UCHUCKLESAHT TRIBE

COMMUNITY WILDFIRE PROTECTION PLAN

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Submitted to:
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Considerations for Wildland Urban Interface Management in the Village of Elhlateese, Green Cove, and Seekah Landing

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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.		

Acknowledgements

We wish to extend our thanks to the Uchucklesaht Tribe Executive, including Chief Councillor Charlie Cootes. Invaluable information and assistance was provided by Chief Administrative Officer Scott Coulson and Director of Lands, Environment and Natural Resource, Monty Horton. Thanks to the First Nations' Emergency Services Society (FNESS) First Nations Liaison Jeff Eustache, Wildfire Management Branch (WMB) Fuel Management Specialist for the Coastal Fire Centre, Derek Lefler RPF, and WMB Geospatial Analyst Melinda McClung for their kind assistance and guidance in the completion of this CWPP.

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Executive Summary

The Uchucklesaht Tribe (also referred to as the Uchucklesaht or UT) is a small First Nations community of 257 citizens, most of which live on Vancouver Island, in and around Port Alberni at the north end of Alberni Inlet. As a result of Bill 45 and the Maa-nulth Final Agreement Act, the Uchucklesaht own approximately 3,000 ha southwest of Port Alberni. Though the 3,000 ha of treaty settlement lands is largely undeveloped, the Village of Elhlateese, associated critical infrastructure, and multiple Uchucklesaht structural assets are all located on this land, with development concentrated along the Uchucklesit Inlet. Thus far, the UT has taken steps towards improving wildfire and emergency planning, including investing in fire suppression equipment and development of emergency community plans. In 2013, the Uchucklesaht Tribe determined that a Community Wildfire Protection Plan (CWPP) for the developed portion of their treaty lands was integral towards guiding future fire mitigation and preparedness strategies and reducing fire risk to the community.

To continue moving forward in reducing risk, the Uchucklesaht retained B.A. Blackwell & Associates Ltd to assess the level of risk to the community, identify measures to mitigate those risks, and outline recomendations and an action plan to implement the mitigation measures. In short, the goal of this plan is to identify the main risk factors related to wildfire and the tools that the community can employ to reduce its risk profile.

Two methods were used to assess risk to the study areas: 1) a geographic information system (GIS) model was used to spatially define risk according to probability of ignition and consequence of wildfire; and 2) the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) system is used to identify larger, relatively homogeneous polygons and rate their threat using the Wildland Urban Interface Wildfire Threat Assessment Worksheets. Both methodologies were based initially on Provincial Strategic Threat Analysis (PSTA) data. In general, wildfire risk in and around the study areas is moderate, although directly adjacent to the developed areas (assets and infrastructure) is generally rated high risk. The outlying portions of the study areas generally represent low fire risk.

Five key areas where changes can be made to address community wildfire risk are identified in this plan: 1) Communication and Education, 2) Community Planning, 3) Structure Protection, 4) Training and Emergency Response, and 5) Fuel Management. Measures are outlined and priortized for each of these areas; the identified measures will reduce the community's risk profile when implemented.

Though wildfires are a relatively infrequent event along the Uchucklesit Inlet, they are still the dominant natural disturbance in the ecosystem and significant-sized wildfires have occurred in recent history. Humans account for over half of total ignitions in the area; reducing ignitions through communication and education is an effective way of safeguarding the community from wildfire. So too, is resident education of measures and methods that can be employed to safeguard individual homes from wildfire. Public education can be a very cost-effective method at reducing the community risk profile.

Houses and infrastructure in the community are generally compliant with FireSmart vegetation recommendations, though are generally not compliant in respects to storage location of

flammable fuels and building standards and materials. Improving flammable fuels storage, maintaining fuel free zones adjacent to structures, and improving building materials to build a more FireSmart community is a long-term strategy that will realize significant risk reduction benefits as the housing inventory changes over time and new development occurs. The Official Community Plan can be used to guide this change; zoning regulations and bylaws can be the vehicles to encourage or require action by community members.

Critical infrastructure, particularly water supply, must continue to operate and be adequately protected during an interface fire. Most critical infrastructure buildings are FireSmart and are adequately setback from forested edges. Small additional changes recommended in this report will help improve the likelihood of these structures surviving a wildfire and their continued operation in the event of power outages.

Fire suppression in Elhlateese is a challenge. Major challenges include: lack of centralized fire fighting department, lack of training, equipment limitations, challenging evacuation situations and outdated emergency planning. As there is no official fire department, the need for community members to actively reduce risk on their own properties, receive sufficient fire suppression training, and realize responsibility for fire suppression efforts is underscored.

Vegetation management will also reduce the community's risk profile. Areas that should be reviewed for treatment or other measures have been identified in the final section of this report. Due to the jurisdiction of the land (privately held by the Uchucklesaht Tribe), there is currently no opportunity for public funding to undertake vegetation management activities. Polygons for fuel treatment consideration are prioritized with current funding limitations in mind. There are polygons identified which can be treated very cost effectively due to small size and relative amount of work required to reduce fuel hazard. In other areas, implementation of fuel treatment activities may not be possible without combining fuel management activities with merchantable harvest of timber to offset fuel management costs and reduce hazardous fuels.

In total, 35 recommendations are made to the Uchucklesaht Tribe. Those rated with the highest priority are found below under Key Recommendations. It is recognized that the Uchucklesaht Tribe has limited resources. Although the recommendations have been prioritized, most remain a high priority. Given the reality that not all recommendations will be acted upon, the Uchucklesaht should review the recommendations and address the ones upon which their resources permit them to act. To address the remaining recommendations, the Uchucklesaht should put together a plan that identifies the resources required and develop a timeline for implementation.

Selected Key Recommendations

Item #	Communication and Education
1	Digital mail outs of FireSmart and CWPP information to residents in the Village.
2	1) Encourage elementary and secondary school educators to develop a lesson plan on FireSmart and Wildfire for use at the District Level. 2) Encourage the Ministry of Education to develop material for elementary and high schools. 3) Work with Port Alberni and District 70 (Alberni) to include FireSmart materials in their annual curriculum.
3	1) Upgrade the website and use other media outlets to provide current and locally relevant wildfire related information such as Danger Class and FireSmart information. 2) Post information from the CWPP on the website showing areas with hazardous fuel complexes. 3) Start official Uchucklesaht Tribe Facebook page to disseminate information regarding public safety, fire danger, upcoming FireSmart events, etc.
4	1) Invite WMB Staff and Thunderbirds Unit Crew to community events to provide expert opinion and information on FireSmart. 3) Provide FireSmart stock material at all community events.
5	1) Seek to develop and distribute targeted WUI fire prevention materials at the Village, Uchucklesaht Tribe office, and on the website. 2) Erect signage regarding fire danger and campfire etiquette/ rules at most populous camping area on Henderson Lake.
6	1) Inform homeowners of what constitutes hazardous fuels near to their home. 2) Request that residents address hazardous fuels prior to the fire season. 3) Conduct structural hazard assessments and relay the results to the homeowner/ resident.
7	1) Appoint an Informations Officer to monitor WMB website and liaise with WMB staff. 2) Provide daily updates for website and Facebook updates and internal circulation.
Item #	**Planning**
9	Draft wildfire regulations: 1) Regulations should be developed to ensure that home owners are required to abate high fire hazards surrounding their homes. 2) Regulations should be developed to limit size, location, and timing of burning activities in the village and across treaty lands.
11	Ensure that all newly created burning bylaws, and regulations on activities such as campfire bans, industrial closures, fire tool requirements, and prevention activities are consistent with provincial regulations and bans, as set by the Coastal Fire Centre.
Item #	**Critical Infrastructure**
13	Purchase mobile generators for use at the water treatment plant/ water reservoir and communication site (internet) in the case of power failure.
15	1) Implement vegetation management in P1 and P2 Zones (0 - 30 m). 2) Maintain communication with BC Hydro to ensure that fuels adjacent to the generating station and in the power line right of way are maintained at a fuel free and low level, respectively. 3) Monitor vegetation re-growth at regular intervals and perform vegetation management maintenance, as necessary.

Item #	Residential Infrastructure
17	Uchucklesaht Tribe to facilitate a program to help residents dispose of hazardous vegetation removed from around their home. Provide a chipping program, organize community work days, or provide direction or bylaws on safe burning practices.
19	Encourage residents to conduct FireSmart treatments on their own properties. Removal of vegetation in P1 zones and maintain P2 zone with low flammability vegetation. Clean vegetation and litter from roofs.
20	1) Encourage homeowners to move woodpiles and other combustibles 10 m from home during fire season. 2) Facilitate program where community members help other, less mobile community members move and/or eliminate flammable material within 5 m of their residence.
22	1) The Uchucklesaht Tribe should update the Elhlateese mapping to account for changes in residences and new infrastructure built. Mapping should be updated every five years or after new development. 2) Include up to date mapping in the updated Community Emergency Plan.
Item #	**Training and Emergency Response**
24	Establish volunteer fire department to respond to fires (structural or wildland) in the direct vicinity of Elhlateese, Green Cove, or Seekah Landing.
25	Partner with WMB and the Thunderbirds Unit Crew to provide annual S100 training and basic fire fighting training to Village residents and Uchucklesaht staff.
28	1) Purchase backup generator for use at the water reservoir in the case of power outage. 2) Identify alternate water sources and construct suitable access to them in case of low reservoir levels and/ or inability to re-fill reservoir.
29	1) Purchase basic structural protection sprinkler system to provide interface protection of approximately 250 - 300 m. 2) Cross train with Thunderbirds Unit Crew/ Fire Zone Base staff on sprinkler deployment.
30	1) Review and update Community Emergency Plan, including emergency communication framework. 2) Review Community Emergency Plan with WMB and PEP to improve interagency cooperation. 3) Communicate plan to Village residents, Uchucklesaht staff, WMB, and community partners who are identified as resources.
Item #	**Fuel Management**
31	Explore opportunities for funding treatments. Options include working with FNESS towards possible future funding for works on treaty lands, exploring future funding opportunities with Aboriginal Affairs and Northern Development Canada (AANDC), and working with Uchucklesaht managing forester and logging contractors to offset the cost of fuel treatments with simultaneous commercial harvesting opportunities. Smaller areas can be completed with social work bees or other community events.
33	Burn slash piles as soon as possible after the fire season. Piles that are located under the canopy will need to be moved into the open or the surrounding canopy cleared prior to burning. Burning of household materials may emit hazardous air pollutants and contribute to potential health problems. It is recommended that pile(s) with household material be shipped to a landfill, rather than be burned.
34	Maintain power line ROW in low hazard fuel state. Maintenance costs, if done regularly before fuel accumulations grow, should be relatively low. Mechanically brush sapling conifers, drag surface fuels and slash to roadside and burn material outside fire season when fire danger is low. Monitor danger trees along power line and remove as required. Work with BC Hydro where relevant to share cost and workload.

