generalizing the Fire Behaviour Threat score. The WUI Threat Score is greatly simplified, as determining the position of structures on a slope, the type of development and the relative position are difficult in an automated GIS process. Structures are considered, but there is no consideration for structure type (also not included on threat assessment worksheet). This method uses the best available information to produce accurate and useable threat assessment across Area A in a format that is required by the UBCM SWPI program.

APPENDIX 3: ENDANGERED SPECIES

Table 24: Publicly available occurrences of Blue, Red and Yellow listed species in Area G

Common Name	Scientific Name	Category	BC List	Habitat
Steer's head	Dicentra Uniflora	Vascular Plant	Red	TERRESTRIAL: forest needleleaf
Caribou (Southern Mountain Population)	Rangifer tarandus	Vertebrate Animal	Red	TERRESTRIAL: forest needleleaf
Umatilla Dace	Rhinichthys umatilla	Vertebrate Animal	Red	RIVERINE; creek; high gradient
Painted Turtle - Intermountain - Rocky Mountain Population	Chrysemys picta	Vertebrate Animal	Blue	LACUSTRINE: Shallow water RIVERINE: Slough
Atkinson's coreopsis	Coreopsis tinctorial var. atkinsoniana	Vertebrate Animal	Red	RIVERINE: big river; moderate gradient
Tall bluebells	Mertensia paniculate var. borealis	Vascular Plant	Blue	TERRESTRIAL: forest needleleaf
Western Skink	Plestiodon skiltonianus	Vertebrate Animal	Yellow	TERRESTRIAL: rock outcrop, coarse talus / boulders, grassland / herbaceous, forest needleleaf
Alkali-marsh Butterweed	Senecia hydrophilus	Vascular Plant	Red	TERRESTRIAL
Midge quillwort	Isoetes minima	Vascular Plant	Red	TERRESTRIAL: seepage
Nettle-leaved giant-hyssop	Agastache urticifolia	Vascular Plant	Red	TERRESTRIAL: forest mixed

Common Name	Scientific Name	Category	BC List	Habitat
Monardella	Monardella ororatissima ssp. discolor	Vascular Plant	Red	TERRESTRIAL
Spurless touch-me-not	Impatiens ecornuta	Vascular Plant	Red	TERRESTRIAL: forest mixed
Heterocodon	Heterocodon rariflorus	Vascular Plant	Blue	TERRESTRIAL: grassland / herbaceous; seepage
Pygmy slug	Kootenaia burkei	Invertebrate Animal	Blue	TERRESTRIAL: forest needleleaf
False-mermaid	Floerkea proserpinacoides	Vascular Plant	Blue	TERRESTRIAL: rock outcrop; seepage slope
Vivid dancer	Argia vivida	Invertebrate Animal	Blue	LACUSTRINE: beach
Short-flowered monkey-flower	Erythranthe breviflora	Vascular Plant	Blue	Terrestrial: seepage slope

APPENDIX 4: PREVIOUS CWPP RECOMMENDATIONS

This 2017 CWPP Update relates to the 2008 CWPP for Ymir and Salmo. Since 2008, Area G has implemented some of these CWPP recommendations. The previous recommendations and progress to date are summarized below. In some cases, the recommendations have been fully achieved. In other cases, these recommendations have been partially met, or met in a limited way. Some of the recommendations that are not fully achieved are cross-referenced to the recommendations and Action Plan in this CWPP update (see Section 7.0).

Some of the previous recommendations are paraphrased and agency names and stakeholders or partners originally referred to may have subsequently changed. These changes have been acknowledged in the reported progress as/if applicable.

