

**Bella Coola Valley**

**COMMUNITY WILDFIRE PROTECTION PLAN**

August, 2006

Submitted to:

Central Coast Regional District  
and  
Nuxalk Nation

By:

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## Wildfire Emergency Contacts

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<b>Nusatsum Fire Department</b>	<b>982-2290</b>
<b>Forest Fire Reporting – Ministry of Forests</b>	<b>1-800-663-5555</b>
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North Island Mid Coast Fire Zone – MOF, Campbell River	1-250-286-7645
NI MC Fire Zone – Protection Officer, Tom Rushton	1-250-286-6632
NI MC Fire Zone – Hagensborg field office	982-2000
Bella Coola RCMP	799-5363
PEP – Provincial Emergency Program	1-800-663-3456
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Updated: May 12, 2006

# Executive Summary

Wildland and urban interface fire is potentially the most severe emergency threat that the Bella Coola valley community faces. Fires can start without warning and, under the right conditions, spread very quickly to affect the whole valley. The 'interface' is described as the area where homes and businesses are built amongst trees in the vicinity of a forest. Virtually all of the Bella Coola valley residences and businesses are located in, or near, the interface fire zone and are consequently at risk from wildfire.

Evaluation of the Interface Community Fire Hazard for the Bella Coola Valley indicates a range of interface fire hazard from **moderate in the west, high in the central part and extreme in the eastern half of the valley**. This report documents the criteria that informed the evaluation and includes descriptions of the surrounding forest, the forest fuel types, community infrastructure, emergency response and special concerns that affect the rating. To address the documented issues, 14 recommendations and three mitigation treatments are proposed to help reduce the hazard of interface fire.

For evaluation and planning purposes, six Interface Fire Planning Units were identified: Bella Coola townsite and 4 Mile Reserve, Hagensborg, Salloompt, Nusatsum, Firvale and Stuiie. Each IFPU has different concerns and varying degrees of hazard.

As per the Ministry of Forests and Range analysis, the Bella Coola Valley has a high probability of wildfire and if a wildfire was to get started it would burn very intensively making control and fire suppression difficult.

Much of the work to mitigate the risk falls on the shoulders of local residents to address the forest fuel hazard around their homes and properties. Therefore, public education and information distribution are core initiatives recommended to help the Bella Coola Valley community become more fire resistant and resilient.

## Summary of Recommendations

### Mitigation

- People are encouraged to ensure that conifer trees in the vicinity of their homes are pruned to a height of at least 2m. Branches overhanging houses or balconies should also be pruned back.
- The clearing of brush and other woody fuels from at least 10 m from homes and infrastructure is also encouraged.
- There are a number of opportunities to improve existing fire breaks throughout the valley by reducing fire loading and ladder fuels in the forested areas amongst the creek, road, deciduous stands and grass field complexes. The map in Appendix H identifies a number of

possible fuel break areas that can be enhanced. These proposed fuel breaks would be designed to stop fires moving from the west.

- West side of 4 Mile reserve
- East side of Thorsen Creek
- Fields near Seventh Day Adventist school
- Airport to cemetery
- Nookliklonic Creek
- Salloompt River and open fields.
- Nusatsum River
- Halfway between Nusatsum and Canoe crossing
- Fields at Hammer road
- West side of Tweedsmuir Lodge grass field.

Most of these fuel break areas are located on private properties so incentives should be developed to conduct fuel treatments on private lands and/or develop mechanisms for use of public funds on private lands.

- Given the susceptibility of slash fuels to fire, it is imperative that any mitigative treatments involve the removal of slash build up.
  - 1) Develop public education and information distribution program regarding legal requirements for wildfire mitigation and precaution. Implement this as part of the broader emergency preparedness program.
  - 2) Encourage the maintenance and expansion of the Bella Coola Community Wildfire Sub-Committee by providing supporting resources that will enable the group to take the lead role in implementing the CWPP. Ideally, this sub-committee should have representation from the four fire departments, MOFR, Emergency Committee and Fire Wardens plus others interested in this issue.
  - 3) Incorporate the need for quick notification and transportation of people and animals in emergency evacuation plans.
  - 4) Develop education/information program to raise awareness of means to minimize risk of wildfire ignition and develop a system to inform the population about daily fire danger rating and the associated restrictions on industrial activity and campfires.
  - 5) Future plan updates should consider updating the forest inventory in combination with a more detailed assessment of forest fuel classes and condition.

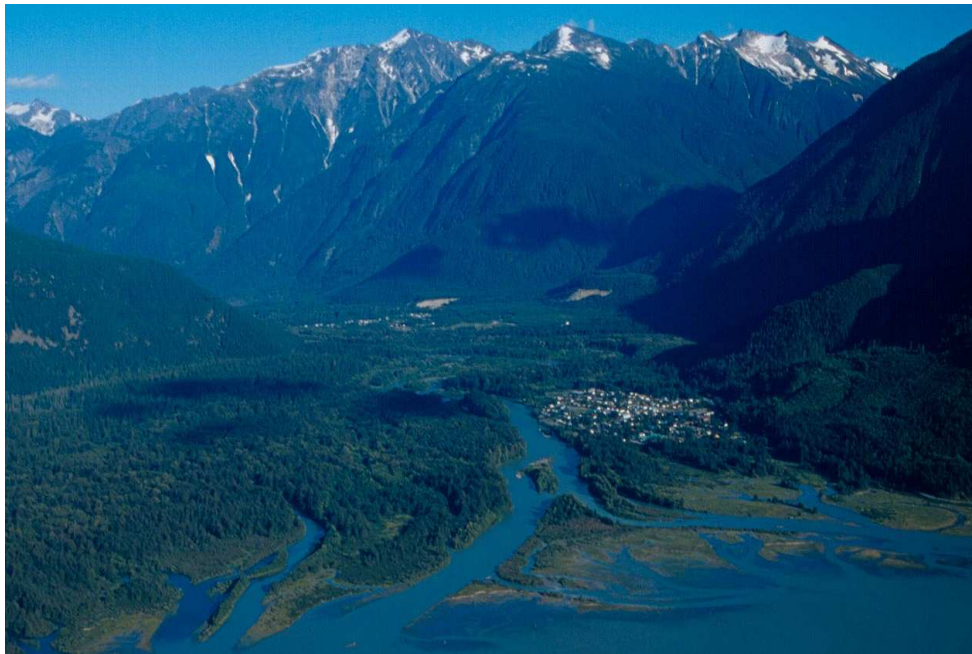
- 6) Encourage highways and residents to work to minimize dry grass fuel loading in roadside ditches.
- 7) Incorporate transportation of farm animals in evacuation plans.
- 8) Ensure burning at the garbage dump is conducted in a safe and careful manner. Preparation of burning plan is encouraged.
- 9) Develop communication mechanism to ensure campsite operators and other campers are aware of fire danger rating and campfire restrictions.
- 10) Remove dead and dying pine trees in vicinity of interface zone.
- 11) Conduct S-100 training of fire crews on an annual basis. Coordinate training with all local fire departments.
- 12) Encourage residents to make sure driveways are maintained to allow safe and quick access for fire trucks.
- 13) Encourage residents to acquire and maintain their own water delivery systems for initial attack suppression, especially in areas of limited or reduced fire department coverage. Equipment could be stockpiled by neighbourhood (ie Salloompt, Firvale and Stuié) for communal use or individually.
- 14) Encourage residents in remote areas to take S-100 fire fighting training.

## Foreword

This Community Wildfire Protection Plan was prepared on behalf of the Central Coast Regional District and the residents of the Bella Coola Valley, with funding assistance from the Union of BC Municipalities. The plan provides an overview of the community, describes the surrounding forest fuel types, estimates the interface fire hazard and provides mitigating recommendations.

## Acknowledgement

Many people assisted with the development of this plan. Acknowledgement and gratitude is due to Stephen Waugh, Emergency Coordinator and Donna Mikkelson of the Central Coast Regional District. The help and advise received from the Fire Chiefs from the Nuxalk, Bella Coola, Hagensborg and Nusatsum Fire Departments (respectively: John Edgar and Roger Harris; Fred Sorensen; Chris Mathews, Peter Nygaard and Ron Gordon ; Pat Kelly and Dave Gilbert) is also greatly appreciated.



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# Bella Coola Community Wildfire Protection Plan

Prepared by:

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Hans Granander, RPF August 23, 2006

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# 1 Introduction

Wildland and urban interface fire is potentially the most severe emergency threat that the Bella Coola valley community faces. Fires can start without warning and, under the right conditions, spread very quickly to affect the whole valley. The 'interface' is described as the area where homes and businesses are built amongst trees in the vicinity of a forest. Virtually all of the Bella Coola valley residences and businesses are located in, or near, the interface fire zone and are consequently at risk from wildfire. Furthermore, the rapid nature by which this emergency can develop and the devastation it can cause makes this one of the most challenging emergency response situations that the valley faces. Accordingly, prevention is paramount and the implementation of a 'Firesmart' community program will help reduce the hazard.