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1.0 INTRODUCTION

In 2013, B.A. Blackwell and Associates Ltd was retained to assist the Uchucklesaht Tribe in developing a Community Wildfire Protection Plan (CWPP). 'FireSmart – Protecting Your Community from Wildfire' (Partners in Protection 2004) was used to guide the protection planning process. Within the Uchucklesaht's treaty lands and near to Uchucklesaht assets, the assessment considered important elements of community wildfire protection that included communication and education, structure protection, training, emergency response, and vegetation management.

The 2003 and 2009 fire seasons caused hardships throughout the Province and resulted in social, economic and environmental losses. These losses emphasize the need for greater consideration and due diligence in regard to fire risk in the wildland urban interface (WUI). In considering the wildfire risk in the WUI, it is important to understand the unique risk profile of a given community. While there are common themes that contribute to the risk profile of communities across British Columbia (BC), each community has unique aspects that require consideration during the CWPP process. Understanding the factors is important in developing a comprehensive plan to reduce the wildfire risk profile of the community. The 2011 fire in Slave Lake, Alberta has demonstrated that the consequences of a wildland urban interface fire can be very significant in communities and that proper consideration and preplanning is vital to reducing the impacts of wildfire.

The CWPP will provide the Uchucklesaht Tribe with a framework that can be used to identify methods and guide future actions to mitigate fire risk. The information contained in this report will help guide the development of emergency plans, emergency response, communication and education programs, community planning, and the management of forestlands adjacent to the community.

In more detail, the plan will provide the community with:

- A description of the community in relation to wildfire.
- Maps of fuel types and recommended areas for fuel treatments.
- Recommendations to mitigate the identified risk in five areas: community education, community planning measures, structure protection, emergency response and training, and fuel management.

2.0 COMMUNITY WILDFIRE PROTECTION PLANNING PROCESS

This CWPP document will review the background information related to three study areas on the Uchucklesit Inlet: three areas with significant Uchucklesaht Tribe structural and infrastructural assets. The CWPP development consists of six general phases:

- Background research - general community characteristics, such as demographic and economic profiles, critical infrastructure, environmental and cultural values, fire weather, fire history, relevent legislation and land jurisdiction.

- Field work - site visits to the area allow for 1) meetings with Uchucklesaht staff, community members, and other stakeholders; 2) fuel typing; 3) ground truthing of background research; 4) completing hazard assessment forms, and 5) identification of site specific issues.
- GIS analysis - digital fuel typing and mapping of probability and consequence of fire, and community wildfire risk.
- Report and map development - identification of community challenges and successes, identification of measures to mitigate risks, and recommendations for action.
- Report review - by Uchucklesaht staff and council, First Nations Emergency Services Society (FNESS), and Wildfire Management Branch (WMB).

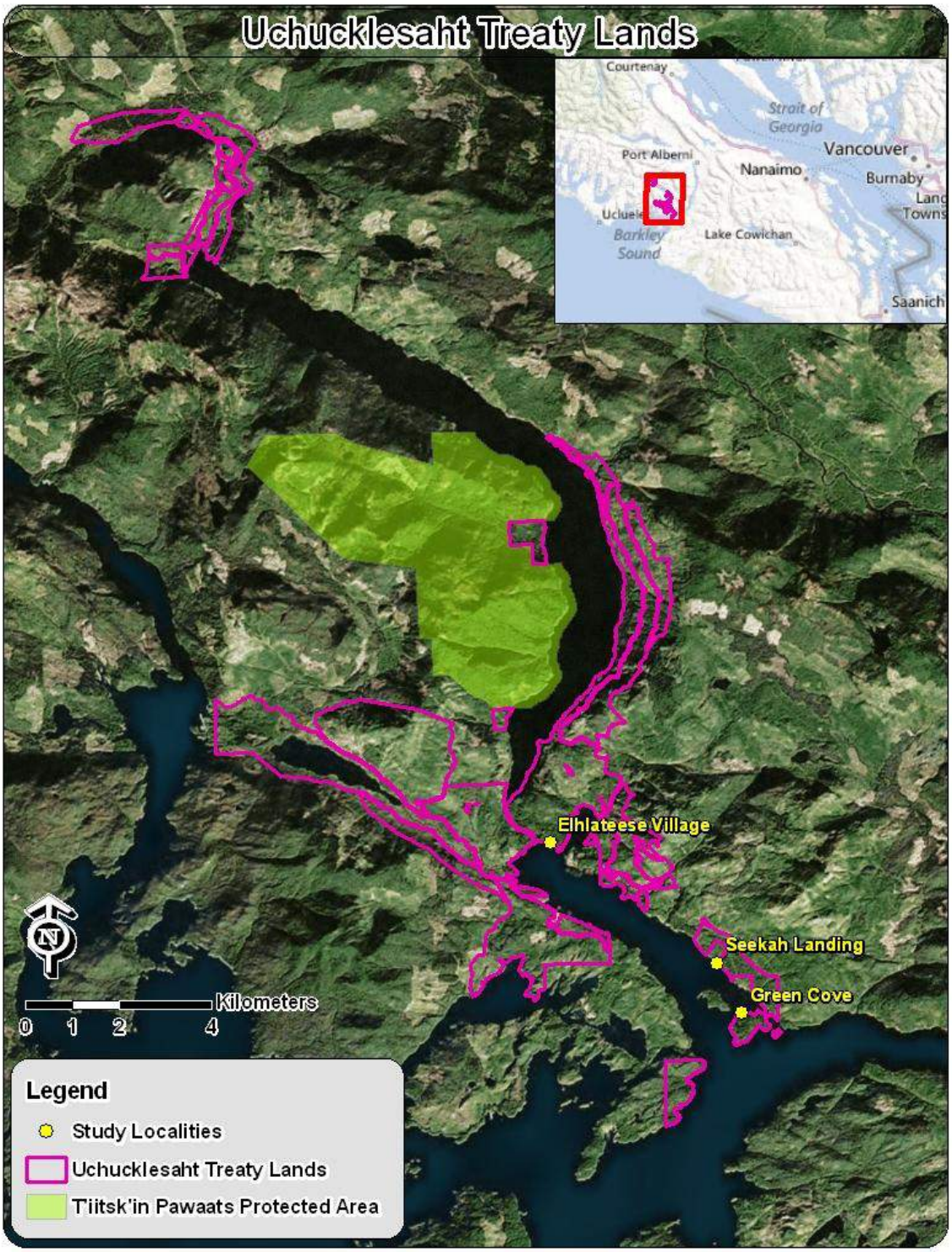
3.0 Uchucklesaht Treaty Lands Profile

In 2007, the Uchucklesaht Tribe (hereinafter referred to as the Uchucklesaht or UT), as part of the Maa-nulth First Nations, voted in favour of the Maa-nulth Final Agreement Act (Bill 45) under the British Columbia Treaty Process. This treaty gave the Maa-Nulth defined treaty rights, including designating Maa-Nulth First Nations treaty settlement lands. Due to the Final Agreement, the Uchucklesaht Tribe now controls approximately 3,067 ha of treaty lands located in their traditional territory on the Uchucklesit Inlet, Snug Basin and Useless Inlet; Henderson Lake; and Uchuck Lake (Map 1).

Each Maa-nulth First Nation, of which there are five, owns their treaty settlement lands in fee simple. This means that the jurisdiction on the approximately 3,100 ha of Uchucklesaht treaty land is privately owned and exclusively managed by the Uchucklesaht. Furthermore, the Uchucklesaht own the forest and range resources on the treaty lands and similarly may make laws in respect of forest practices and land usage on those lands. Laws regarding forest and range practices on treaty lands must meet or exceed standards set by federal and provincial laws; provincial and federal laws would prevail in the event of a conflict between Uchucklesaht law and federal and/or provincial law[1]

The majority of the Uchucklesaht treaty lands are isolated with no development or Uchucklesaht assets and are therefore not considered as part of the WUI. For this reason the isolated areas are not included in this plan's analyses; the study areas are limited to three WUI areas within the greater treaty lands. The entirety of the treaty lands areas have significant cultural, ecological, spiritual, and economic value associated with them, which should not be considered diminished by this fact. Not included in Uchucklesaht treaty lands, but also identified as an area of high cultural and spiritual value, is the land now set aside as the Thunderbird's Nest (T'iitsk'in Pawaats) Protected area (Map 1).

[1] Bill 45 - 2007: Maa-nulth First Nations Final Agreement Act. http://www.leg.bc.ca/38th3rd/3rd_read/gov45/gov45-3.htm?toc=0. Accessed 16 July 2013.



Map 1. Map of Uchucklesaht Tribe treaty lands, as set out in the Maa-Nulth Final Agreement Act.

3.1 Study Areas

Three WUI study areas were identified from the treaty areas and were based on development location, key infrastructure, and Uchucklesaht assets: Elhlateese Village, Seekah Landing, and Green Cove. Each area of development was buffered based on PSTA spotting distance data, geographical and topographical features.

The village of Elhlateese (hereinafter referred to as Elhlateese or the Village) is located on the Uchucklesit Inlet and Snug Basin. The developed Village area is the approximately 15 ha of the study area that is closest to the inlet, west of Snug Basin, and east of the Henderson River (Figure 1). The entire Elhlateese study area encompasses the developed village and a 1.3 - 2 km buffer (Map 2). Elhlateese is comprised of 14 residential buildings in the community; 13 single family houses and 1 six-plex residential unit. One additional residence stood until December of 2012 when it was destroyed in a fire. There are 9 additional structures, ranging from critical infrastructure, such as community water and power supply, to outbuildings. The total study area is 806 ha.