Table 26: Summary of previous recommendations

Recommendation		Progress
1. Communication and Education		
1.	The community should consider developing a communication plan to outline the purpose, methods and desired results of communication and education in the Village. The plan should cover the principles of fire risk to the community, fire behaviour, spotting, structure protection and vegetation management. Educational information and communication tools need to be stakeholder specific. To establish effective communication within target groups, the plan should identify spokespersons who can best establish communication ties with target audiences and provide the educational information required.	The RDCK has not developed a communication plan, but rather sends out sporadic updates and press releases (consider increasing frequency of public safety and fire information messages).
2.	The community should investigate working with local developers to construct a FireSmart show home to be used as a tool to educate and communicate the principles of FireSmart to the public. The demonstration home would be built to FireSmart standards using recommended materials for interface communities. Additionally, vegetation adjacent to the home would be managed to guidelines outlined in the FireSmart program.	The RDCK has not achieved this recommendation and no longer considers this approach to be an effective outreach tool. The RDCK is working with BC Parks, City of Nelson, forest licensees, MFLNRORD and other stakeholders to develop an effective set of tools to educate and communicate the principles of FireSmart to the public.

Recommendation	Progress
<p>3. The standard for website information about fire should include an outline of community fire risks and proactive steps individual homeowners can take to make their homes safer within the community. Other information, such as fire danger and FireSmart principles, and a Home Hazard Assessment can also be maintained on the local website. A section should be included to provide information on campfire bans and wildfire hazard ratings to educate visitors and provide information to local residents.</p>	<p>The RDCK has some information on its website to inform residents of fire risks and proactive steps individual homeowners can take to make their homes safer within the Fire Protection Area. Current fire danger ratings are not included.</p> <p>A RDCK Web Blocker is in place in the event of any kind of fire event directing residents to click on and receive emergency information prior to accessing other information.</p> <p>The RDCK website has links to FireSmart Canada and the FireSmart homeowners' manual posted on their websites.</p> <p>The RDCK EOC circulates Emergency Alerts to residents on a routine basis.</p>
<p>4. The RDCK should access local newspapers or community bulletins to deliver FireSmart educational materials or mail materials to residents as was done in 2004</p>	<p>The RDCK has not achieved this recommendation and no longer considers this approach to be an effective outreach tool.</p> <p>The RDCK is working with BC Parks, forest licensees, MFLNRORD and other stakeholders to develop an effective set of tools to educate and communicate the principles of FireSmart to the public.</p>
<p>5. The RDCK should investigate creating a central phone number accessible to the public with messages updating fire bans and fire danger rating.</p>	<p>The RDCK is working with MFLNRORD and BCWS to determine how best to provide the public with messages updating fire bans and fire danger rating.</p>
<p>6. The RDCK should establish communications with the MOFR for daily updates during the fire season. This information should be relayed to individual Fire Departments and to the homes of the Fire Chiefs and Deputy Chiefs</p>	<p>RDCK (BC Zone 4) Fire Chiefs receive daily BCWS fire weather updates.</p>

	Recommendation	Progress
7.	Fire halls should be assessed to ensure that they meet or exceed FireSmart recommendations. Additionally, fire halls should have emergency power backup and be equipped with sufficient resources to act as alternate incident command posts. Alternatively, sub-regional caches could be provided with incident command centre equipment.	The RDCK has not formally completed these assessments, and is carried forward in this revised CWPP. See Recommendation 10, Table 1.
8.	Signage consisting of current fire danger, campfire bans and general warnings regarding fire safety should be posted at all major entrances to the community or surrounding fire protection area and updated with current fire information as required.	This has been completed in most communities in Area A, and is ongoing
9.	The Regional District should consider developing a campfire ban bylaw and, in conjunction with the Fire Chief, implement the ban at times of high fire danger when provincial bans are not in place. The bylaw should consider effective and efficient enforcement measures and powers.	The RDCK does not have burning bylaws. The RDCK advises residents in municipalities to check with city halls regarding municipal bylaws, restrictions and permits and has posted links to relevant provincial guidelines (air quality control legislation, BCWS open burning restrictions and fire bans). See recommendation 21, Table 1.
10.	The Fire Department and the Regional District should work with the Regional Chamber of Commerce to educate the local business community, particularly businesses that depend on forest use (i.e., tourism and recreation) on FireSmart preparation and planning. Public education programs should be enhanced by: 1) integrating a unit of “FireSmart” and wildfire safety into the local elementary school curriculum, promoting the principles of community wildfire protection at a young age in order to improve awareness over time. This unit could be part of a general emergency preparedness teaching program; 2) creating a “FireSmart” sticker program where Fire Department members attend residences and certify them as meeting “FireSmart” guidelines.	<p>The RDCK has not achieved this recommendation and no longer considers this approach to be an effective outreach tool.</p> <p>The RDCK is working with BC Parks, City of Nelson, forest licensees, MFLNRORD and other stakeholders to develop an effective set of tools to educate and communicate the principles of FireSmart to the public, including local businesses.</p>