To help the Bella Coola Valley become a Disaster Resilient Community, the Central Coast Regional District (CCRD), in cooperation with the Union of British Columbia Municipalities (UBCM), has commissioned the preparation of the Bella Coola Valley Community Wildfire Protection Plan (CWPP). The purposes of the plan are to:

- Assess, document and map interface wildfire hazard
- Recommend fire prevention and mitigation strategy
- Recommend implementation activities regarding zoning, by-laws, development and landscaping
- Enhance emergency response plans
- Propose public communication strategies
- Recommend plan monitoring and updating mechanisms.

## 1.1 Planning Area

The plan covers most of the forested lands in the Bella Coola valley extending from the harbour and dry land sort installations at North Bentinck Arm to the small settlement of Stuiie in Tweedsmuir Park. The plan area includes the communities of Bella Coola, 4 Mile Reserve, Hagensborg, Firvale and Stuiie along with the interlaying residences. Residences further west in North Bentinck Arm, like Tallheo Cannery, and the Tweedsmuir Park Ranger Station, located east of Stuiie are not included in the plan.

The CCRD Electoral Areas covered by this plan are EA C, D, and E.

See Appendix A for a map showing the plan area.

## **1.2 Legal Framework**

Interface fire is primarily addressed by the Provincial Wildfire Act (2005) and Regulations. This legislation spells out the authorities, obligations and responsibilities for the different layers of government, industry and individuals. The Provincial government has the authority to enter onto any land in the province to carry out fire control measures, including entering property, restricting access, order an evacuation and requisition persons and equipment. The government may also provide fire control assistance when requested by a local government.

Compared to previous versions of the fire legislation, greater responsibility is now placed on municipal governments to address use of fire and prevention of wildfire within their jurisdictions. With respect to the duties of a Regional District, unless they have established bylaws dealing with open fires or wildfire, then requirements still default to the Provincial standards under the direction of the Ministry of Forests and Range. Indian Reserve lands fall under Federal jurisdiction, but through agreement with Indian and Northern Affairs Canada (INAC), the Ministry of Forests will take action to suppress wildfires and then bill INAC for the costs.

At this time there is no legal requirement for the Central Coast Regional District or First Nations to carry out Community Wildfire Planning; however, in the interest of making Central Coast communities 'disaster resilient', the CCRD and the Nuxalk Nation is undertaking this proactive and preventative initiative.

Other legislation that pertains to fire in and around communities includes:

- Forest and Range Practices Act
- Land and Parks Waste Management Act
- Open Burning Smoke Control Regulation

## **1.3 Local Fire Policies and Programs**

The Central Coast Regional District is challenged financially with an extremely tight budget, limited due to its small tax assessment base. As such, the CCRD lacks administrative and other resources to take on a greater role in dealing with wildfire prevention and control. Therefore, the CCRD does not have any policies or regulations regarding wildland interface fire and, by default, rely on Provincial regulation, policies and support to control wildfire. There are no local bylaws or zoning requirements dealing with wildfire prevention or mitigation. Through this plan however, the CCRD recognizes the importance of determining the interface wildfire hazard in the valley and to provide information on to its

residents so they can take voluntary action to reduce wildfire hazard in vicinity of their homes and properties.

Similarly, the Nuxalk Nation does not have any specific interface wildfire policies or programs and default to Federal and Provincial government's policies and support. Through agreement with Indian and Northern Affairs Canada (INAC), the Province is the lead agency in controlling fire on Indian Reserve lands.

The CCRD's and Nuxalk Nation's role as governments is more pronounced however in the event of an actual interface wildfire. In this kind of crisis situation, the Nuxalk Nation and CCRD (for non-reserve lands) may issue a **Local State of Emergency** to invoke powers necessary to address the emergency, including the issuance of an **Evacuation Order** if necessary (please refer to the Bella Coola Emergency Plan for further information).

It should be noted that the Nuxalk Nation and CCRD have a unique protocol agreement to work together and share resources in emergency situations.

The CCRD and the Nuxalk Nation both operate volunteer fire departments. These fire departments are primarily set up to fight residential fires, not forest fires. More information on the limited capacity and abilities of the local fire departments to deal with interface wildfires is describe in Section 5, Emergency Operations. It is clear that the Bella Coola valley has limited capacity in terms of equipment, labour and expertise to fight anything but the smallest interface fire and therefore quick access to resources from outside the community is paramount.

#### **1.4 Key Wildfire Regulation Requirements**

Given the small size of Central Coast communities, almost all of the settled areas are in close proximity to the forest. Since the provincial wildfire legislation pertains to, not only forested areas, but areas within specified distances of a forest, the regulations apply to most areas in the communities. Key elements of the regulations that apply to industries, businesses and residences include hazard assessments, hazard mitigation, restrictions on industrial activities, fire preparedness and permissible fire requirements.

The Provincial Wildfire regulations do not directly apply to Indian Reserve lands, which are under Federal jurisdiction. However, in the interest of due diligence, the adoption of the precautionary practices as described in the regulations is advisable.

*Note: The following is only a brief summary of the Wildfire Regulation. It is provided for basic information only. Those persons carrying out activities in*

*the vicinity of a forest must refer to the current wildfire legislation for a complete understanding of the requirements. These regulations can be accessed at:*

[www.for.gov.bc.ca/protect/](http://www.for.gov.bc.ca/protect/)

Although the regulations apply to most activities, particular emphasis is placed on 'industrial activity' and 'high risk activity'. In general, **industrial activity** refers to land clearing and activities related to forestry, like logging, processing and silviculture, but it also includes activities like refuse disposal and road maintenance. **High risk** activities, again generally, refers to forestry work, but it also includes welding, grinding, right of way grass mowing and use of pyrotechnics. These types of activities are undertaken regularly within Central Coast communities and it is important that people are aware of their responsibilities in these regards.

#### **Sufficient Fire Fighting Tools**

Anyone carrying out an industrial activity that has potential to cause wildfire is required to keep sufficient fire fighting hand tools on site.

#### **High Risk Activity Restriction**

Anyone carrying out a high risk activity within 300 m of a forest during fire season must determine the Fire Danger Class and conduct operations in accordance with any applicable restrictions (fire watch, early shift, shutdown, etc), must have adequate hand tools and adequate fire suppression system (fire pumps and water) on site.

#### **Precautions to Prevent Escape of Fire**

Anyone carrying out an industrial activity, including waste disposal, within 300 m of a forest must maintain sufficient fuel break to ensure fire does not escape.

#### **Hazard Assessment**

Anyone conducting industrial activity or operating a waste disposal site within 2 km of the boundary of the local government or a fire prevention district in a Regional District must conduct fire hazard assessment at 3 month intervals.

#### **Hazard Abatement**

For those areas where Hazard Assessments are required (within 2 km zone), fire hazard abatement is to be done within 6 months of the assessment.

### **Permissible Open Fires**

There are four categories of permissible fires, three of which generally applies to communities:

- **Category 1** – small fire (<1m height & diameter), including campfires.
- **Category 2** – one or two moderately small fires (< 2m height & 3 m diameter), or grass fire <0.2 ha.
- **Category 3** – 3 or more fires not exceeding 2 m in height or 3 m in diameter; or less than three fires and greater than 2 m in height or 3 m in diameter; or grass fires > 0.2 ha.

These categories require increasing levels of safeguards and the regulations should be referenced for the most up to date requirements. Most Central Coast communities burn their garbage in fires that fit the Category 3 designation and, as such, are required to:

- obey any burning restrictions
- do so in a safe manner
- obtain a burn registration number
- take all necessary precautions
- establish fuel break around fire
- ensure an adequate fire suppression system is available
- maintain a fire watch
- ensure fire does not exceed capacity to prevent escape.

Given the recent changes to the Wildfire Legislation, it is likely that many people are not aware of their responsibilities in regard to their industrial activities and use of fire.

#### **Recommendation**

Develop public education and information distribution program regarding legal requirements for wildfire mitigation and precaution. Implement this as part of the broader emergency preparedness program.

## **1.5 Fire Planning Process**

A 'Hazard, Risk and Vulnerability Analysis' (HRVA) was conducted in preparation for the latest update of the Bella Coola Emergency Plan (2005). This analysis ranked interface wildfire as the hazard with potentially the highest severity in the valley. To address this concern, the CCRD commissioned the development of a Community Wildfire Protection Plan.

The process of developing the CWPP was initiated at the Bella Coola Emergency Planning workshop held on October 24, 2005. The following steps and tasks were taken to complete the Plan:

- Available forest inventory maps and data were assimilated.
- Strategic Threat Analysis maps and data were acquired.
- Background information on forest fire ecology, weather data and topography was summarized.
- Information on the community in terms of population, infrastructure, developments, activities and fire control resources was summarized.
- Community Wildfire Sub-committee was initiated.
- MOFR Fire Protection personnel were consulted.
- Field reviews were conducted to determine forest fuel conditions.
- Interface Fire Units (IFU's) were identified.
- Hazard evaluation was conducted.
- A draft CWPP with hazard map was circulated for review and comment.
- Final CWPP completed.

### **1.5.1 Bella Coola Community Wildfire Sub-Committee**

The formation of a Bella Coola Community Wildfire Sub-Committee as part of the Central Coast Regional District's broader Emergency Management Program should be considered. An unofficial sub-committee was initiated as part of the process of completing the CWPP. Initial participation included representation from the CCRD Emergency Committee and each of the four Fire Stations. The inclusion of additional participants like the MOFR, or other local people knowledgeable about forest fire fighting, should be encouraged. The anticipated community forest is also an ideal organization to take a lead role in addressing interface forest management issues to reduce fire hazard.