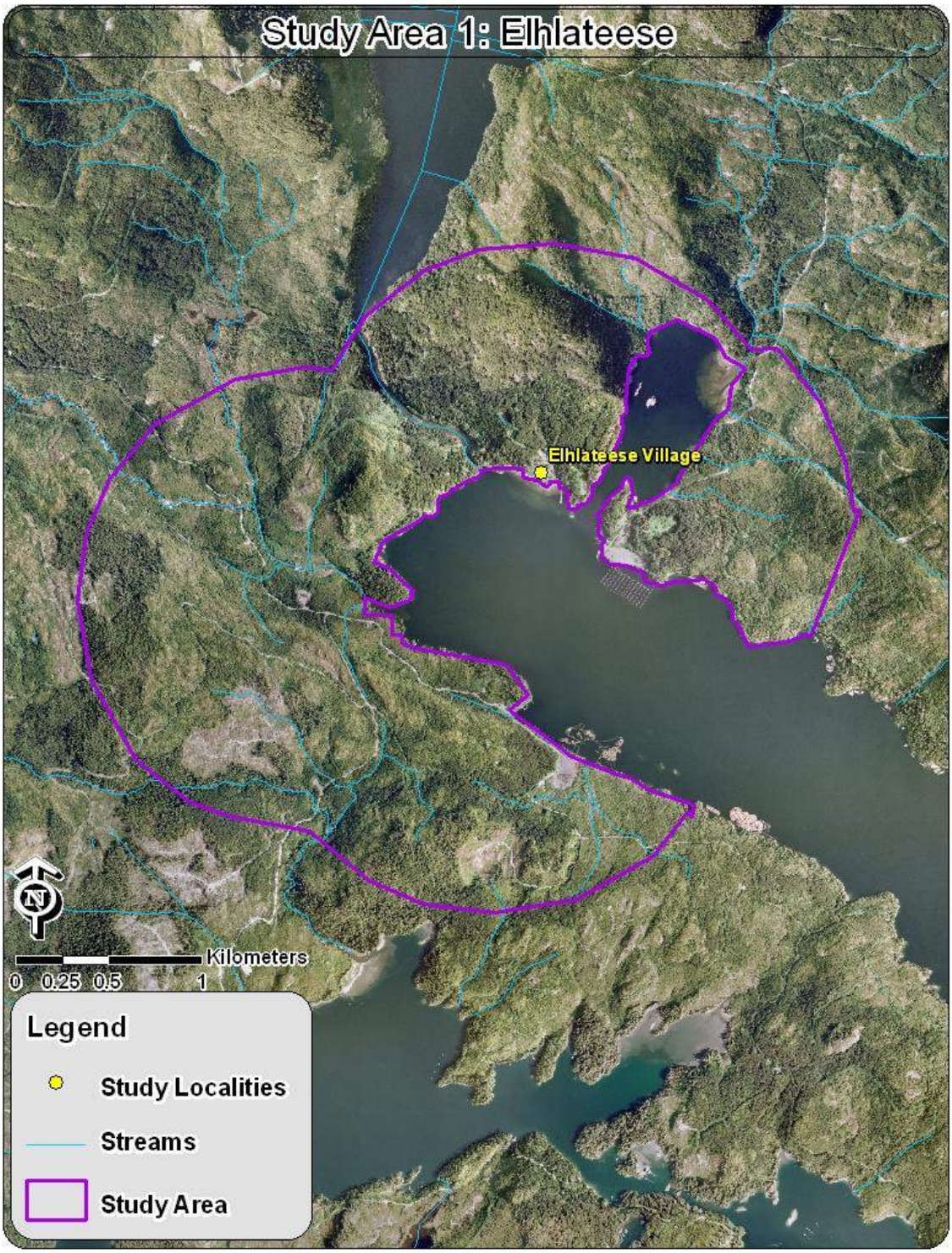
Figure 1. Overview of Elhlateese study area.

The Seekah Landing cabin is located on the eastern shores of the Uchucklesit Inlet, midway between Elhlateese and Green Cove (Map 3). Uchucklesaht assets in the study area are limited to the dock and one cabin (Figure 2). There are numerous adjacent privately-owned non-Uchucklesaht cabins along the water, both illegally located on Uchucklesaht treaty lands and on legal private lots. The study area includes an approximately 500 m buffer from the cabin and dock area and incorporates both private and treaty lands. The Seekah Landing study area is 55 ha in size.

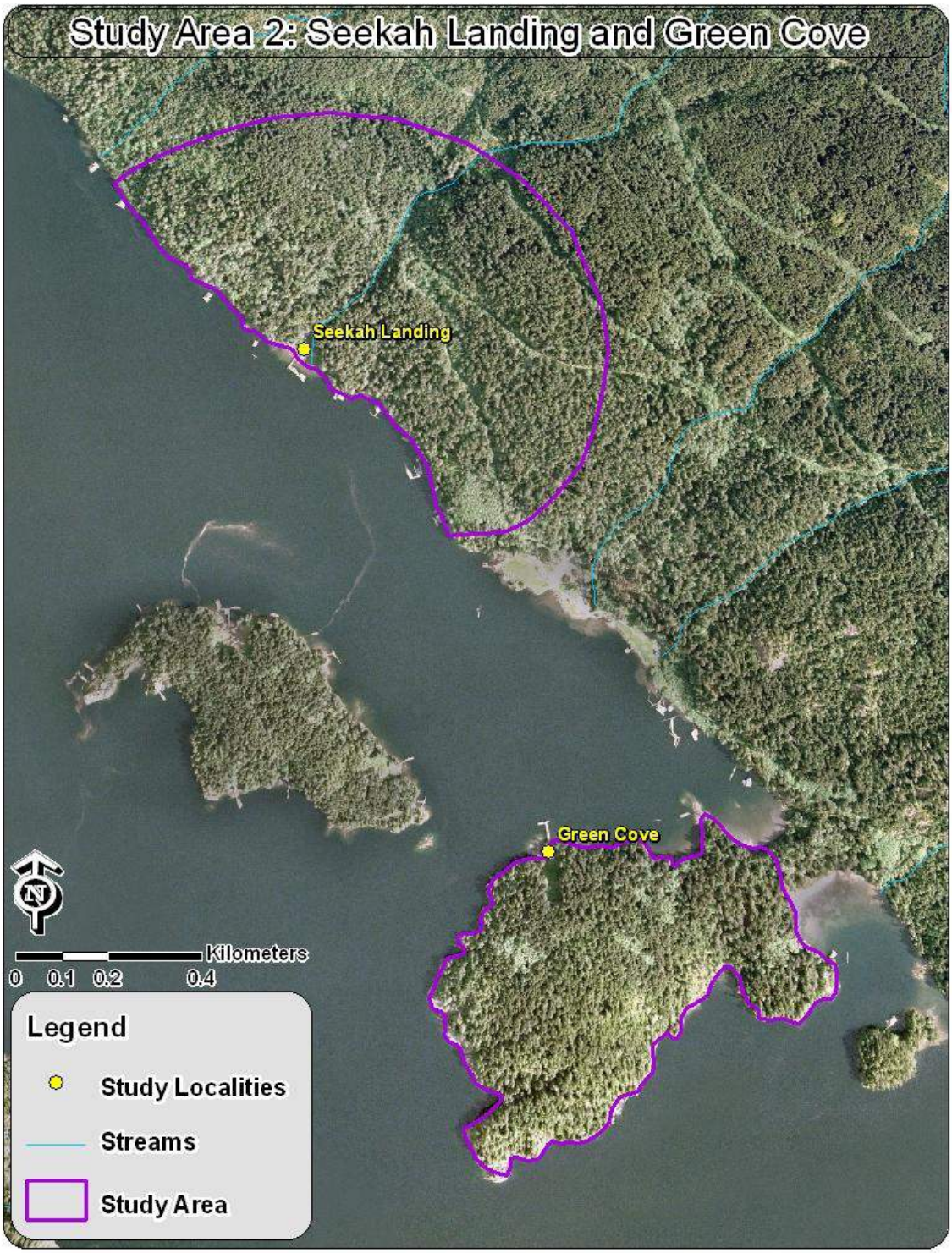
Figure 2. Seekah Landing dock and study area.

Figure 3. Green Cove gas station and dock in the right foreground and Green Cove store in the center background.

The Green Cove study area is located south of Elhlateese where the Uchucklesit and Alberni Inlets meet (Map 3). It is located on an isthmus and is comprised of the Green Cove Store, marine (dockside) gas station, an outbuilding, and the dock (Figure 3). There are no residences in the Green Cove study area. The Green Cove study area includes the entire isthmus and covers approximately 36 ha.



Map 2. Map of Elhlateese Village study area.



Map 3. Study areas of Seekah Landing and Green Cove.

3.2 Population and Settlement

The Uchucklesaht Tribe has 257 citizens, between 10 and 15[2] of which live in Elhlateese. The other 238 live away from the village in Port Alberni and other urban centres.

The economic and employment opportunities in the village are available almost exclusively through the Uchucklesaht Tribe and include jobs in fisheries, maintenance, and transportation (Low-Rider).