Structure Protection

Recommendation	Progress
<p>11. Many homes and businesses are built immediately adjacent to the forest edge. In these neighbourhoods, trees and vegetation are often in direct contact with homes. The Regional District should consider incorporating building setbacks into bylaw with a minimum distance of 10 m when buildings border the forest interface.</p>	<p>The RDCK does not have a Development Permit Area. Discussions are ongoing on how best to achieve this recommendation. See recommendation 16, Table 1.</p>
<p>12. It is recommended that the RDCK conduct detailed FireSmart assessments of homes and businesses to further communicate and promote fire risk reduction on private property. The Wildfire Risk Management System developed for individual Fire Protection Areas indicates that many areas of the Regional District are at high risk from wildfire.</p>	<p>Queens Bay, Heddle Road, Woodbury, and the Kaslo Backroad have achieved Community FireSmart Recognition. See recommendation 14, Table 1.</p>
<p>13. The RDCK should investigate the policy tools available for reducing wildfire risk within the municipality. These include voluntary fire risk reduction for landowners, bylaws for building materials and subdivision establishment, covenants for vegetation set-backs, delineation of Wildfire Development Permit areas, incentives such as exclusion from a fire protection tax and education. Specifically, the community should investigate a process to create and/or review and revise existing bylaws to be consistent with the development of a FireSmart community. Consideration should be given to the creation of a Wildfire Bylaw that mandates sprinkler protection, providing for good access for emergency response, and specifies fuel management on both public and private property.</p>	<p>Queens Bay, Heddle Road, Woodbury, and the Kaslo Backroad have achieved Community FireSmart Recognition.</p> <p>The recommended policy tools have not all specifically been addressed and are consolidated in the current CWPP recommendations. See recommendations 14, 16-20, and 22, Table 1.</p>

Recommendation	Progress
<p>14. The RDCK should consider requiring roofing materials that are fire retardant with a Class A and Class B rating within new subdivisions. While it is recognized that wholesale changes to existing roofing materials within the community are not practical, a long-term replacement standard that is phased in over the roof rotation period would significantly reduce the vulnerability of the community. The RDCK should consider obtaining legal advice regarding the implementation of building requirements that are more restrictive than the BC Building Code. While restrictions to rated roofing are not supported in the Code at this time, there are several communities who have or are undergoing various processes (e.g., lobbying, legal opinion, declaration of hazard by Fire Chief) to enact roofing bylaws within their Wildfire Development Permit areas.</p>	<p>The RDCK does not have a Development Permit Area and has not considered requiring roofing materials that are fire retardant with a Class A and Class B rating within new subdivisions.</p> <p>Discussions are ongoing on how best to achieve this recommendation. See recommendation 17, Table 1).</p>
<p>15. The RDCK should consider working with the Building Policy Branch to create a structure that would enable the municipality to better address wildland urban interface protection considerations for buildings.</p>	<p>The RDCK does not have a Development Permit Area and has not pursued other mechanisms to enable Area A to better address wildland urban interface protection considerations for buildings.</p> <p>Discussions are ongoing on how best to achieve this recommendation. See recommendation 21, Table 1).</p>
<p>16. The RDCK should consider lobbying the province to identify and document hazardous fuel types on crown lands that are not within 2 km of the boundary of the community but that are within 5 km of residential areas that could be impacted by a wildland urban interface fire. Effort should be directed at encouraging the province to initiate a fuel treatment program for these lands. This may include coordinating lobbying initiatives with other local governments from within the Regional District.</p>	<p>The RDCK has been successful in achieving funding to revise the 2008 CWPP and identify and document hazardous fuel types on crown lands that are not simply within 2 km of the boundary of the community but that are within a broader landscape that could be impacted by a wildland urban interface fire.</p> <p>As an outcome of this CWPP update the RDCK is working with BC Parks, the City of Nelson and other stakeholders to initiate a fuel treatment program for these lands at the landscape level.</p>
<p>17. Access constraints to residences should be addressed. Homeowners should be made aware of access constraints that may prevent the Fire Department from attending a wildland fire that could threaten their property.</p>	<p>The RDCK has identified access issues in this CWPP update. See Section 7.4.1. Work on this is ongoing on. See recommendations 31-33, Table 1.</p>