**Recommendation:**

Encourage the establishment of a Bella Coola Community Wildfire Sub-Committee by providing supporting resources that will enable the group to take the lead role in implementing the CWPP.



## 2 Community Profile

The Bella Coola Valley community is a unique area of settlement in the heart of the Coast Mountains. It is a coastal town 120 km from the open ocean, an interior town 450 km from the nearest stop light. Surrounded by a vast wilderness of virtually impenetrable mountains, it is an isolated rural community with a population of approximately 2500 people, the majority of whom are spread out along a narrow 30 km stretch in the lower valley.

The valley itself is characteristically U-shaped and the majority of the populated areas are located on the relatively flat valley bottom where the Bella Coola river snakes amongst a mix of deciduous and coniferous forests intermingled by small farms, clearings and rural properties. Swamps, sloughs and creeks are also interspersed throughout the valley flood plain. Coniferous forest predominate the lower slopes of the surrounding mountains. Figure 1 provides a typical example of the interface fire zone in the Bella Coola valley and the satellite map in Appendix B provides a broad overview impression of the valley.

Figure 1. Aerial view of the Thorsen creek area, typical of the interface fire zone in the Bella Coola valley.



### **2.1.1 Topography**

The topography surrounding Bella Coola is extremely steep and rugged. However, since the majority of development, infrastructure, homes and facilities are located on the flat valley bottom, the majority of the interface zone is flat with a moderate to steep perimeter.

Very few installations and residences are situated above the river flood plain. A few homes are located on higher terraces where the effect of slope is a factor in controlling the spread of fire. These areas are primarily in the Salloompt, in Hagensborg immediately east of 'Tippies' corner, above the Nusatsum gravel pit and the Stuiie settlement.

## **2.2 Population**

According to the latest census, the total population of the Bella Coola Valley is 3,322 (2003 BC Stats); however, due to emigration, it is believed that the actual current population is closer to 2200-2500 people. Approximately 40% of the population are of First Nation origin. The majority of people reside on the Bella Coola town site, 4 Mile Reserve, Hagensborg and the Smith Subdivision. The rest of the population is scattered throughout the valley with decreasing density heading east, up to Stuiie in Tweedsmuir Park.

## **2.3 Socio-economic Condition**

The average family income is well below the Provincial average and 40% of the families earn less than \$20,000 per year. Of the 77 Health Areas in the Province, Bella Coola ranks 6<sup>th</sup> lowest in terms of its socio-economic situation (2003 BC Stats). Given this type of socio-economic background, a significant part of the population is not in a position to easily recover from a catastrophic event (many people likely do not have insurance or finances to cover emergency expenses). Furthermore, the Central Coast Regional District has a very small tax base and virtually no industrial tax income. Consequently, the Bella Coola Valley is very limited in the amount of resources it can put towards emergency response, mitigation and recovery.

## **2.4 Investments and Infrastructure**

Investments include residential and private dwellings as well as small business facilities and retail outlets. Infrastructure investments by government, utilities and service providers include:

- Hospital in Bella Coola, ambulance station in Hagensborg
- Schools in Bella Coola, 4 Mile and Hagensborg
- Highway and bridges

- Airport in Hagensborg
- BC Hydro electricity generation at 4 Mile and Clayton Falls.
- Telephone lines including microwave transmission
- Internet radio repeaters
- Harbour facilities, ferry docking ramp and ice plant
- Petroleum fuel storage at harbour and gas stations
- Water supply at Bella Coola, 4 Mile, Hagensborg and Smith subdivision
- Garbage dump at Thorsen Creek
- Public recreation infrastructure at Walker Island Park, Rodeo grounds, Fall Fair grounds.
- Snootli creek fish hatchery.

## ***2.5 Key Community Interface Fire Issues***

The Bella Coola town site and 4 Mile Reserve areas have less tree cover than most other inhabited areas of the valley and therefore the risk is slightly lower. However, the potential for house-to-house fire is higher in these relatively dense areas. The prevailing summertime winds flow up valley, placing areas east of Thorsen Creek at higher risk.

Power and telephone disruptions can be expected as power lines are suspended on wooden poles.

Fires can last from a few days to a number of weeks, so there could be prolonged disruption in the valley. Forest fires generate a tremendous amount of smoke and given the valley's narrow geography, smoke can pose a considerable respiratory threat, as well as limiting visibility for traffic and aircraft. Roads may become impassable due to fallen trees or intense smoke and heat. Evacuations of people and livestock can be anticipated and homes and infrastructure may be lost. Restoration and clean up efforts can be sizeable and prolonged.

The main interface wildfire issues facing Bella Coola include;

- Emergency Evacuation
- Campfires
- Fuel reduction
- Education, information dissemination
- Local fire fighting capacity and training in wildfire suppression
- Garbage dump burning
- Quick onset of high fire danger in early part of fire season
- Improved mapping of private property lines to better ascertain fuel management and fire responsibility.

### 3 Wildfire Hazard Assessment

Wildfire hazard is a function of the risk of occurrence in combination with the severity of impact. To determine the hazard, a review of local fire ecology, fire history, likely sources of ignition, forest fuel characteristics and density of developments in the interface is necessary. To objectively quantify the hazard, the Interface Community Fire Hazard Form (ICFH Form) was used. Appendix C contains the hazard evaluation Forms for each of the Interface Fire Planning Units (IFPU) described in Section 4.

In 2005, the Ministry of Forests and Range evaluated interface fire threats and the mapped results of this Strategic Threat Analysis (STA) has been incorporated into the evaluation of the hazard in the Bella Coola valley. Information from the STA include: fire probability classification, building density analysis, probability of human and lightning caused ignition, head fire intensity and spotting potential.

#### 3.1 A Fire Based Ecology

The Bella Coola valley is located in a fire based ecosystem where forest fire is the natural process of forest renewal. Natural and man caused forest fires have burned large areas of the valley in the past and there are readily visible signs of old fires throughout the valley. It is inevitable that forest fires will occur again.

In terms of the provincial danger rating, the Bella Coola valley is located in the Danger Class 1 and 2 transition. The western half of the valley is in DC 1 and eastern half is in DC 2. This increasing danger from west to east is reflected in the ecology of the area.

The populated, lower elevation areas of the valley are classified as the dry sub-maritime Coastal Western Hemlock (CWH ds2) biogeoclimatic zone (MOF, 2003). This zone is characterized by infrequent natural disturbance occurrences (Natural Disturbance Type 2, MOF, 1995) and the mean return interval for fire is around 200 years on average. Fires historically range in size from 20 to 1,000 ha.

The eastern part of the valley (Tweedsmuir Park) is classified as wet, warm Interior Douglas-fir (IDF ww) biogeoclimatic zone (MOF, 2003). The IDF is one of the drier ecosystems in the Province and is characterized by frequent stand maintaining fires (NDT 4). Historically, light, surface fires may occur in cycles less than 50 years while stand initiating fires usually return in 150 – 250 year intervals (MOF, 1995) in this ecosystem.

Above 500 m elevation, conditions are more moist (CWH ms2) but the risk of fire is still significant as the natural disturbance interval is still 200 years

on average. However, there are no facilities or residences at these elevations in the valley.

The risk of fire decreases significantly at elevations above 700 m where conditions change from sub-maritime to maritime in the Mountain Hemlock (MH mm1) biogeoclimatic zone. Fires in this ecosystem are considered to be rare, returning at periods in excess of 350 years. Besides mountain top communication repeater stations, there are no facilities or residences at these higher elevation areas.

### **3.2 Fire Weather**

Historical weather data was provided by the Ministry of Forests and Range. There are five weather stations that apply to the Mid Coast Forest District. They are located in Hagensborg, McInnes Island, Machmell drainage, Port Hardy and Talchacko valley. The weather station that provides the most pertinent information for the Bella Coola valley is the Hagensborg and to a lesser extent, Talchacko. Table 1 summarizes the Hagensborg weather data and associated fire weather indices from 2001 to 2005 and Table 2 summarizes the Talchacko data.

The data indicates that on average, the fire danger in the lower Bella Coola valley (Hagensborg weather station) is moderate or higher for 35% of the days during the fire season and in the Talchacko it is moderate or higher for 24% of the days. The Bella Coola valley also had consistently higher number of days in both high and extreme fire danger. This is a surprising revelation as the Talchacko valley has higher temperatures and lower humidity than the Bella Coola valley.

The difference in fire danger between these two weather stations is due to different wind conditions. During hot and dry summer periods strong westerly in-flow winds pick up during the afternoon and the valley becomes a massive wind tunnel. During these times, data from the Hagensborg Airport weather station indicates that prolonged afternoon winds average close to 20 km/hr (gentle breeze according to Beaufort scale, CFFDRS) with gusts ranging from 30 to 58 km/hr (fresh breeze to near gale). The Talchacko valley is sheltered from these winds and thus has a slightly lower fire danger rating. However, the temperature and humidity conditions in the Talchacko provides a more relevant indication of the conditions in the upper (eastern) part of the Bella Coola valley than the Hagensborg data and this should be factored with the wind information for the main valley. As a consequence, the fire danger in the upper valley (Firvale and Stui) can be expected to be significantly higher than the lower valley.