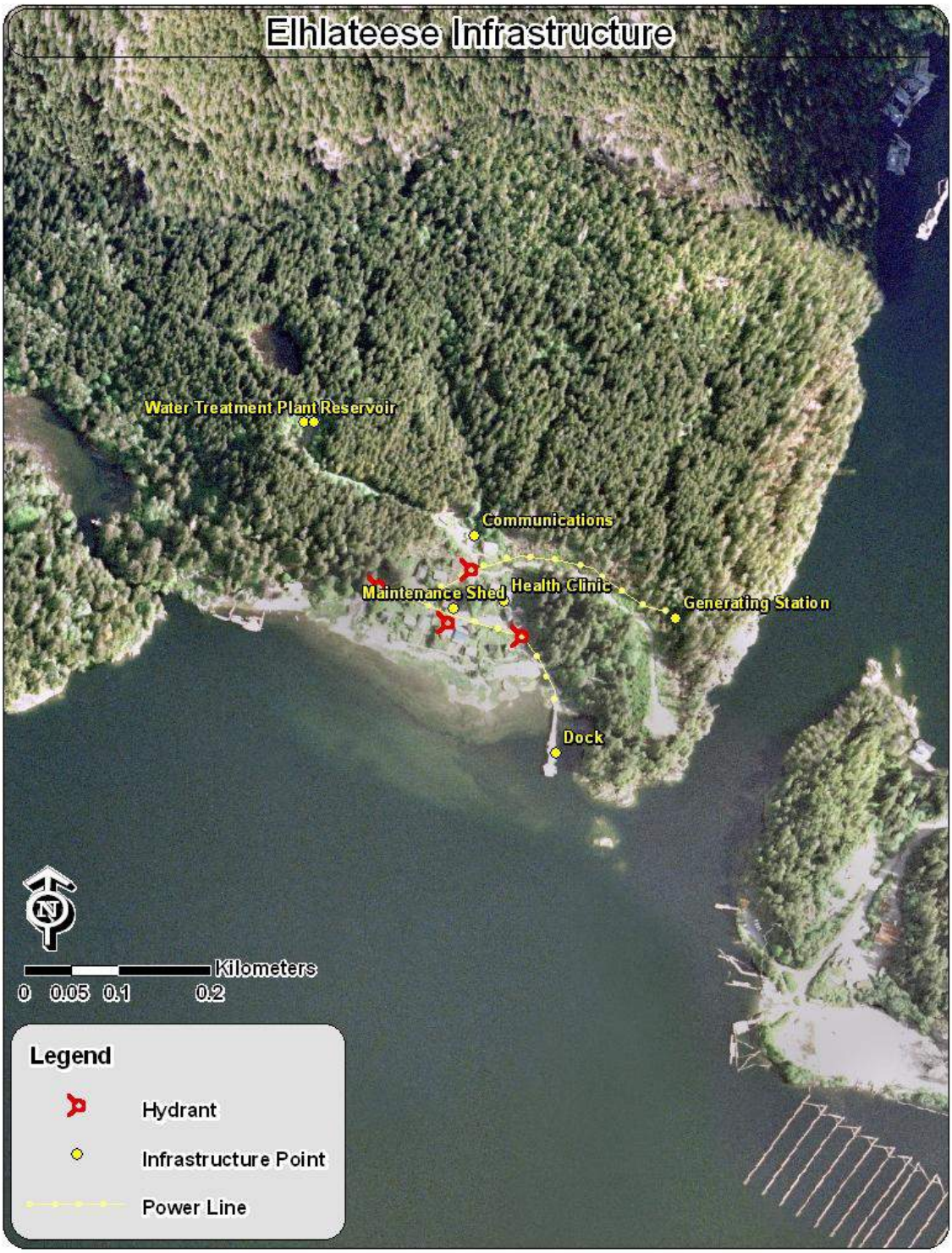
3.3 Infrastructure

Protection of infrastructure during a wildfire event is important to ensure that emergency response is as effective as possible, coordinated evacuation can occur if necessary, and essential services to the village can be maintained and or restored quickly in the case of wildfire or other emergency. Key infrastructure is located in Elhlateese and serves those that reside there. Other critical infrastructure not located in the village, such as the gas station and generator in Green Cove, may also provide the Village and emergency response units with important services in the case of an emergency. Key infrastructure that may be involved during emergency response to a wildfire is summarized in Table 1, Map 4 and Map 5.

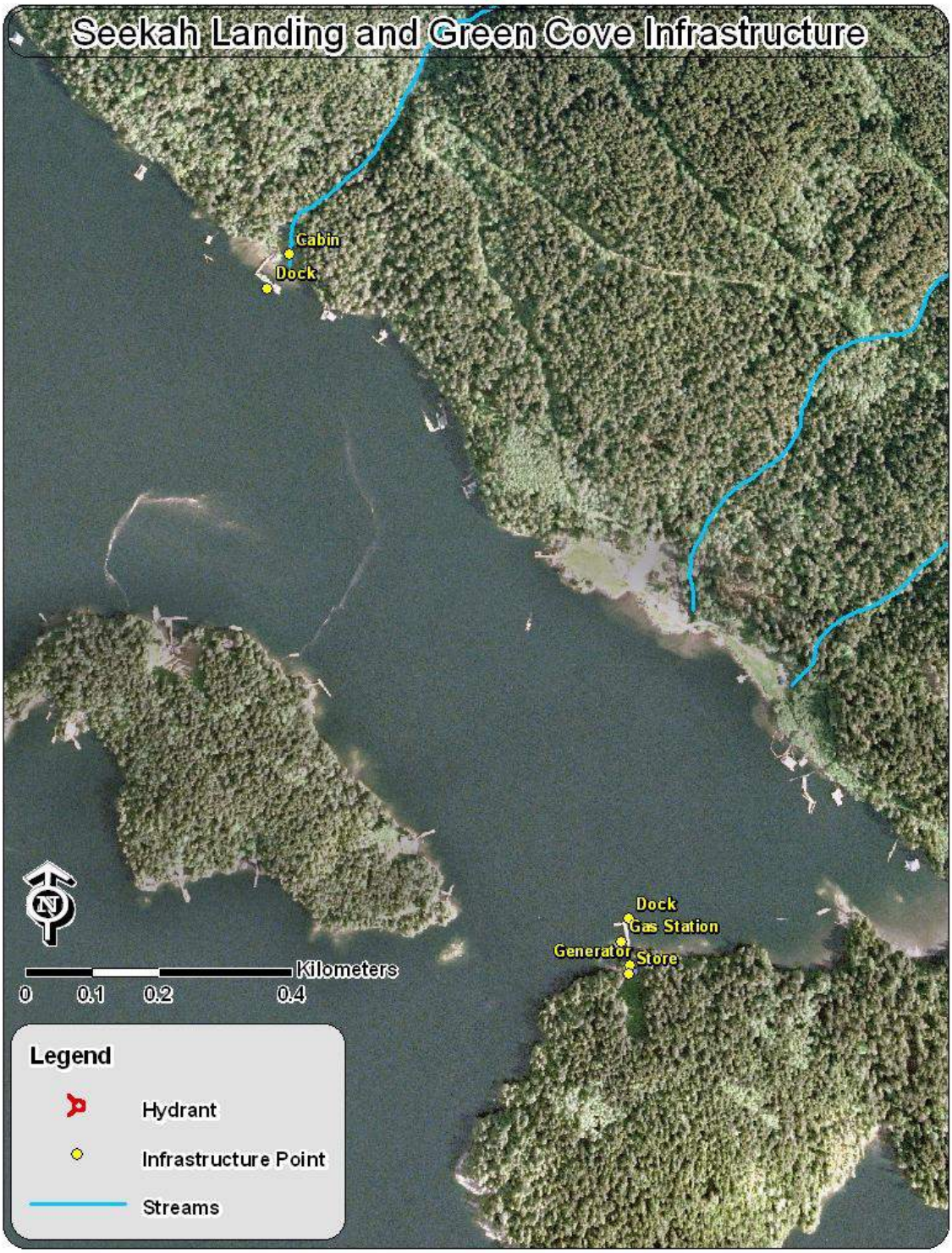
Table 1. Key infrastructure in the three study areas: Elhlateese Village, Green Cove, and Seekah Landing.

Facility	Study Area
Generating Station	Elhlateese
Water Treatment Plant	Elhlateese
Water Reservoir	Elhlateese
Health Clinic	Elhlateese
Internet/ Satellite Dish	Elhlateese
Dock	Elhlateese
Hydrants	Elhlateese
Maintenance Building	Elhlateese
Store	Green Cove
Generator	Green Cove
Dock	Green Cove
Gas Station	Green Cove
Dock	Seekah Landing
Cabin	Seekah Landing

[2] Horton, Monty. Personal communication. 24 July, 2013.



Map 4. Critical infrastructure in Elhlateese Village.



Map 5. Critical infrastructure and assets in Green Cove and Seekah Landing.

3.3.1 Electrical Infrastructure

Figure 4. Transmission electrical infrastructure and right of way.

Power lines – BC Hydro distribution lines run from the diesel generator to the village centre, supplying residences and other structures with electrical power. The pole infrastructure consists of wooden poles and the location of the lines is adjacent to coniferous forests, deciduous fuel complexes and through the developed village. The right of way under the power lines is a mostly low to moderat hazard fuels. The wooden poles are vulnerable in the case of a wildfire, though lightning strikes along the line are not a major concern. Trees falling onto live power lines are the biggest ignition concern and threat to the power line infrastructure.

Figure 5. BC Hydro diesel generator.

Generating station – Two BC Hydro 100 kilowatt diesel generators are located east of the village centre on Ha'wiih Road. The generating station was installed as part of the Remote Community Electrification Program; a program established by BC Hydro to offer electric utility service to remote communities[3]. The power system includes a diesel tank, 2 diesel generators, and a battery bank, which allows generators to be turned off during low load times to reduce diesel consumption, emissions, and noise. The diesel generator runs intermittently in order to charge the batteries which supply power to the village. A diesel truck is barged in to re-supply the tank approximately every two weeks. The area surrounding the generator station is cleared of vegetation for more than 40 m and has low vulnerability to wildfire.

The program also included an upgrade of the road access to the generating station and home wiring upgrades where needed. The generating station is accessible from two directions.

3.3.2 Communications Infrastructure

A satellite link provides the village with internet and voice over internet protocol (VOIP) phone service. Internet is the only reliable source of communication from the village to the Uchucklesaht offices, Port Alberni, and elsewhere. The satellite service also functions as the BC Hydro's method of monitoring and remotely controlling the generating station.

Figure 6. Monte Cristo Mountain Communications Tower

[3] http://www.bchydro.com/community/aboriginal_relations/key_initiatives/reliability.html. Accessed 30 May 2013.

The site is powered by a wooden pole distribution line, similar to the other infrastructure in the village. Vegetation is cleared to the north, west, and south for more than 40 m. Woody deciduous shrubs to the east impinge on the protective fencing and create some vulnerability of the site to wildfire.

3.3.3 Water Infrastructure

Water Supply Infrastructure - The new village water infrastructure is located north and at a considerably higher elevation than the village centre, up Hochuklisaht-h Road. The water infrastructure was still under construction, though close to completion, at the time of the field visit. The infrastructure consists of a water treatment (chlorination) system and reservoir. The reservoir is filled by water pumped up from two wells, both of which draw from water supply 9' below sea level. The pumps are powered by the BC Hydro generating station. The reservoir's capacity is 150,000 L in the reservoir with another 7,000 L available in the lines between the reservoir and town, the total of which is approximately 10 days of village water supply at regular usage levels. The village is supplied water from the reservoir by gravity feed. This includes the village fire hydrants, which are supplied through the same gravity-fed system.

Figure 7. Water treatment building and reservoir.