Recommendation		Progress
18.	Subdivision design plans should be reviewed by the Fire Department to ensure suitable access routes exist, hydrant accessibility is adequate where applicable, and that interface fire related issues are addressed.	<p>The RDCK does not require that subdivision design plans be reviewed by the Fire Department</p> <p>Work on this is ongoing on. See recommendation 32, Table 1.</p>
19.	As Fire Department officials can only request rather than force an illegal fire to be extinguished, the Regional District should consider enacting a mechanism such as a 'fee for service charge' or developing a policy to enforce regional bylaws if Fire Departments are called out to attend illegal burning. The issue of illegal fires is considered significant in the uncontrolled areas of the Regional District and requires action.	<p>When a burn ban is in place, the RDCK can extinguish the fire and request that Compliance and Enforcement issue a fine to the person responsible.</p> <p>Under the Fire Services Act, the RDCK can extinguish a fire that is threatening life and structures.</p> <p>With other forms of illegal fires such as burning garbage, the RDCK can request that Compliance and Enforcement issue a fine to the person responsible.</p>
20.	Given the wildfire risk profile of the Fire Protection Area, an emergency sprinkler kit capable of protecting 30 to 50 homes should be purchased and maintained in the RDCK. Fire rescue personnel, or a designate of the department, should be trained to mobilize and set up the equipment efficiently and effectively during a fire event.	<p>The RDCK has one type 2 structural protection unit and three type 3 structural protection units.</p> <p>Further work required. See recommendation 27, Table 1.</p> <p>Since the development of the 2008 CWPP, the RDCK has acquired 4 Structural Protection Units that can be utilized in emergency events.</p>
Emergency Response		
21.	Consideration should be given to developing a regional initial attack crew as other regional districts such as Metro Vancouver and the Capital Regional District have done. The location of this crew should be determined in consultation with communities and fire chiefs. The crew could consist of seasonal and permanent staff. Permanent staff could be trained to offer S100 and S215 training to fire departments as well as providing support such as community education and communication during the non-wildfire season.	<p>The RDCK has trained its members to Wildland Fire Fighter Structure Protection Program standards, delivered by the Office of the Fire Commissioner. This includes SPP-115 structural protection training. The result is a region wide roster of trained fire fighters.</p> <p>Further work required. See recommendation 25, Table 1.</p>