Due to the summer in-flow wind phenomenon, a fire started in the lower valley during one of these periods can quickly race up valley posing significant evacuation and control challenges.

Table 1 Hagensborg weather station data and fire indices 2001-2005.

Factor	April	May	June	July	August	Sept	Oct
<b>Weather Data:</b>							
Mean Temp C	12.0	16.3	19.4	20.0	20.5	15.7	10.5
Relative Humidity	61.6	57.3	59.8	65.2	67.9	76.2	82.0
Wind Speed (km/hr)	7.2	9.7	12.7	11.5	8.3	5.2	3.8
Wind Direction	195	216	237	246	222	212	189
Precipitation (mm)	61.1	36.5	38.9	44.0	109.9	131.4	190.0
<b>Fuel Indices:</b>							
FFMC	68.3	75.0	78.3	70.8	65.0	49.7	36.4
DMC	11.5	33.5	34.2	21.6	22.1	4.3	2.8
DC	30.2	144.2	260.7	342.6	372.1	228.6	138.7
ISI	3.1	3.5	4.6	3.6	2.5	0.7	0.4
BUI	12.2	40.6	50.3	36.1	36.9	7.6	5.1
FW	4.2	8.2	11.8	8.0	6.6	0.8	0.6
<b>Danger Class (days/mnth)</b>							
Extreme (5)	0.0	0.0	2.5	0.3	0.0	0.0	0.0
High (4)	0.5	5.3	6.0	4.5	5.4	0.0	0.0
Moderate (3)	3.5	11.3	13.5	11.3	8.8	0.0	0.0
Low (2)	13.0	14.0	6.3	10.0	9.0	7.6	3.5
Very Low (1)	12.5	0.5	1.8	5.0	7.8	22.4	23.8

Table 2 Talchacko weather station data and fire indices 2001 – 2005.

Factor	April	May	June	July	August	Sept	Oct
<b>Weather Data:</b>							
Mean Temp C	12.3	16.4	20.5	21.8	21.9	15.9	10.1
Relative Humidity	49.5	45.6	46.7	49.4	52.7	65.5	79.4
Wind Speed (km/hr)	5.0	5.5	5.3	5.5	4.3	3.1	2.2
Wind Direction	134	148	148	148	147	116	125
Precipitation (mm)	72.0	38.8	36.0	0.0	61.0	109.0	145.1
<b>Fuel Indices:</b>							
FFMC	69.1	79.1	81.3	82.7	76.0	60.8	37.9
DMC	16.0	38.8	47.4	58.2	63.9	9.1	4.2
DC	35.0	128.2	245.1	395.1	522.5	336.4	172.2
ISI	2.7	3.8	4.2	4.2	3.6	1.1	0.6
BUI	16.3	43.9	62.0	81.7	94.2	16.7	7.7
FW	4.5	9.5	12.4	14.6	13.6	1.9	1.0
<b>Danger Class (days/mnth)</b>							
Extreme	0.0	0.0	0.6	0.0	1.6	0.0	0.0
High	0.0	0.2	1.4	7.2	7.6	0.0	0.0
Moderate	0.3	5.2	8.2	9.8	7.6	0.0	0.0
Low	7.5	15.4	13.6	11.0	9.0	4.6	3.0
Very Low	16.3	10.2	6.2	3.0	5.2	25.4	27.4

Typical extreme temperatures during hot summer periods range from 34-37° C in the main part of the valley. However, temperatures may spike at even higher degrees along south facing slopes, in the eastern half of the valley.

Due to the tall mountains and east-west orientation of the valley, the effect of aspect is very pronounced. Forests on the south side of the valley are generally more moist and cooler than those on the north side, that are more exposed to the drying effect of direct sun. As a result, Douglas-fir dominate forests on the north side, while on the south side there is a greater mix of hemlock, spruce and cedar amongst the Douglas-fir.

**Recommendation:**

Incorporate the need for quick notification and transportation of people and animals in emergency evacuation plans, due to potential for rapid fire spread during windy summer conditions.

### **3.3 Fire History**

Signs of large forest fires from decades ago are clearly visible throughout the Bella Coola valley. The majority of these larger fires resulted from lightning strikes, camp fires or logging activities. The last major fire burning in the interface vicinity was in 1969 when the lower slope areas on the south side of the valley between Nookliklonic and Snootli creeks burned. An inadequately extinguished camp fire was the cause for that fire. Since that time, there have been a number of smaller fires and every year there are usually lightning or human caused fire occurrences in the vicinity of the interface that fortunately have been controlled before causing significant damage.

According to Ministry of Forests and Range records, since 2002 there have been a total of three human caused fires and 11 lightning caused fires in the Bella Coola area surroundings. Most of these fires occurred east of Hagensborg and were under 5 ha. However, the Gyllenspetz and Nordschow fires in 2004 burned 360 and 80 ha respectively. This demonstrates that Bella Coola has a moderate to high historical fire occurrence, with increasing risk from west to east.

### **3.4 Risk of Wildfire Occurrence**

Risk of occurrence is primarily affected by sources of ignition, the availability of fuel and its condition. Forest fuels are found throughout the valley and are discussed in detail in Section 3.4 Forest Fire Fuels. In recent years, most fires have been initiated from lightning. Sources of ignition are

changing with the changing socio-economic character of the Bella Coola communities. In the past, logging activities was a main cause of local forest fires; however, logging activities in the main valley has diminished greatly since the 1980's so the risk of fire from this activity has declined significantly. People still clear land and burn slash debris on a regular basis though and today the main ignition threats are from yard/grass fires, smoke-house fires and carelessly discarded cigarettes. The garbage dump at Thorsen creek is another potential fire source as paper and cardboard are routinely burned. The increase in tourism and development of private campgrounds in recent years also increases the potential for campfire caused fires. Of particular concern is the common occurrence of high fire danger in the early part of the fire season which has potential to catch people unawares of the fire hazard. Public education and awareness of fire weather danger rating are fundamental ways in which to reduce the threat of human caused ignition.

**Recommendation:**

Develop education/information program to raise awareness of means to minimize risk of wildfire ignition and develop a system to inform the population about daily fire danger rating and the associated restrictions on industrial activity and campfires.

### **3.5 Forest Fuels**

The forests of the Bella Coola valley are a mix of coniferous and deciduous stands of varying age classes and seral stage development. Most of the valley bottom and toe of slope forests have re-grown from previous farm clearing or logging and thus are generally less than 100 years old. These younger stands usually contain a mix of coniferous and deciduous trees. There are a few pockets of old growth coniferous stands in the valley bottom and scattered along hard to reach areas along the lower mountain slopes. The majority of low elevation coniferous old growth is found in Tweedsmuir Park.

In coastal ecosystems, the most volatile fuels are generally associated with slash build up from logging or land clearing. Except for the eastern areas of the district, most of the larger fires in the Mid Coast have occurred in slash fuel types, thereby demonstrating the need to manage fuel loading associated with timber harvesting or forest clearing in the vicinity of the interface. Mature coastal forests generally do not burn easily, except in extreme cases and forested buffer strips have been a key 'fire break' strategy between large areas of slash loading. Often, slash fires will only burn into surrounding forest perimeter to the 'shadow line' (area of direct sunlight permeation from forest edge into the timber). Fuels exposed to open sunlight are often more volatile than those under the shadow of the



forest canopy. It should be cautioned though that during extreme weather conditions (prolonged period of dry weather, hot temperatures and wind), then coastal forests will burn and due to the large amount of biomass, fires can be very intense and difficult to suppress.

The most common forest type in the Bella Coola valley is a mix of coniferous and deciduous cover. Deciduous trees do not readily burn thus reducing the volatility of these forests and potential for widespread crown fires. In these forest types, 'candling' of conifer trees can be expected. However, there is a high degree of variability in conifer/deciduous composition and fire behaviour will vary from site to site.

A map depicting the broad forest cover in the valley is contained in Appendix E. Ministry of Forest and Range vegetation inventory data was relied on to provide forest cover information.

### **Forest Fuel Classification**

The Canadian Forest Fire Danger Rating System (CFFDRS), developed by the Canadian Forest Service, classifies forest fuels into 16 major types. Most of these classifications were developed in eastern and northern forests and they do not fit very well in terms of describing coastal forest fuels. However, in order to provide some consistency, attempts have been made to best approximate the local fuels in terms of the CFFDR System. For this CWPP, the Bella Coola valley forests have been classified into 6 different forest fuel types.

- **Young coniferous plantations:** estimated to correspond to CFFDRS C2 fuel type.
- **Mature coniferous second growth:** estimated C3 fuel type.
- **Pole size coniferous second growth:** estimated C4 fuel type.
- **Coniferous old growth:** estimated C5 fuel type. There are two distinct forest types in this category: valley bottom alluvial floodplain and steep rocky sidehills.
- **Mixed conifer/deciduous second growth:** estimated M2 fuel type.
- **Deciduous:** estimated D1 fuel type.
- **Grass Fields:** estimated O1 fuel type.