In the event of power failure, a mobile generator can be connected to the system. The mobile generator would be used to energize the pump to resupply the reservoir and to run the water treatment system. The structures associated with the water infrastructure are built out of fire resistant materials and vegetation within 40 m has been cleared.

The water supply has access from two directions, an older steep road straight up from the village and a lower gradient road that loops past the power generating station. Though the water infrastructure has limited vulnerability to wildfire, a power outage during a wildfire event could jeopardize the water supply to the village, hindering suppression efforts and jeopardizing the village's drinking water supply.

The previous water system was threatened during the 2012 house fire; the power to the water supply was cut and no back-up generator was in place, which limited water supply for suppression efforts. Fortunately, there was a contractor in the village who had the knowledge and permissions from BC Hydro to rig a power bypass, this event demonstrated the risk of fire to the village, as well as the limitations of the water and power supply systems (Morrow 2013).

Fire suppression efforts can be augmented with natural water supply sourced from Uchucklesit Inlet and from a pond uphill and to the north of the water supply infrastructure. Both natural

water sources have relatively good access, though require a pump to extract water. Neither sources are a source of safe drinking water (Map 20).

Figure 8. Emergency mobile generator hook-up in case of power outage at generating station.

Figure 9. Water treatment building.

3.3.4 Transportation Infrastructure

Access to and from the three study areas (Elhlateese, Green Cove, and Seekah Landing) is very limited due to their isolation. Community egress methods from Elhlateese should be a primary concern for the Uchucklesaht Tribe. Access to the Village is exclusively by boat or floatplane. The boat trip is approximately 60 minutes from Port Alberni in calm seas and considerably longer in rough water conditions (Map 6). There is no regular floatplane service to the study areas; floatplane access is by charter only. Charter floatplane rides range from $6 - $9 per mile.

The Uchucklesaht Tribe own and operate four boats: the Low-Rider, UTG 1, UTG 2, and UTG 3 (Figure 10). The four boats have a total capacity of approximately 27 adult passengers. The Low-Rider, which operates as a daily shuttle and school bus between Elhlateese and Port Alberni, has the largest capacity and can hold 12 passengers, plus the driver. All four boats are kept in Elhlateese during the summer fire season.

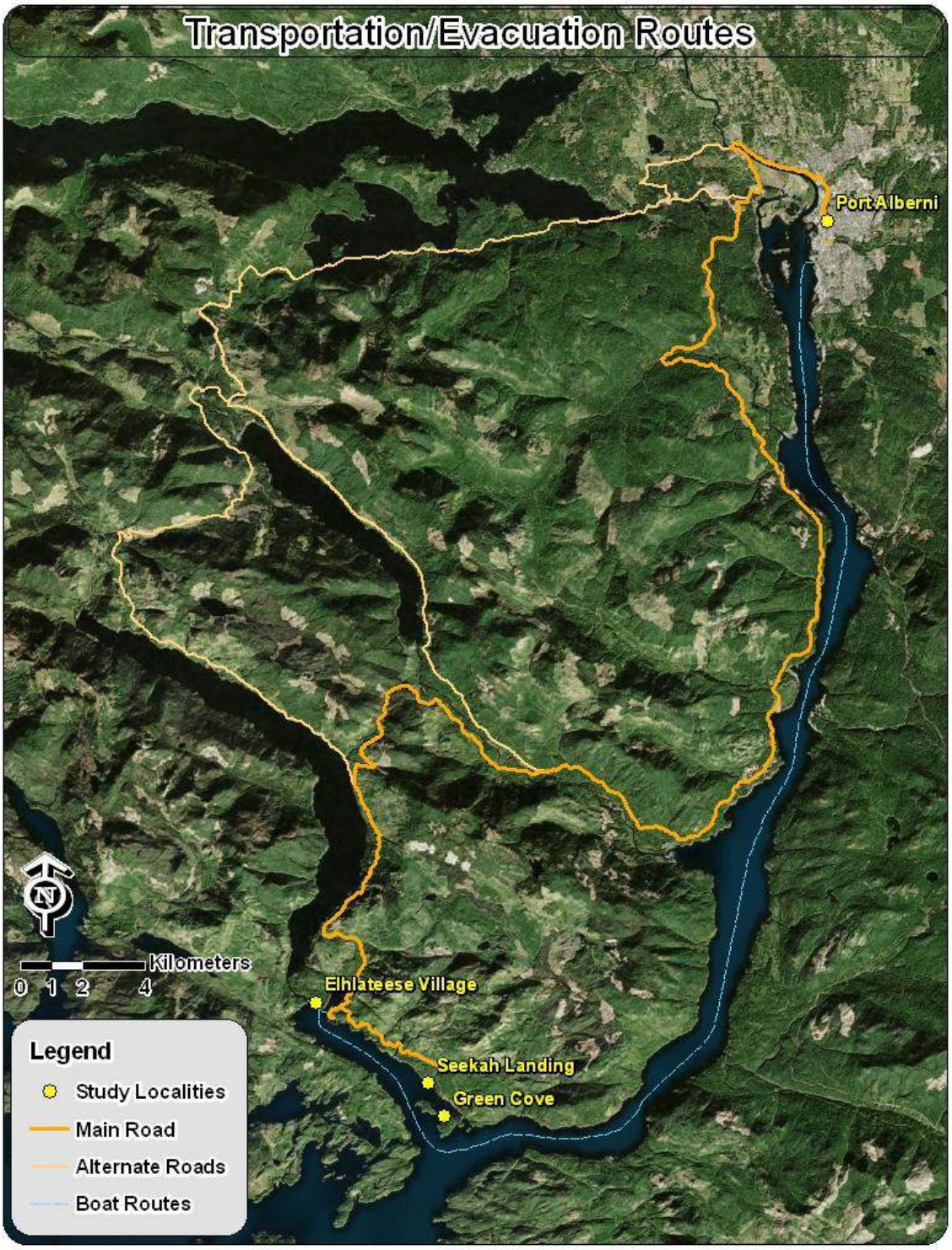
Figure 10. UTG 1 docked in Port Alberni (left). UTG 2 docked in Elhlateese.

Alternative access is by 4WD vehicle via a network of logging mainline roads (Map 6). Driving access is approximately 2 hours and ends at Snug Sort, which is a 500 m boat shuttle away from Elhlateese. Driving access to the Seekah Cabin is available and is approximately 2 ½ - 3 hours from Port Alberni along the same network of logging roads. In times of inclement weather, the shuttle boat/ road access combination becomes the only route of access and egress.

Figure 11. Photo taken from Elhlateese towards the closest car-accessible point, which is about five minutes' boat shuttle from the village.

Once in the village, there is a network of roads running through town providing access to residences, the generating station, the water treatment plant and reservoir, and upriver towards Henderson Lake. Transportation in and around the village is by car, foot or bike for residents and the Uchucklesaht Tribe has an ATV for maintenance and travel.

Additional access to the north side of the Elhlateese study area is available via a new logging road to Henderson Lake. Though the road is rough, it is assured to increase traffic of non-community members into the study area. Increased use of the area has been observed, as campers and recreationalists look to enjoy the Henderson Lake and Henderson River area. This new road will increase traffic and fire ignition risk to the area, but will not improve community access or egress, as the road does not connect to Elhlateese.



Map 6. Available transportation routes from Port Alberni to Elhlateese Village, Seekah Landing, and Green Cove.

3.4 Environmental Values

3.4.1 Species at Risk Values

The Conservation Data Centre (CDC), 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. To identify species and ecosystems at risk in the study area, the CDC database was referenced. No species at risk within the study areas were identified by the CDC.

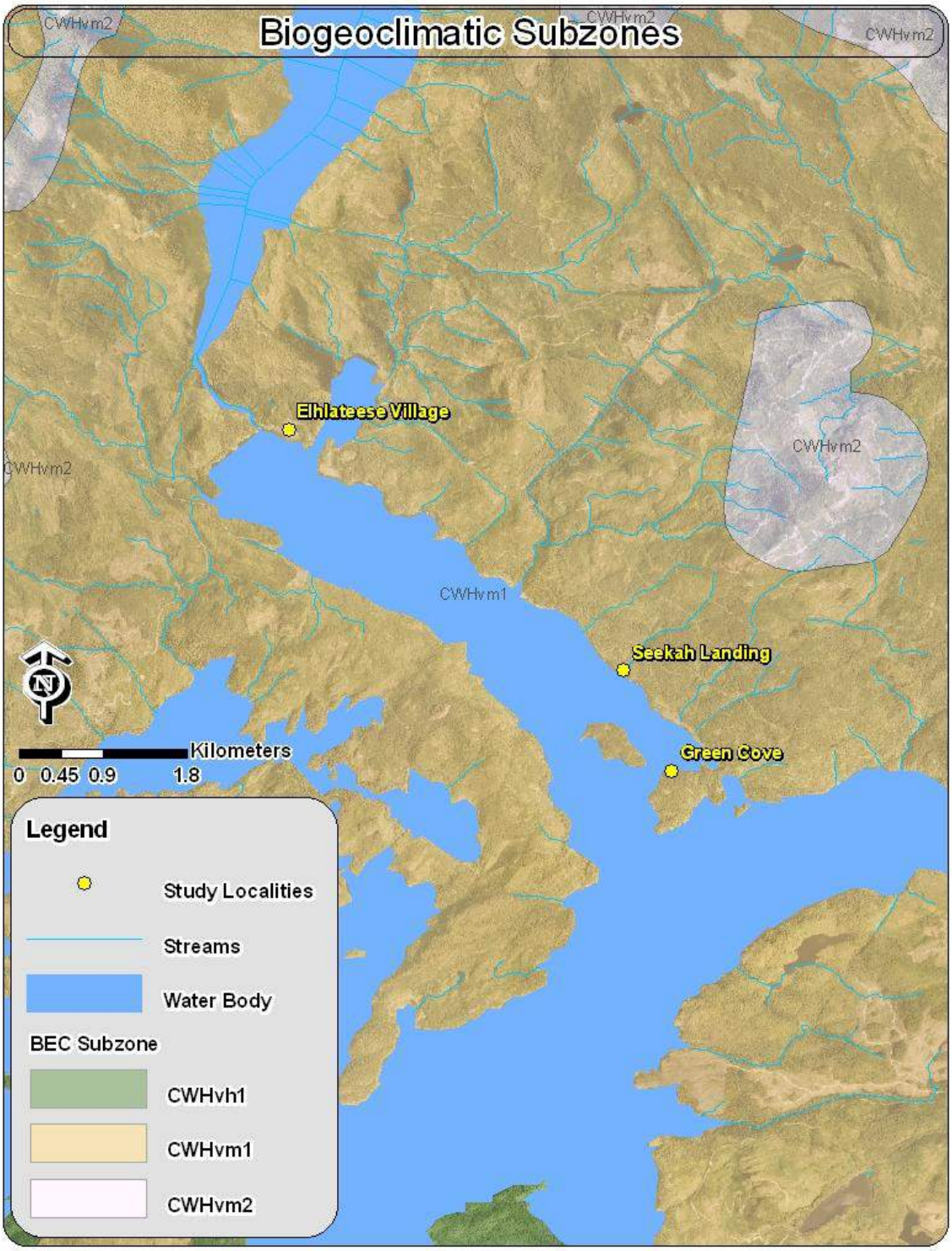
The Uchucklesit Inlet and the inflowing streams and rivers, as well as Henderson Lake to the north, are rich with aquatic and riparian habitats. Fish bearing streams serve as habitat and spawning ground for various species of salmonids. Though there are no identified and mapped locations of species at risk within the study areas, the study area ecosystem is rich with ideal habitat for a variety of species at risk such as northern goshawk, wandering salamander, Townsend's big-eared bat, Keen's myotis, northern red-legged frog, and dwarf trillium, to name just a few.