Recommendation	Progress
<p>22. A formal communication structure should be established with the MOFR so that information regarding fires in the region is communicated in a timely manner to the communities and fire departments adjacent to active fires. This might be best achieved through joint cooperation with the RDCK, the communities, Fire Protection Areas and the MOFR.</p>	<p>Fire Weather is currently communicated by BCWS. Some but not all information regarding wildfires is also shared.</p> <p>Additional work required. See recommendation 24, Table 1.</p>
<p>23. Consideration should be given to developing community evacuation plans in each Fire Protection Area. Appropriate evacuation routes should be mapped, considering Disaster Response Routes (DRR). Major evacuation routes should be signed and communicated to the public. The plan should identify loop roads and ensure access has sufficient width for two-way traffic. In addition, alternative emergency responder access should be considered.</p>	<p>Harrop Procter has a community evacuation plan in place.</p> <p>Additional work required. See recommendations 31 and 33, Table 1.</p>
<p>26. The Regional District should consider providing an accurate and detailed set of maps to all Fire Protection Area Fire Departments. Maps should provide details related to access and evacuation routes, water supply, subdivision layout and the fire risk mapping developed as part of this project. Periodic updates to the mapping will be required in areas of the Regional District where development is active.</p>	<p>Most of these maps have been provided including water supply, subdivision layout and evacuation routes.</p> <p>Fire risk mapping has not yet been provided (see recommendation 31, Table 1).</p>
<p>27. During a large wildfire it is possible that critical infrastructure within the community could be severely impacted by smoke. It is recommended that contingency plans be developed in the event that smoke causes evacuation of the community's incident command centres. The RDCK should co-operate with Provincial and municipal governments to identify alternate incident command locations and a mobile facility in the event that the community or Fire Protection Area is evacuated.</p>	<p>These alternate incident command locations have not been identified.</p> <p>The RDCK is working with BC Parks, forest licensees, MFLNRORD and other stakeholders to consider such issues as contingency plans and alternate incident command locations.</p>

Recommendation	Progress
<p>28. New subdivisions should be developed with access points that are suitable for evacuation and the movement of emergency response equipment. The number of access points and their capacity should be determined during subdivision design and be based on threshold densities of houses and vehicles within the subdivisions.</p>	<p>This has not been completed. The RDCK has limited jurisdiction over subdivisions developed with access points suitable for evacuation and the movement of emergency response equipment.</p> <p>Additional work required. See recommendations 30-33, Table 1.</p>
<p>29. Where forested lands abut new subdivisions, consideration should be given to requiring roadways to be placed adjacent to those lands. If forested lands surround the subdivision, ring roads should be part of the subdivisions design. These roads both improve access to the interface for emergency vehicles and provide a fuel break between the Wildland and the subdivision.</p>	<p>This has not been completed.</p> <p>Additional work required. See recommendations 31-33, Table 1.</p>
<p>30. The RDCK should consider conducting a review of critical water infrastructure to determine whether water flow and pressure will be adequate in an interface fire emergency. The review should consider water supply, water delivery volumes/pressure, pumping capacity and vulnerability of reservoirs.</p>	<p>This has not been completed.</p> <p>See recommendation 9 and 10, Table 1.</p>
<p>31. The RDCK should review the safety of current water fill locations and procedures related to water transportation to ensure that tendering is safe and as efficient as feasible.</p>	<p>This has not been completed.</p> <p>See recommendations 10-11, Table 1.</p>
<p>32. The RDCK should consider establishing standpipes at safe locations adjacent to bridges and other water access points. Gravity fill tanks or permanent pumps should be established in strategic locations where tendering distances and return times are prohibitive.</p>	<p>This has not been completed.</p>
<p>33. Given the values at risk identified in this plan, it is recommended that, during periods of high and extreme fire danger (danger class V and IV), individual Fire Protection Areas work with adjacent municipalities, the RDCK and the MOFR to maintain a local helicopter with a bucket on standby within 30 minutes of each community</p>	<p>This has not been achieved.</p> <p>The RDCK is working with BC Parks, City of Nelson, forest licensees, MFLNRORD and other stakeholders to ensure preparedness for periods of high or extreme hazard.</p>
<p>Training/Equipment</p>	