The mapped fuel information provided in this plan (Appendix F) is only a preliminary estimate based on existing forest cover information, air photos, local knowledge and field reconnaissance. The information is not based on systematic sampling and therefore its accuracy is limited. The forest cover information is not current and there have been numerous changes to the land since the last update. Future updates of this plan should consider conducting a more comprehensive fuel inventory update.

The MOFR has also generated an estimation of the anticipated fire intensity based on the types of forest in the vicinity. Termed Head Fire Intensity (HFI), it is the predicted energy output of the fire at the front, or head, of the fire. It has become one of the standard gauges by which fire managers estimate the difficulty of controlling a fire and select appropriate suppression methods. It is measured in kilowatts per meter of fire front and is based on the Rate of Spread and the Total Fuel Consumption. This analysis indicates that the most of the forest types surrounding Oweekeno village would burn with very high intensity. The Head Fire Intensity map is provided in Appendix G.

**Burning Difficulty:** In the description of the various fuel types, a subjective assessment is made regarding how easily the fuels will burn. In this context, a Burning Difficulty rating of 'low' means that fuels will usually not burn readily. A 'high' rating means the fuels can easily burn.

**Crowning Potential:** Subjective assessments of the various fuel type's potential for crown fire is also made. This assessment incorporated the fuel type, density and presence of ladder fuels. Wind also has a strong influence on crowning potential.

**Recommendation:**

Future plan updates should consider updating the forest inventory in combination with a more detailed assessment of forest fuel classes and condition.



### **Young conifer plantation (C2)**

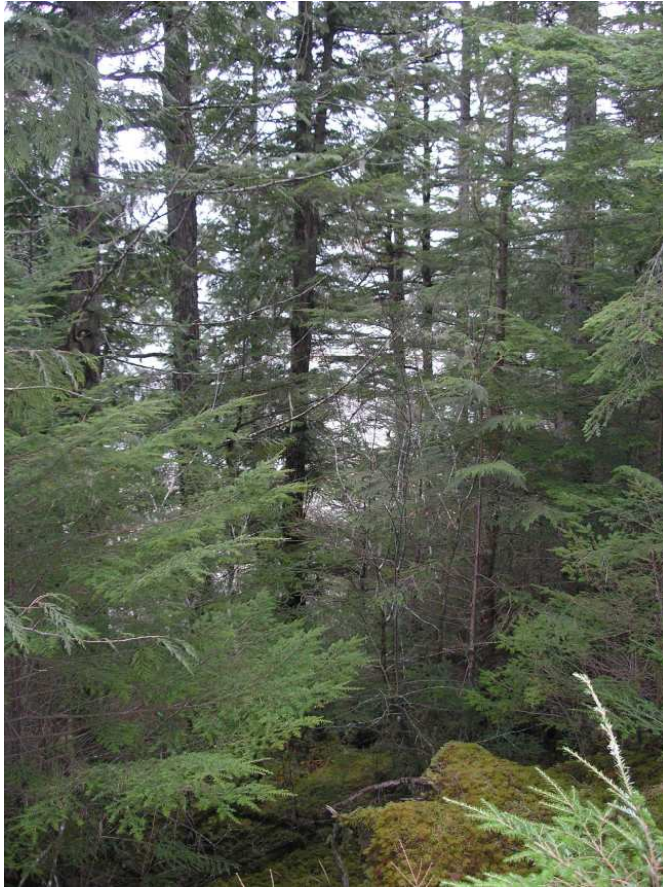
- This type is 15-40 year old second growth that may have received silvicultural treatments like spacing or manual brushing.
- Generally composed of FH(CDB/A) 221
- Live crown is near ground.
- 3500 sph in unspaced stands, 800 sph in spaced stands.
- Crown closure 70%
- Duff 5-10 cm.
- Ground cover is sparse due to dense overstory.
- High degree of ladder fuels.
- Dense stands are going through stage of self thinning and suppressed trees are dying, leaving vertical and horizontal woody debris throughout.
- Spacing occurred more than 10 years ago, so fines have decayed although the larger stems and branches remain crisscrossed on forest floor.
- Burning difficulty is moderate to high and crowning potential is high, especially during windy conditions.



### **Mature Coniferous second growth (C3)**

- Generally, 80-100 year old hemlock stands with lesser amounts of cedar and Douglas-fir with minor alder or birch.
- Typically H(CFD) 541
- 30 m tall
- Height to live crown 10-15 m.
- Approx 700 sph
- Crown closure 60%
- Duff 5-10 cm.
- Sparse ground cover, mostly moss.
- Few scattered branches or tops.
- Burning difficulty is low with low/mod crowning potential.
- Stands of this type are primarily located on flats in lower part of valley.





#### **Pole Size Conifer (C4)**

- This type is 40-80 year old naturally regenerated second growth.
- Generally composed of HF(CDB) 321
- Live crown is near ground.
- 2500 sph
- Crown closure 70-80%
- Duff 5-20 cm.
- Ground cover is sparse due to dense overstory.
- High degree of ladder fuels.
- Dense stands are going through stage of self thinning and suppressed trees are dying, leaving woody horizontal and vertical debris throughout.
- Burning difficulty is moderate to high and crowning potential is high, especially during windy conditions.



### **Coniferous old growth – alluvial flats (C5)**

- Typical coastal old growth consisting of large Douglas-fir, hemlock, cedar and Sitka Spruce.
- On alluvial floodplains, usually CS 951 and on drier sites FHC 951
- 40 m tall
- Height to live crown 10 – 20 m.
- Approx 250 sph
- Crown closure 60%, but also larger gaps.
- Duff 3-10 cm.
- Ground cover mostly herbaceous or berry bushes.
- Scattered younger trees have potential to provide ladder fuel.
- High volumes of fuel in these large trees.
- Few scattered branches or tops.
- Burning difficulty is low with mod crowning potential.
- Old growth is rare at lower elevations, especially on the valley flats. Most low elevation old growth is found in Tweedsmuir Park.





### **Coniferous old growth – steep sidehill (C5)**

- This type is primarily found around perimeter of the IFPUs and stretch up the mountain sides. Tree size decreases with increasing elevation and dryness of shallow, rocky soils.
- Old growth consisting of Douglas-fir, hemlock, cedar and balsam of varying size and quality.
- Typically FH(C) 841
- Small stands of lodgepole pine are found on rocky outcrops and these are under attack from pine bark beetle.
- 30-35 m tall
- Height to live crown 10 – 15 m.
- Approx 400 sph
- Crown closure 40 - 60%
- Duff: 5-20 cm (deeper in western compared to eastern part of valley)
- Ground cover mostly moss with huckleberry bush.
- Scattered younger trees have potential to provide ladder fuel.
- Discontinuous scattering of branches, tops and logs.
- Burning difficulty is moderate to low with mod crowning potential.



Above – moist/wet site with more deciduous.




Above/below: drier site with more coniferous.



### **Mixed conifer deciduous second growth (M2)**

- This type is naturally regenerated from old logging or land clearing and is the most prevalent fuel type in vicinity of interface.
- It consists of mix of cottonwood and/or alder with hemlock and cedar and lesser amounts of Douglas-fir and Sitka spruce.
- There are two different stand types in this category: moist/wet sites and dry/moist sites.
- Moist/wet sites are typically composed of AcC (S) 441
- Dry/moist sites are typically HFD(CB) 431
- Ages vary from 40 to 80 years old.
- Height to live crown is 1-2 m for conifers.
- 1400 sph
- Crown closure 40%
- Duff 3-10 cm.
- Variable ground cover – wetter sites has berry brush; drier sites have sparse ground cover.
- High degree of ladder fuels.
- Scattered woody debris, generally not elevated.
- Burning difficulty and crowning potential is highly influenced by the amount of deciduous. For stands with higher proportion of conifers, the burning difficulty is moderate and crowning potential is high, especially during windy conditions.



	<p><b>Deciduous (D1)</b></p> <ul style="list-style-type: none"> <li>• This type is primarily associated with riparian areas or wet valley bottom sites.</li> <li>• Generally composed of cottonwood or alder in ages ranging from a few years to 40 (older stands usually have understory of conifer).</li> <li>• Ground cover is dense brush and herbaceous growth.</li> <li>• Burning difficulty is considered low with low crowning potential.</li> </ul>
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### **3.6 Density of Developments**

The density of development in the Bella Coola valley varies from ‘rural – continuous forest’ for most of the valley to urban at the Bella Coola townsite and 4 Mile reserve. Rural continuous forest is the most hazardous as developments are usually surrounded by forest while interface fire is generally only a concern around the perimeter of urban areas.

Building density varies from ‘undeveloped’ with less than 1 building per square km to ‘urban’ with building density of >1000 per sq. km.

## 4 Interface Fire Planning Units

Community wildfire plans are broken down into Interface Fire Planning Units (IFPU) in order to facilitate planning for areas with different fire hazard, values at risk, logistics and operational challenges. There are six IFPU's in the Bella Coola Valley:

- Bella Coola
- Hagensborg
- Salloompt
- Nusatsum
- Firvale
- Stui

### 4.1 Bella Coola IFPU

The Bella Coola IFPU stretches from the Bella Coola harbour to Thorsen creek and includes the main Bella Coola townsite, Bella Coola reserve and 4 Mile reserve. This unit has the highest concentration of people, residences and supporting infrastructure compared to the rest of the valley IFPU's.