Fuel treatments that occur should consider the presence of, and the impact on, all potentially affected species. Additionally, fuel treatment prescriptions should identify any relevant masked (sensitive occurrences) species that may be occurring and manage the fuel treatments accordingly to mitigate the impact of fuel treatments on species at risk.

3.4.2 Biogeoclimatic Units

The Biogeoclimatic Ecosystem Classification (BEC) system describes zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. The entirety of all three study areas are within the Coastal Western Hemlock submontane very wet maritime (CWHvm1) subzone. This subzone lies between sea level and 400 m elevation and has a wet, humid and mild maritime climate with a long growing season. Very little precipitation falls as snow.

There are small areas within the treaty settlement lands, yet outside the study areas, which are classified as within the CWHvm2 BEC subzone. This subzone is found directly above the CWHvm1 between 400 – 800 m in elevation. The main differences are that the CWHvm2 is generally cooler, with a shorter growing season and heavier snowfall and snowpack than the CWHvm1 subzone. This subzone does not make up a substantial area of the Uchucklesaht treaty lands area; only 29.2 ha of the total treaty lands fall within the CWHvm2 subzone (Table 2). These subzones are illustrated in Map 7.



Map 7. Biogeoclimatic subzones for the study area.

Table 2. Treaty lands and the three study areas by BEC subzone.

BEC Subzone	Uchucklesaht Treaty Lands	Elhlateese	Green Cove	Seekah Landing
CWHvm1 Area (ha)	3,166.9	180.0	35.7	54.8
CWHvm2 Area (ha)	29.1	0.0	0.0	0.0
Total	**3,196**	**180.0**	**35.7**	**54.8**

3.4.1 Natural Disturbance Types

Natural disturbance types (NDT) are presented here as they identify the historic disturbance interval and type of disturbance that has shaped these ecosystems. This is relevant as the primary agent of disturbance is fire. Natural disturbance types 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 the treatments are ecologically and socially acceptable.

All three study areas, as well as the entirety of the Uchucklesaht treaty lands, are within the NDT 1 – ecosystems characterised by rare stand-initiating events. The main disturbance agents in NDT 1 are wildfire and windstorms. Insects and landslides can be stand initiating disturbances in NDT 1 ecosystems, albeit to a lesser extent than wildfire and wind. This type of natural disturbance pattern historically resulted in uneven-aged or multi-storied even-aged stands with gap regeneration after the death of individual trees or small patches of trees. The average fire disturbance size was fairly small with irregular edges and patchy landscape patterns. The average return frequency for fire in these ecosystems is 250 years[4].

3.5 Cultural and Archaeological Values

The land within and surrounding the Uchucklesaht treaty lands provides essential resources to sustain the Uchucklesaht way of life. The fish bearing streams provide salmon, an integral food source, as well as an element of spiritual practices. Cedar is a highly valued species; the bark is used for mats, rope, clothing and baskets. Large diameter, or monumental, cedars are used for canoe carving. Eagle parts (feathers and other body parts) are an important value to the Uchucklesaht, as they are used and worn in traditional ceremonies[5].

Within the study areas, there are two official and identified archaeological sites, as identified by the Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO) Archaeology Branch. The exact location of these sites is sensitive information that is not released publicly. The location of these sites must again be identified during any fuel treatment prescription

[4] Forest Practices Code Biodiversity Guidebook. 1995. http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/biodiv/chap2.htm#big. Accessed 3 June 2013.

[5] Uchucklesaht Times. 2012. Vol. 4, Iss. 2. http://www.uchucklesaht.ca/cms/wpattachments/wpID189atID140.pdf. Accessed 3 June 2013.

development to ensure that they are not impacted by the plan. Additionally, there is a high likelihood that unofficial archaeological sites exist throughout the study areas. It is recommended that during fuel management prescription development, appropriate actions are taken to investigate and identify known and potential sites and that protection and/or mitigation measures are incorporated into the plan and executed during implementation.

T'iitsk'in Paawatts, or the directly translated Thunderbird's Nest, is a 2,338 ha Provincially Protected Area on the west side of Henderson Lake. Although it is a place without any permanent structures or Uchucklesaht assets, and therefore not part of the WUI and not included as a study area in this document, it is an area of high importance and cultural value to the Uchucklesaht. The area surrounds an Uchucklesaht treaty parcel and is comprised of five mountain peaks enclosing a river valley. The area is valued for its bathing pools, food and material gathering areas, monumental cedar and cypress harvest, and other archaeological sites. The area is believed to be the nesting place of the Thunderbird, controller of the rain and thunderstorms, as well as directly connected to whales and whaling power[4]. Uchucklesaht members travel to Thunderbird's Nest in preparation for whaling activities and to cleanse themselves. The protected area is illustrated in Map 1.

3.6 Forested Areas and Past Forest Management

The forested area directly surrounding Elhlateese is mostly second growth western hemlock, western redcedar, and amabilis fir. The stand age is approximately 50 - 65 years, as logging occurred in the 1950's. West of the Henderson River and further north of the Village was logged in the 1970's. Outside the boundary of the previous Elhlateese Reserve was, until the treaty settlement, part of Tree Farm License (TFL) 44, managed by Western Forest Products. This area has since been deleted from TFL 44 and granted to the Uchucklesaht, as per the Final Agreement.

3.7 Previous Wildfire Related Projects

The Uchucklesaht Tribe is actively working towards a state of improved preparedness and training for wildfire and other emergencies. Wildfire-related progress has been in the arenas of general emergency planning and jurisdictional clarifications. Most recently, the Uchucklesaht have inventoried and started the process of updating their firefighting equipment resources in Elhlateese.

The Uchucklesaht developed a Community Emergency Plan (updated 2010) to help guide emergency response, communications and evacuation for Elhlateese. This plan explicitly identifies wildfire as a likely hazard to the village. The evacuation plan is a solid start to emergency planning, but requires updating to create a more robust and useful document, as well as to incorporate the significant jurisdictional changes that have occurred since 2010.

As a part of the Maa-nulth Final Agreement, the Uchucklesaht Tribe entered into a Wildfire Suppression Agreement with the province of B.C. and Canada. This agreement outlines the sharing of wildfire suppression costs between the three entities for a ten year period and provides clarity and certainty to the Uchucklesaht regarding the financial responsibility and liability of fire suppression activities.

This CWPP is an invaluable step in moving forward with the emergency planning and wildfire risk mitigation process. Recommendations in this plan will help to guide future wildfire related projects.

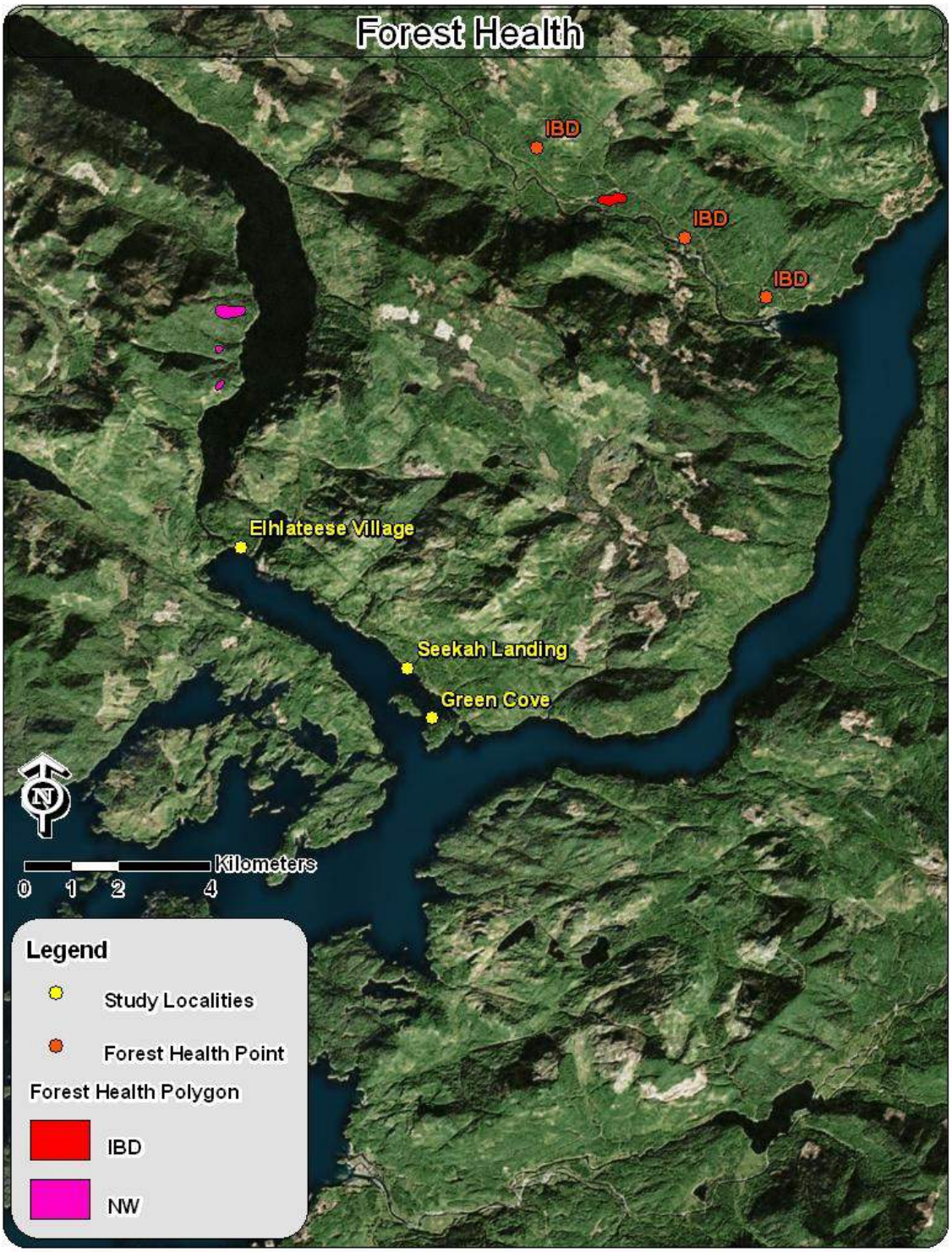
3.8 Forest Health

The predominant forest health factors in the study area are Douglas-fir bark beetle (IBD) and windthrow (NW) of both deciduous and coniferous trees.

Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) is the leading biotic forest health factor in the study area and its occurrence in the general area (Alberni Inlet and surrounding area) has been noted to have increased during 2012 aerial forest health surveys. Specifically within the study area and the immediate surroundings, bark beetle incidence is very low and is not noted to be of significant fire hazard concern (Map 8). IBD should be monitored for continued increases in occurrence in the study area, as an infestation could significantly add to surface fuel loadings.

Windthrow is a fairly common occurrence in and around the study area and can be a fire hazard concern, particularly along power lines in Elhlateese where fallen trees on active lines can spark wildfire. Additionally, larger windthrow events can contribute significantly to surface fuel loadings.

Considering stand composition, and extent and intensity of current forest health factors, the cumulative effects are not considerable. Though there are no major fire hazard concerns associated with forest health within the study area, new IBD infestations and danger trees adjacent to power lines should be considered the biggest risk and monitored and dealt with in a timely manner as they start to contribute to fire hazard.



Map 8. Forest health factors affecting the local ecosystems.

4.0 The Wildland Urban Interface (WUI)

The classical definition of WUI is the place where the “forest meets the community” or "any area where combustible wildland fuels are found adjacent to homes, farm structures and other outbuildings". Other configurations of the WUI can be described as intermixed. Intermixed areas include smaller, more isolated developments that are embedded within the forest. Figure 12 illustrates intermixed and interface areas in the WUI of the study area.

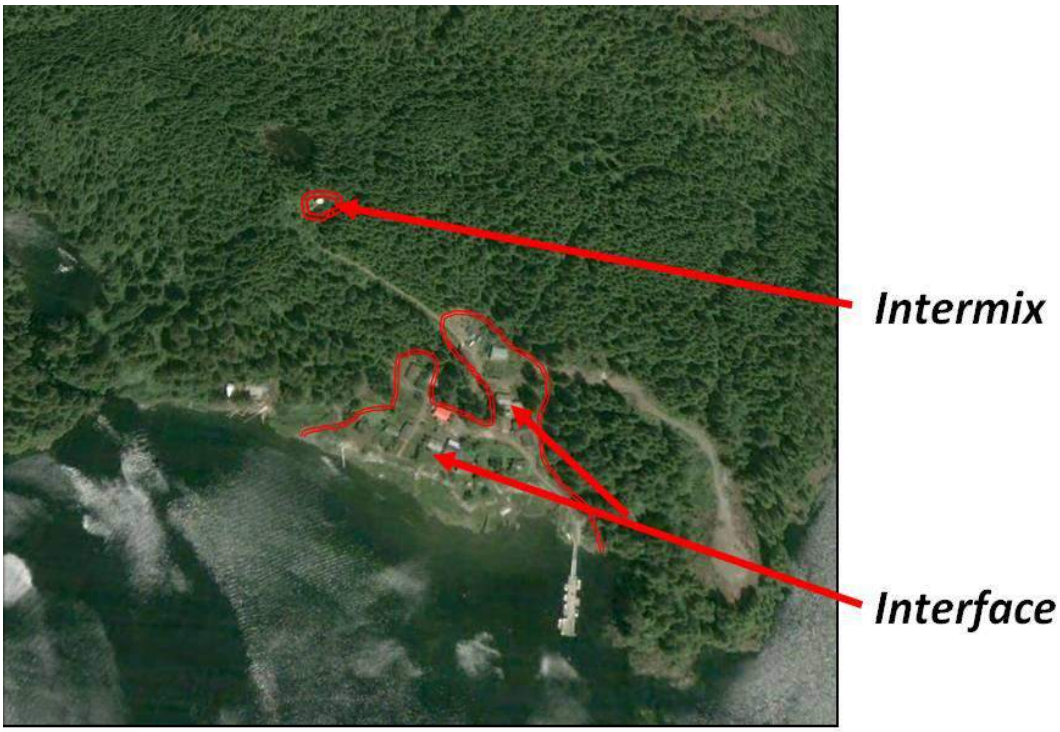


Figure 12. Example of interface and intermix in the Elhlateese WUI.

In each of these cases, fire has the ability to spread from the forest into the community or from the community into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk. In the three study areas, the probability of a fire moving out of the community and into the forest is equal to, or greater than, the probability of fire moving from the forest into the community. For example, the house fire in Elhlateese in December of 2012 threatened to spread to other structures and the surrounding forested stand. Though the house was consumed, fire spread was hampered mostly by cool weather, heavy rainfall, and community member firefighting efforts. A similar fire in summer fire weather conditions, or with slower emergency response, likely would have resulted in greater and more rapid fire spread, structure loss, and required greater and costlier suppression efforts. In either fire spread scenario, community impacts can be significant and it is important for the Uchucklesaht to plan and prepare for interface fires.

4.1 Vulnerability of the Wildland Urban Interface to Fire

Fires spreading into the WUI from the forest can impact homes in two distinct ways: 1) by sparks or burning embers carried by the wind or convection that start new fires beyond the zone of direct ignition (main advancing fire front; Figure 13) and alight on vulnerable construction materials (i.e. roofing, siding, decks, etc.; Figure 14) and 2) through direct flame contact, convective heating, conductive heating or radiant heating along the edge of a 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) of either the forest edge or another burning house (Figure 15).

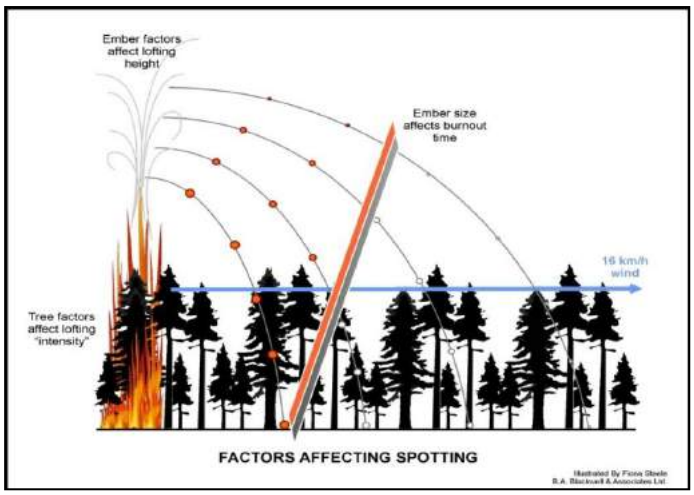


Figure 13. Spotting factors.

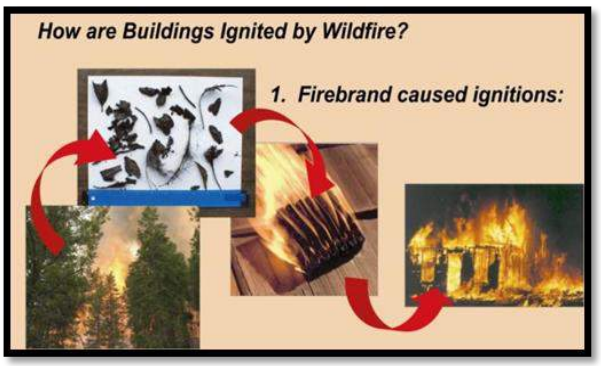


Figure 14. Firebrand caused ignitions: burning embers are carried ahead of the fire front and alight on vulnerable building surfaces.

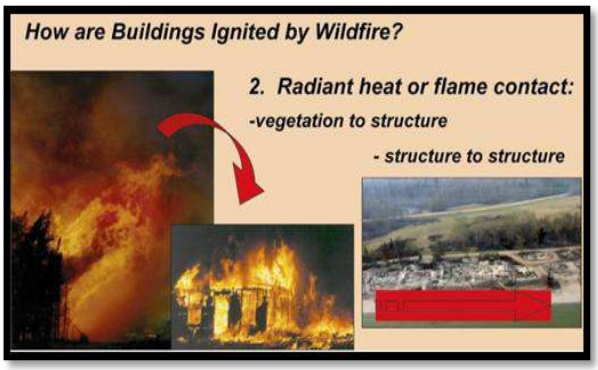


Figure 15. Radiant heat and flame contact allow fire to spread from vegetation to structure or from structure to structure.

Structural fires also have the potential to move from a house into the adjacent forest. FireSmart principles not only address fire coming from the WUI to a structure but they also reduce the probability of a structural fire igniting the forest interface.

The appropriate management response to a given wildfire risk profile is based on the combination and level of emphasis of several key elements:

- Communication & Education
- Community Planning
- Structure Protection

- Emergency response, training and equipment
- Fuel Management

For example, in an interface area with a high-risk profile, equal weight may be given to all elements. Alternatively, in this same high-risk example, active intervention through vegetation management may be given a higher emphasis. This change in emphasis is based on the values at risk (consequence) and the level of desired protection required. In a low risk situation the emphasis may be on communication and education combined with emergency response and training. In other words, a variety of management responses may be appropriate within a given community.