Recommendation	Progress
<p>34. The following training should be maintained/considered: 1) Continue the S-100 course training on an annual basis; 2) Regional Parks outside staff should be trained in the S-100 course; 3) A review of the S-215 course instruction should be given on a yearly basis; 4) The S-215 course instruction should be given to senior fire officers on an ongoing basis; and, 5) Incident Command System training should be given to all rural Fire Chiefs. Funding for proper training and compensation for members who wish to take S100 or S215 should be provided by the RDCK</p>	<p>WFF SPP and S-100 are mandatory training. The SPP 115 training is offered through the Office of the Fire Commissioner. ICS 100 training is mandatory for all fire service personnel. ICS 200 through ICS 400 training is offered regionally.</p> <p>Further work required. See recommendation 25, Table 1</p>
<p>35. Fire Departments should meet with the MOFR prior to the fire season to review the Incident Command System structure in the event of a major wildland fire. It may be most effective for this to occur at a regional level, these agencies should work in conjunction with Regional District staff to establish clear command structures and lines of communication with MOFR to ensure efficient operations during wildfire events. This should include designated radio channels and operating procedures.</p>	<p>An effective line of communication exists between BCWS and RDCK Fire Departments through the Zone 4 BC Fire Chiefs Association, Central Kootenay Fire Chiefs Association and individual meetings between Fire Halls and Regional Staff.</p>

<p>36. The RDCK and Fire Departments should consider reviewing existing inventory of interface fire fighting equipment to ensure that items such as large volume fire hose, portable pumps and firefighter personal protection (PPE) are adequate to resource the interface area. Fire Department personnel should have correct personal protective equipment and wildland fire fighting tools. Hoses, pumps and other equipment should be compatible with MOFR wildland fire fighting equipment.</p>	<p>This is happening on an ongoing basis.</p> <p>See recommendation 28, Table 1 regarding opportunities for obtaining discount volumes of hose for interface fires.</p>
<p>Vegetation (Fuel) Management</p>	
<p>38. The RDCK should investigate the potential for fuel management programs. A number of high hazard areas immediately adjacent to or embedded in the community have been identified as part of the wildfire risk assessment. These high hazard areas should be the focus of a progressive thinning program that is implemented over the next five to ten years. Thinning should be focused on priority 1 and 2 areas identified in Map 7 of the respective CWPPs. A qualified professional (RPF), with a sound understanding of fire behaviour and fire suppression, should develop treatment prescriptions. Any treatments that take place on sloped sites must be prescribed with consideration given to slope stability. Where slope stability may be an issue, a Professional Geotechnical Engineer should review the treatment prescription. The RDCK should also investigate the potential for working with private land owners to address hazardous fuels on private land.</p>	<p>To date 68.67 ha have been treated on areas identified in the 2008 CWPP as priority 1 and 2 areas (see Table 13). Fuel Management Prescriptions have been developed for additional priority 1 and 2 areas and are pending funding for implementation.</p> <p>This work is ongoing. See Table 1 for a summary of areas identified for treatment at the landscape level in Area A.</p>
<p>39. The mountain pine beetle has the potential to cause significant changes in fuels and fire risk over the next decade and beyond. Where applicable, fuel treatment strategies should target removal of beetle susceptible lodgepole pine. The RDCK should consider working with the province and private land owners to monitor and quantify changes in fire risk associated with the mountain pine beetle outbreak.</p>	<p>To date 68.67 ha have been treated on areas identified in the 2008 CWPP as priority 1 and 2 areas including stands with mountain pine beetle. Fuel Management Prescriptions have been developed for additional areas affected by MPB and are pending funding for implementation.</p> <p>This work is ongoing. See Table 14 for a summary of areas identified for treatment at the landscape level in Area A.</p>