The main characteristics of this IFPU are:

- Dense development so interface fire zone is primarily around the perimeter of the town sites.
- Critical services, including hospital, schools, bank, government buildings, power generation, churches and food stores.
- Three fire departments
- Good fire hydrant coverage
- Fuel tank farm
- Ferry dock and marina facility

Element	Description
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• Moderate, bordering high.</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Most westerly IFPU in the valley, therefore slightly cooler and wetter than rest of valley.</li> <li>• Located at the head of the inlet and as such is influenced by ocean breezes and humidity.</li> <li>• Ecology characterized as moist sub-maritime transitioning to dry sub-maritime.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Hagensborg weather station provides a good indication of fire weather conditions in this IFPU.</li> <li>• &gt;25% of days during fire season are moderate or higher danger class.</li> <li>• See Section 3.2 for more information.</li> </ul>
<b>Fire History</b>	<ul style="list-style-type: none"> <li>• In recent memory, the only fires in this IFPU have been associated with residential fires.</li> </ul>

	<ul style="list-style-type: none"> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates a high fire probability around the perimeter of the developed areas.</li> <li>• Low fire probability within developed areas (probability map indicates high for 4 Mile Reserve, however this is due to incorrect forest inventory showing coniferous tree cover when in actuality it is exposed land) and moderate along the river floodplain.</li> <li>• Main ignition sources are residential fires along with back yard campfires and garden debris burning. Clayton Falls dry land sort is a potential fire source from outside the IFPU.</li> <li>• Accidental fires from smoking and children playing with matches are also a threat.</li> <li>• IFPU is adjacent to garbage dump, but prevailing summer winds blow in opposite direction.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Primarily coniferous mature forest around the upslope perimeter of the developed areas with a combination of purely deciduous and a mix of coniferous and deciduous stands along the river flat perimeter.</li> <li>• Specifically, the fuels include: coniferous old growth, mixed deciduous/coniferous second growth, young coniferous plantation and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> </ul>
<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Bella Coola townsite has 'urban' density (&gt;1000 buildings/sq. km)</li> <li>• 4 Mile reserve has 'mixed' density (10-100 buildings/sq km)</li> <li>• For hazard determination, classed as 'suburban/rural with scattered forest'.</li> </ul>

#### 4.1.1 Bella Coola IFPU Issues

- Evacuation – this IFPU has the densest concentration of people and many people do not have vehicles.
- The grassy areas of the estuary is used for recreation but there is no access for fire fighting vehicles onto the estuary.
- The fuel station at the harbour is the most significant industrial danger.

#### 4.2 Hagensborg IFPU

The Hagensborg IFPU extends from the east side of Thorsen Creek to “Tippies Corner” in Hagensborg. It includes Walker Island and the majority of the Hagensborg settlement. This IFPU has the highest amount of people and infrastructure scattered throughout the forest.

Key characteristics of the Hagensborg IFPU:

- Extensive areas of residential development surrounded by forest.
- One fire hall.
- Partial fire hydrant coverage in Hagensborg.

- High amounts of beetle killed pine on the southern forested slopes above the IFPU.
- Critical infrastructure include: airport, schools, grocery store, hotel, gas station, post office, telephone repeater station, fish hatchery, churches.
- High recreational use associated with Walker Island park and rodeo grounds, Fall Fair Grounds, ice arena/skate board park, numerous privately run campgrounds.

Element	Description
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• High, bordering extreme.</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Interface area ecology characterized as dry sub-maritime. Moist sub-maritime as go up in elevation.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Hagensborg weather station provides specific indication of fire weather conditions in this IFPU.</li> <li>• &gt;25% of days during fire season are moderate or higher danger class.</li> <li>• See Section 3.2 for more information.</li> </ul>
<b>Fire History</b>	<ul style="list-style-type: none"> <li>• Small spot fires have occurred from the garbage dump debris burning.</li> <li>• Large tract of this IFPU (Snootli creek to Nookliklonic) burned in late 1966s as a result of campfire escape.</li> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates moderate to high fire probability within this IFPU.</li> <li>• High for areas with coniferous forests and especially around the perimeter of the unit.</li> <li>• Moderate is associated with mixed conifer/deciduous stands on the river floodplain.</li> <li>• Main ignition sources are residential fires, back yard campfires, garden debris and grass burning.</li> <li>• Garbage dump debris burning is a key concern. Located at the western edge of the unit, the prevailing winds can spread fire into rest of the unit.</li> <li>• Accidental fires from smoking and children playing with matches are also a threat.</li> <li>• This unit also has the highest amount of recreational use associated with camp grounds, Walker Island Park and rodeo grounds.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Coniferous forest stands within the unit as well as around the upslope perimeter. Alluvial flats contain a combination of purely deciduous and a mix of coniferous and deciduous stands.</li> <li>• Specifically, the fuels include: mature coniferous second growth, coniferous old growth, mixed deciduous/coniferous second growth, young coniferous plantation and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> <li>• This unit also contains significant areas of grass fields, the majority of which are actively being managed for hay production so grassy fuel build-up is relatively low.</li> </ul>

<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Building density is predominantly 'mixed' with 10-100 buildings per square km. Around the fringes of the main Hwy 20 corridor, density drops to 'isolated' at 1-10 buildings per sq km.</li> <li>• For hazard determination, classed as 'rural with scattered forest/continuous forest'.</li> </ul>
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#### 4.2.1 Hagensborg IFPU Issues

- Dry grass in ditches – numerous farming properties along Hwy 20 gives cause for concern about potential for discarded cigarette to ignite roadside grass fuels.
- Maintain and enhance regular communication between MOFR initial attack crews and local fire departments.
- Evacuation – significant amount of farm animals in this IFPU poses evacuation challenges.
- Significant amount of recently killed lodgepole pine on steep side hill overlooking the south side of IFPU.
- Managing threat of fire from garbage dump.
- Farm hay field burning is a major concern.
- Managing camp fire use at Walker Island, rodeo grounds and private camp grounds.

#### **Recommendation:**

Encourage highways and residents to work to minimize dry grass fuel loading in roadside ditches.

Incorporate transportation of farm animals in evacuation plans.

Ensure garbage dump operator conducts burning operations in safe and careful manner. Preparation of burning plan is encouraged.

Develop communication mechanism to ensure campsite operators and other campers are aware of fire danger rating and campfire restrictions.

#### 4.3 Salloompt IFPU

The Salloompt IFPU includes the developments on the north side of the Bella Coola River accessed across the Bailey Bridge in Hagensborg. This unit has a strong southerly aspect and most properties are located above the Bella Coola flood plain. Therefore, this unit is significantly drier than the Hagensborg or Nusatsum IFPU's.

The main characteristics of this unit are:

- Continuous forest around residential developments.

- No fire hydrant coverage.
- Significant amount of recently killed lodgepole pine in mixed stands in this IFPU.
- Bailey bridge across Bella Coola River is the only access.
- Relies on Nusatsum Fire Hall for coverage.

Element	Description
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• Extreme</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Interface area ecology characterized as dry sub-maritime. Moist sub-maritime as go up in elevation.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Hagensborg weather station provides reasonable indication of fire weather conditions in this IFPU. However, soil conditions are drier in Salloompt than Hagensborg or Nusatsum and therefore vegetation is more stressed for water.</li> <li>• &gt;25% of days during fire season are moderate or higher danger class.</li> <li>• See Section 3.2 for more information.</li> </ul>
<b>Fire History</b>	<ul style="list-style-type: none"> <li>• Small human caused spot fires have recently occurred in this IFPU.</li> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates moderate to high fire probability within this IFPU.</li> <li>• High for areas with coniferous forests and especially around the perimeter of the unit.</li> <li>• Moderate is associated with mixed conifer/deciduous stands on the river floodplain.</li> <li>• Main ignition sources are residential fires, back yard campfires, garden debris and grass burning.</li> <li>• Accidental fires from smoking and children playing with matches are also a threat.</li> <li>• This unit also has high amount of recreational use associated with shore line fishing and camping.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Coniferous forest stands within the unit as well as around the upslope perimeter. Alluvial flats contain a combination of purely deciduous and a mix of coniferous and deciduous stands.</li> <li>• Specifically, the fuels include: coniferous old growth, mixed deciduous/coniferous second growth and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> <li>• This unit contains some grass fields, the majority of which are actively being managed for hay production, so grassy fuel build-up is relatively low.</li> </ul>
<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Building density is a combination of 'mixed' with 10-100 buildings per square km and 'isolated' at 1-10 buildings per sq km.</li> <li>• For hazard determination, classed as 'rural with continuous forest'.</li> </ul>

### 4.3.1 Salloompt IFPU Issues

- Beetle infested pine trees – disposal of dead and dying pine trees should be undertaken.
- Dependence on Nusatsum Fire Hall means possible delays in quick response so local people may need to take action individually as has been done in the past. This requires privately fire fighting and suppression equipment.
- Evacuation – options are limited due to dependence on Bailey bridge.
- Free range cattle occurs in Salloompt valley next to IFPU thereby posing additional evacuation challenges.
- There is decreased haying activity so there is a concern of grass fuel build up.