<p>40.</p>	<p>The Provincial government and the UBCM have funding programs specifically to address wildfire hazard and the wildfire hazard associated with Mountain Pine Beetle on Crown and Municipal Lands. The RDCK should consider applying for UBCM funding to carry out fuel treatments that will strategically mitigate fuel hazard within the 2 km of the Fire Protection Area. The priority 1 treatment area identified in the respective CWPPs would be the focus for funding.</p>	<p>To date 68.67 ha have been treated on areas identified in the 2008 CWPP as priority 1 and 2 areas including stands with mountain pine beetle (see Table 14). Fuel Management Prescriptions have been developed for additional areas affected by MPB and are pending funding for implementation.</p> <p>This work is ongoing. See Table 14 for a summary of areas identified for treatment at the landscape level in Area A</p>
<p>41.</p>	<p>The RDCK should investigate the potential for additional funding options, such as a cogeneration plant, composting program or a minimal increase in property taxes, which could be used to encourage and aid property owners with fuel mitigation and to facilitate treatments on public lands. Efficiencies may be gained if this is coordinated at a Regional level and shared with RDCK municipalities.</p>	<p>The RDCK has made some progress on this. A Biomass Feasibility Study for Areas D and E and Kaslo was completed in May 2011, identifying the amount of biomass available, including from interface treatment areas, and summarizing potential markets.</p> <p>Further work is required.</p>
<p>42.</p>	<p>The RDCK should investigate the potential for working with the Ministry of Transportation and Highways to maintain major roadways as fuel breaks through communities. This would be achieved by thinning the understory and raising the height to live crown on either side of the roadway to a depth of 50 m.</p>	<p>Limited progress has been made.</p> <p>See recommendation 7, Table 2 for a summary of the proposed approach to the collaborative approach identified in this CWPP update.</p>
<p>43.</p>	<p>The RDCK should investigate the potential for partnering with residents to promote treatment of public lands adjacent private property. Private land owners could be encouraged to not only clean their own yards of debris and brush but also to be responsible for the removal of debris and brush from public lands immediately adjacent to them to a depth of 20 meters. Removal of material could be coordinated with a spring yard waste pickup program.</p>	<p>Limited progress has been made to date.</p> <p>See recommendation 14.</p>

44.	<p>The RDCK should work with FortisBC to ensure that transmission infrastructure within the Fire Protection Area can be maintained and managed during a wildfire event. Maintaining the transmission corridor to a fuelbreak standard will provide the community with a more reliable power supply that is less likely to fail during a fire event and will reduce the probability of fire spreading into the community. The RDCK should work with FortisBC to ensure that the right-of-way vegetation management strategy includes consultation with the community and the fire department so that wood waste accumulations do not contribute to unacceptable fuel loading or diminish the ability of the right-of-way to act as a fuel break.</p>	<p>Limited progress has been made to date. See recommendation 7, Table 4 for a summary of the proposed approach to the collaborative approach identified in this CWPP update</p>
45.	<p>The RDCK should prioritize the development of a fuelbreak network that builds on existing breaks such as the FortisBC Transmission Corridors and major roads running through the Fire Protection Areas.</p>	<p>To date 68.67ha have been treated on areas identified in the 2008 CWPP as priority 1 and 2 areas. Fuel Management Prescriptions have been developed for additional priority 1 and 2 areas and are pending funding for implementation. This landscape level approach is the focus of work for the revised CWPP.</p>
Wildfire Rehabilitation Planning		
46.	<p>Individual Fire Protection Areas should develop plans for post fire rehabilitation that considers the procurement of seed, seedlings and materials required to regenerate an extensive burn area (1,000-5,000 ha). The opportunity to conduct meaningful rehabilitation post fire will be limited to a short fall season (September to November). The focus of initial rehabilitation efforts should be on slope stabilization and infrastructure protection. These issues should form the foundation of an action plan that lays out the necessary steps to stabilize and rehabilitate the burn area.</p>	<p>Limited progress has been made to date. See recommendation 13 regarding completing detailed hazard assessments and developing response plans for stabilization and rehabilitation of burn areas in watersheds that are vulnerable to post-wildfire debris flows and floods.</p>