**Recommendation:**  
Remove dead and dying pine trees in vicinity of interface zone.

### 4.4 Nusatsum IFPU

This unit extends from Tippié’s Corner in Hagensborg to the Hwy 20 cement bridge over the Bella Coola River by the Hammer road junction. The unit is located on the south side of the river. Developments are concentrated in the western part of the unit, particularly around the Smith subdivision and building density steadily decreases towards the east.

The main characteristics of this IFPU are:

- Decreasing building density compared to more westerly units.
- Valley starts to narrow, thereby increasing wind conditions.
- Infrastructure is primarily residential but also include some industrial (idle sawmill, gravel pits, cement plant, highways shop, and back yard sawmills), church.

Element	Description
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• High, bordering extreme.</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Interface area ecology characterized as dry sub-maritime. Moist sub-maritime as go up in elevation.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Hagensborg weather station provides reasonable indication of fire weather conditions in this IFPU.</li> <li>• &gt;25% of days during fire season are moderate or higher danger class.</li> <li>• See Section 3.2 for more information.</li> </ul>
<b>Fire History</b>	<ul style="list-style-type: none"> <li>• Uphill areas surrounding this IFPU have burned at various historical times as a result of logging activity and lightning strikes.</li> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates primarily moderate to high fire probability within this IFPU, although there are some areas with low probability in deciduous stands along the</li> </ul>

	<p>rivers.</p> <ul style="list-style-type: none"> <li>• High for areas with coniferous forests and especially around the perimeter of the unit.</li> <li>• Moderate is associated with mixed conifer/deciduous stands on the river floodplain.</li> <li>• Main ignition sources are residential fires, back yard campfires, garden debris and grass burning.</li> <li>• Accidental fires from smoking and children playing with matches are also a threat.</li> <li>• There is less recreational use in this IFPU compared to other areas of the valley.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Coniferous forest stands within the unit as well as around the upslope perimeter. Alluvial flats contain a combination of purely deciduous and a mix of coniferous and deciduous stands.</li> <li>• Specifically, the fuels include: mature coniferous second growth, coniferous old growth, mixed deciduous/coniferous second growth, grass and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> </ul>
<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Building density of the western half of unit is predominantly 'mixed' with 10-100 buildings per square km, while the eastern half is primarily 'isolated' at 1-10 buildings per sq km.</li> <li>• For hazard determination, classed as 'rural with continuous forest'.</li> </ul>

#### 4.4.1 Nusatsum IFPU Issues

- Similar to Hagensborg issues.

#### 4.5 Firvale IFPU

This unit extends from the junction of Hammer road and Hwy 20 just east of the Glacier view settlement and extends on both north and south shores of Bella Coola River to Tweedsmuir Park border at Burnt Bridge.

Developments are generally spread out and isolated in this IFPU with the greatest concentration of buildings at the Firvale settlement.

The main characteristics of this IFPU are:

- IFPU is not covered by fire department. Initial fire attack is dependent on local residents with delayed assistance from fire departments in Hagensborg and Bella Coola.
- Decreasing building density compared to more westerly units.
- IFPU includes both sides of Bella Coola River.
- Infrastructure is primarily residential but also include some farm properties.
- Western part of IFPU is narrow compared to eastern part and therefore is expected to have higher velocity winds.



<b>Element</b>	<b>Description</b>
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• Extreme (bordering on high).</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Interface area ecology characterized as dry sub-maritime. Moist sub-maritime as go up in elevation.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Combination of Hagensborg and Talchacko weather stations provides indication of fire weather conditions in this IFPU. Hagensborg station provides good indication of wind conditions while Talchacko station is anticipated to provide more relative moisture conditions.</li> <li>• Hagensborg station indicates that &gt;25% of days during fire season are moderate or higher danger class. However, in combination with the lower precipitation levels indicated by the Talchacko station, the % of days with moderate or higher fire weather conditions is expected to be higher than in the more westerly locations of the valley.</li> <li>• Increasing occurrence of lightning.</li> <li>• See Section 3.2 for more information.</li> </ul>
<b>Fire History</b>	<ul style="list-style-type: none"> <li>• Uphill areas surrounding this IFPU have burned at various historical times as a result of logging activity and lightning strikes.</li> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates primarily moderate to high fire probability within this IFPU, although there are some areas with low probability in deciduous stands along the rivers.</li> <li>• High for areas with coniferous forests and especially around the perimeter of the unit.</li> <li>• Moderate is associated with mixed conifer/deciduous stands on the river floodplain.</li> <li>• Main ignition sources are residential fires, back yard campfires, garden debris and grass burning.</li> <li>• Accidental fires from dropped cigarettes and children playing with matches are also a threat.</li> <li>• There is less recreational use in this IFPU compared to other areas of the valley.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Coniferous forest stands located within the unit as well as around the upslope perimeter. Alluvial flats contain a combination of purely deciduous and a mix of coniferous and deciduous stands.</li> <li>• Specifically, the fuels include: mature coniferous second growth, coniferous old growth, mixed deciduous/coniferous second growth, grass and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> </ul>
<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Building density of the western half of unit is a combination of 'mixed' with 10-100 buildings per square km and 'isolated' at 1-10 buildings per sq km.</li> <li>• For hazard determination, classed as 'rural with continuous/scattered forest'.</li> </ul>

#### 4.5.1 Firvale IFPU Issues

- Fire suppression response time – IFPU located outside the Nusatsum Fire Department zone. Local fire departments are willing to assist with fire, but response time is delayed due to long travel distance.
- Dry and windy part of valley so fire danger is increased.

#### 4.6 *Stuie IFPU*

This unit is located in Tweedsmuir Park and extends along Hwy 20 from the homes located at what is known locally as ‘Steep Roof’ to the Belarko properties, east of Stuie. The area includes the popular Fisheries Pool campground and picnic area. This IFPU is the least developed in the valley but it has some of the highest recreational use. Most infrastructure are located at the Stuie settlement. Except for Tweedsmuir Lodge at Stuie, most developments are private residences.

The main characteristics of this IFPU are:

- Interface zone is private property parcels surrounded by Class A Tweedsmuir Provincial Park.
- Smallest amount of developments compared to other IFPU’s in Bella Coola valley.
- Infrastructure is primarily residential but also include lodge, campsites and telecommunication station.
- IFPU is not covered by fire department. Initial fire attack is dependent on local residents with delayed assistance from fire departments in Hagensborg and Bella Coola.
- Pine trees in the IFPU are under attack by pine bark beetle.

Element	Description
<b>IFPU Hazard Rating</b>	<ul style="list-style-type: none"> <li>• Extreme.</li> </ul>
<b>Forest Ecology</b>	<ul style="list-style-type: none"> <li>• Interface area ecology characterized as dry sub-maritime Coastal Western Hemlock transitioning to Interior Douglas-fir Zone.</li> </ul>
<b>Fire Weather</b>	<ul style="list-style-type: none"> <li>• Combination of Hagensborg and Talchacko weather stations provides indication of fire weather conditions in this IFPU. Hagensborg station provides good indication of wind conditions while Talchacko station is anticipated to provide more relative moisture conditions.</li> <li>• Hagensborg station indicates that &gt;25% of days during fire season are moderate or higher danger class. However, in combination with the lower precipitation levels indicated by the Talchacko station, the % of days with moderate or higher fire weather conditions is expected to be significantly higher than in the more westerly locations of the valley.</li> <li>• Higher occurrence of lightning than in more western part of Bella Coola valley.</li> <li>• See Section 3.2 for more information.</li> </ul>

<b>Fire History</b>	<ul style="list-style-type: none"> <li>• Two large forest fires occurred to the south of this unit in 2004 as a result of lightning strikes.</li> <li>• See Section 3.3 for further information.</li> </ul>
<b>Risk of Wildfire</b>	<ul style="list-style-type: none"> <li>• MOFR Strategic Threat Analysis (STA) indicates a moderate fire probability within this IFPU. This finding is contrary to local beliefs that rank this area as having much higher fire probability.</li> <li>• Main ignition sources are camp fires, garden debris fires, grass burning and lightning.</li> <li>• Accidental fires from dropped cigarettes and children playing with matches are also a threat.</li> <li>• There is high recreational use in this IFPU.</li> </ul>
<b>Forest Fuels</b>	<ul style="list-style-type: none"> <li>• Coniferous forest stands located within the unit as well as around the upslope perimeter. Alluvial flats contain a combination of purely deciduous and a mix of coniferous and deciduous stands.</li> <li>• Specifically, the fuels include: coniferous old growth, mixed deciduous/coniferous second growth, grass and deciduous.</li> <li>• MOF STA indicates that the Head Fire Intensity of the upland coniferous forests is extreme and moderate for the deciduous/conifer mixed stands on the river floodplain.</li> </ul>
<b>Density of Developments</b>	<ul style="list-style-type: none"> <li>• Building density of the western half of unit is a combination of 'mixed' with 10-100 buildings per square km and 'isolated' at 1-10 buildings per sq km.</li> <li>• For hazard determination, classed as 'rural with continuous/scattered forest'.</li> </ul>

#### 4.6.1 Stui IFPU Issues

- Fire suppression response time – IFPU located outside the Nusatsum Fire Department zone. Local fire departments are willing to assist with fire, but response time is delayed due to long travel distance.
- Dry and windy part of valley so fire danger is increased.
- Beetle infested pine trees – dead and dying pine trees are found in the interface zone.

**Recommendation:**  
Remove dead and dying pine trees in vicinity of interface zone.

## 5 Emergency Operations

Residential fire protection is enabled through four volunteer fire departments – Bella Coola, Nuxalk (2 halls), Hagensborg and Nusatsum. The Nuxalk Fire Department is administered by the Nuxalk Nation while the other three are under the authority of the Central Coast Regional District. To coordinate use of limited resources, a mutual aid agreement is in place between the different fire departments.

During the fire season, the MOFR stations an Initial Attack crew in Bella Coola at times of significant fire danger. The MOFR strategy relies on the mobile Initial Attack crews to quickly attack wildfires while they are still relatively small. If initial attack efforts are insufficient, then additional fire fighting capabilities and resources are deployed by the Coast Fire Center in Campbell River.

Additional fire fighting resources are available from the private sector. Some people have fire pumps and hose but rapid deployment of these would be sporadic and undependable.

### 5.1 *Bella Coola Fire Department*

Equipment and resources:

- 2 pumper trucks – 1250 gl and 800 gl
- Portable pump
- 10 man crew ( 4 is main core), goal is to have 12 memebers
- Training – pump training done on a regular basis but need wildfire training.
- Jurisdiction – Bella Coola townsite and wharf.
- Highest risk is at wharf with boat fires posing main threat.

#### **Recommendation:**

Conduct S-100 training of fire crews on an annual basis. Coordinate training with all local fire departments.

### 5.2 *Nuxalk Fire Department*

Nuxalk operate two fire halls – one on the Bella Coola townsite reserve and one at the 4 Mile reserve.

Equipment and resources:

- 2 operational trucks (one additional truck is inoperable at present)
- 500 gl truck at 4 Mile, 860 gl truck at Bella Coola
- Plus one snuffer truck with 300 gl

- Portable pumps
- 12 volunteers on crew
- Some have wildfire training.

### **5.3 Hagensborg Fire Department**

Fire hall located on Hwy 20 by Snootli creek.

Equipment and resources:

- 1 Truck – 1000 gl
- 2 portable pumps – 1 Wajax, 1 Briggs & Stratton
- Crew size =16, 5-6 active
- 5400' hose
- Training – most have experience in wildfire but only 1 has training.
- Good hydrant coverage – although pressure drops significantly near the end of the water lines.
- Some access concerns to isolated properties with small/weak bridges and also narrow, brushed over driveways.

#### **Recommendation:**

Encourage residents to make sure driveways are maintained to allow safe and quick access for fire trucks.

### **5.4 Nusatsum Fire Department**

Nusatsum Fire Hall located in Smith Subdivision.

- 1 Fire truck

### **5.5 MOFR Initial Attack Crew**

During times of significant fire danger, the MOFR stations an Initial Attack crew in Hagensborg. This crew is helicopter ready to for fast initial attack. The crew also has a 'snuffer' truck and conduct routine surveillance of the valley when stationed there.

Equipment and resources:

- 3 Person crews
- 1 Snuffer truck
- 6 Mark 2 Wajax pumps plus hose
- 2 Shindaiwa pumps plus hose

## **5.6 Fire Warden Program**

As part of the MOFR protection program, there are three Fire Wardens in Bella Coola. Their roles are only to act as a contact to the Mid Coast Fire Protection Officer and report on fire weather conditions as well as to keep lookout for fires. They are not responsible to fight fires.

## **5.7 Private Suppression Resources**

A number of people maintain their own pumps and hose for fire suppression purposes. This is especially important for areas where fire department response is limited or delayed, like Stuie, Firvale and Salloompt. The residents in the Salloompt have shown that private response in remote locations is important and effective in preventing spread of fire before they get too large. However, fighting fire is dangerous and should only be attempted by people trained and experienced in forest fire fighting. Furthermore, the status and availability of private resources is unclear and difficult to keep track of and therefore should not be relied on for planning purposes.

### **Recommendation:**

Encourage residents to acquire and maintain their own water delivery systems for initial attack suppression, especially in areas of limited or reduced fire department coverage. Equipment could be stockpiled by neighbourhood (ie Salloompt, Firvale and Stuie) for communal use or individually.

Encourage residents in remote areas to take S-100 fire fighting training.

## 6 Mitigation and Action Plan

The main realistic opportunities to reduce interface wildfire in the Bella Coola valley is through public education to reduce risk of human caused ignitions and to reduce fuel loading in the vicinity of homes and structures. There are also a number of opportunities where complexes of creeks, roads, deciduous stands and grassy areas provide fuel breaks and these can be enhanced by reducing fuel loading in nearby forested areas. Much information on how people can 'Firesmart' their homes and properties is available on the government website:

[www.for.gov.bc.ca/protect/](http://www.for.gov.bc.ca/protect/)

### 6.1 Mitigation Treatments

- People are encouraged to ensure that conifer trees in the vicinity of their homes are pruned to a height of at least 2m. Branches overhanging houses or balconies should also be pruned back.
- The clearing of brush and other woody fuels from at least 10 m from homes and infrastructure is also encouraged.
- There are a number of opportunities to improve existing fire breaks throughout the valley by reducing fire loading and ladder fuels in the forested areas amongst the creek, road, deciduous stands and grass field complexes. The map in Appendix H identifies a number of possible fuel break areas that can be enhanced. These proposed fuel breaks would be designed to stop fires moving from the west.
  - West side of 4 Mile reserve
  - East side of Thorsen Creek
  - Fields near Seventh Day Adventist school
  - Airport to cemetery
  - Nookliklonic Creek
  - Salloompt River and open fields.
  - Nusatsum River
  - Halfway between Nusatsum and Canoe crossing
  - Fields at Hammer road
  - West side of Tweedsmuir Lodge grass field.

Most of these fuel break areas are located on private properties so incentives should be developed to conduct fuel treatments on private lands and/or develop mechanisms for use of public funds on private lands.

- Given the susceptibility of slash fuels to fire, it is imperative that any mitigative treatments involve the removal of slash build up.

## **6.2 Recommendations Summary**

The recommendations for follow up are summarized for convenience:

- 15) Develop public education and information distribution program regarding legal requirements for wildfire mitigation and precaution. Implement this as part of the broader emergency preparedness program.
- 16) Encourage the maintenance and expansion of the Bella Coola Community Wildfire Sub-Committee by providing supporting resources that will enable the group to take the lead role in implementing the CWPP. Ideally, this sub-committee should have representation from the four fire departments, MOFR, Emergency Committee and Fire Wardens plus others interested in this issue.
- 17) Incorporate the need for quick notification and transportation of people and animals in emergency evacuation plans.
- 18) Develop education/information program to raise awareness of means to minimize risk of wildfire ignition and develop a system to inform the population about daily fire danger rating and the associated restrictions on industrial activity and campfires.
- 19) Future plan updates should consider updating the forest inventory in combination with a more detailed assessment of forest fuel classes and condition.
- 20) Encourage highways and residents to work to minimize dry grass fuel loading in roadside ditches.
- 21) Incorporate transportation of farm animals in evacuation plans.
- 22) Ensure burning at the garbage dump is conducted in a safe and careful manner. Preparation of burning plan is encouraged.
- 23) Develop communication mechanism to ensure campsite operators and other campers are aware of fire danger rating and campfire restrictions.
- 24) Remove dead and dying pine trees in vicinity of interface zone.
- 25) Conduct S-100 training of fire crews on an annual basis. Coordinate training with all local fire departments.



- 26) Encourage residents to make sure driveways are maintained to allow safe and quick access for fire trucks.
- 27) Encourage residents to acquire and maintain their own water delivery systems for initial attack suppression, especially in areas of limited or reduced fire department coverage. Equipment could be stockpiled by neighbourhood (ie Salloompt, Firvale and Stuiie) for communal use or individually.
- 28) Encourage residents in remote areas to take S-100 fire fighting training.

## **7 Monitoring and Evaluation**

Forest fuel conditions and communities change over time and so this plan should be reviewed on an annual basis by the local emergency management committee and/or a Community Wildfire Protection Sub-Committee and updated as required. If major developments or changes occur, such as forestry activity significantly changing the fuel loading of the surrounding forest, then the plan may require rewrite.

## **8 Bibliography**

Ministry of Forests, "Bioegeoclimatic Ecosystem Classification Map for Mid Coast Forest District", 1:300,000 scale, April 2003.

Ministry of Forests, "Biodiversity Guidebook", 1995.

Ministry of Forests, "A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region", Land Management Handbook No 28, ISSN -229-1622, 1994.

Fraser Basin Council, "Williams Lake and Area Interface Fire Plan", August, 2005.

Union of BC Municipalities, 'Member Release – Questions & Answer on Wildfire Act/Regulation', May 27, 2005.

## **Appendices**

***Appendix A Overview and Hazard Rating Map***

***Appendix B Satellite Image Map***

***Appendix C Hazard Assessment Forms***

***Appendix D Fire Probability Map***

***Appendix E Land and Forest Cover Map***

***Appendix F Fuel Types Map***

***Appendix G Head Fire Intensity Map***

***Appendix H Fuel Break Zone Map***