4.1.1 Interface Fire Suppression Challenges

Another reason buildings are so rapidly ignited during interface fires is that all available firefighting resources are often rapidly overwhelmed. WUI fires are complex incidents that typically involve both wildland and structural fires. They often demand a joint response by wildland and structural firefighting agencies with specialized operating procedures and tactics. Even so, unless interface stakeholders have applied FireSmart principles and standards, these fires frequently overwhelm all available firefighting resources. This is particularly a challenge in the study areas where there is not sufficient firefighting equipment or community members to protect more than one house at the same time.

5.0 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*[6] is a guide developed by Partners in Protection (2003) that provides practical tools and information on how to reduce the risk of loss from interface fires. FireSmart provides individuals and agency personnel with a structured and practical approach for assessing wildfire site and structure hazard, selecting viable solutions or mitigative approaches to reduce the hazard posed by interface fire to communities or homes.

We often consider wildfire as an external threat to our residences; however in many cases fire can originate as a house fire and spread into the interface. In both cases homeowners and businesses can take steps to reduce the probability of this occurring. There are two main avenues for FireSmarting[7] 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.

5.1 FireSmart Structure Protection

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

[6] Can be accessed from: https://www.firesmartcanada.ca/resources-library/c/manuals

[7] The Home Owners' FireSmart Manual: http://www.pep.**bc**.ca/hazard_preparedness/**FireSmart**-BC4.pdf

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 communities established to date in BC were built without significant consideration of 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 encouragement and education or through addition of building regulations.

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 WUI. 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. Due to the limited accessibility to the study areas, the FireSmart standard should be applied to any new developments and, wherever possible, the standard should be integrated into existing structures when renovations occur.

The following link accesses an excellent 4 minute video demonstrating the importance of FireSmart building practices during a simulated ember shower: http://www.youtube.com/watch?v=_Vh4cQdH26g.

Figure 16. Combustible roofing (cedar shake) makes this house vulnerable to spotting. Deciduous and grass landscaping surrounding the home is low flammability which decreases the site hazard.

5.1.1.1 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, such as untreated wood shake, increase the probability of fire related damage to a home during an interface fire event. In many communities, homes are often constructed with unrated materials that are considered a major hazard during a large fire event (Figure 16). 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. Roofing made of metal, clay tile, and asphalt shingles are the most fire resistant materials in the case of wildfire.

5.1.1.2 Building Exterior

Building exteriors constructed of vinyl or wood are considered the second highest contributor to structural hazard after roofing material (Figure 17). 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.

Figure 17. Residence with untreated wood siding, coniferous vegetation overhanging roof, and open decking which may trap embers. These factors greatly increase the fire hazard for this home.

While wood may not be the best choice for use in the WUI, its other values from economic and environmental perspectives must also be considered. It is significantly less expensive than many other materials, supplies substantial employment in BC, and is a renewable resource. New treatments and paints are now available for wood that increase resistance to fire and should be considered for use in cases where wood exterior is the best option for non-fire related considerations. Residents can increase the fire resistance of a wood-sided building by eliminating areas on the siding surface where sparks and embers will lodge. Exterior vertical walls should be sheathed from ground level to roof line with material that is at least 12 mm thick.

5.1.1.3 Building Exterior – Window and Door Glazing

Glass shattered by fire can create openings in building exteriors, allowing firebrands to enter and burn the building from the interior. Small or multiple-pane windows are less vulnerable to breakage than large panes. Single-pane windows fracture and collapse more easily than double or triple-pane windows and tempered glass will provide more safety than plate glass.

5.1.1.4 Building Exterior – Eaves, Vents and Openings

Eaves and vents are ready-made openings that can allow heat and embers to enter a building and ignite it. To prevent entry of windblown embers, eaves should be closed in with fascia and vents and soffits are screened with 3 mm mesh.

5.1.1.5 *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 and reduces fire vulnerability. Additionally, utilizing non-combustible or fire resistant materials in construction will further reduce fire vulnerability. Sheath in decks, balconies and undersides of overhangs with 12 mm sheathing made of non-combustible material and encase or build stilts of non-combustible materials or with heavy timbers to increase fire resistance. Maintain access to areas below slotted deck surfaces so debris can be removed on a regular basis.

Figure 18. Woodpile adjacent to structure (at right).

5.1.1.6 *Combustible Materials*

Combustible materials stored within 10 m of residences are also considered a significant issue (Figure 18). Woodpiles, building materials, combustible debris piles, propane tanks, neighbouring outbuildings, and other flammable materials adjacent to the home provide fuel and ignitable surfaces for embers. Locating these fuels away from structures, particularly during the fire season, helps reduce structural fire hazards and makes it easier and safer for suppression crews to action a house during wildfires.

5.2 FireSmart Fuel Treatments

One effective method of reducing the ease with which fire can move to and from a home is by altering the vegetation around the home. Alterations may include removal, reduction or conversion (from flammable to less flammable) of vegetation around the home. The following information regarding fuel treatments is based on the FireSmart Manual (Partners in Protection 2003).

Priority Zone 1 is the zone less than 10 m radius from structures (Figure 19). The objective of Priority Zone 1 vegetation management is to create an environment that will not support fire of any kind. 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 fuel free zone is not always

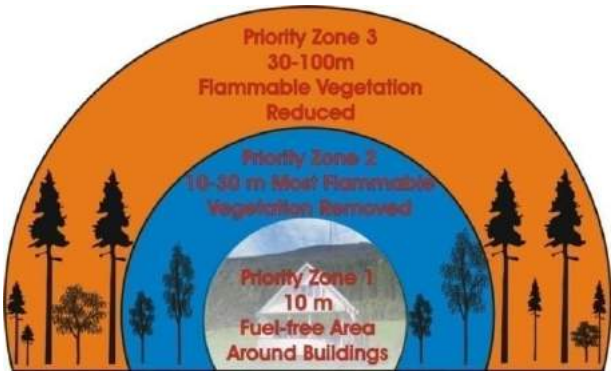
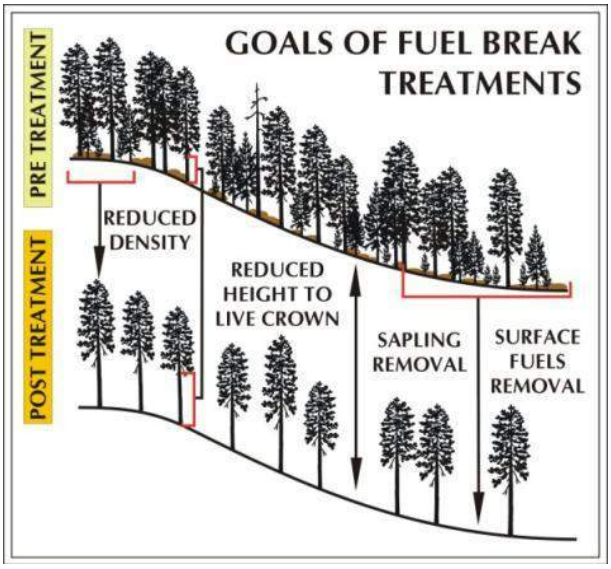


Figure 19. FireSmart Priority Zones.

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 western redcedars, should be avoided, as these are highly flammable. Any vegetation in this zone should be deciduous or green grass, widely spaced and distanced from the house.

Priority Zone 2 extends from 10 to 30 m from the structure. The objective of Priority Zone 2 vegetation management is to create an environment that will only support fires of lower intensity and rate of spread. Fuel reduction (rather than removal) is the principal strategy in Priority Zone 2. For example, 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 fire moving along the ground.



Priority Zone 3 extends from 30 to 100 m from the home. The objective of Priority Zone 3 vegetation management is similar to Priority Zone 2 as it creates an environment that will only support fires of a lower intensity and lower rate of spread. The main threat posed by trees in this zone is spotting. To reduce this threat, cleanup of surface fuels as well as pruning and spacing of trees should be completed in this zone. Vegetation management in Priority Zone 3 may not be required in all circumstances, but should be considered in specific cases when high hazard levels resulting from heavy continuous forest vegetation and steep topography are not reduced enough by fuel management in Priority Zone 2.

6.0 Fire Environment

6.1 Fire Weather

The Canadian Forest Fire Danger Rating System (CFFDRS), developed by the Canadian Forest Service, is used to assess fire danger and potential fire behaviour. MFLNRO maintains a network of fire weather stations during the fire season that determine fire danger on forestlands in communities. Municipalities, parks, and regional governments commonly use the information to monitor fire weather and to determine hazard ratings and associated fire bans and closures.

The Danger Class Rating is derived from fire weather indices and has five classes: 1) Very Low Danger; 2) Low Danger; 3) Moderate Danger; 4) High Danger; and 5) Extreme Danger.

It is important to understand the likelihood of exposure to periods of high fire danger, defined as Danger Class 4 (high) and 5 (extreme), in order to determine appropriate prevention programs, levels of response, and management strategies. The study area lies in an ecosystem with relatively high annual precipitation and high biological productivity. This creates a situation with generally low fire hazard but with complexes of high fuel loading which can become potentially very hazardous during times of drier fire weather. Danger class days were summarized to provide an indication of the fire weather in the study areas. Fire danger within the study areas can vary from season to season.

The 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* [SBC 2004] and *Wildfire Regulation* [B.C. Reg. 38/2005], which specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation, restrict high risk activities based on these classes. Fire danger class conditions are used to impose fire prevention restrictions on industrial and recreational forest users and also assist fire management agencies in complying with fire preparedness and response standards. 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 smouldering in deep, drier layers.

Class 2 (Low) – Creeping or gentle surface fires. Fires are easily contained by ground crews 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.

While fire danger affecting the study area varies from year to year, analysis of historical weather station data can provide information on the number and distribution of days when the Village is typically subject to high fire danger conditions, which is useful information in assessing fire risk to the community.

Figure 20 illustrates the number of Danger Class days on average for each month of the fire season (May – September). Weather station data was compiled from two local, but currently non-operational weather stations. There is no weather station located within the study areas' boundaries and there are no currently operational weather stations of high relevance to the study area. Historical data from the Sarita and Snug weather stations (1978-1997) were used to

determine the average number of days in each fire danger class. The Sarita and Snug weather stations are in close geographic proximity to, and within the same ecosystem, as the study areas. On average, the greatest numbers of High and Extreme danger class days occur in July and August. Typically, the most extreme fire weather occurs between late July and mid-August.

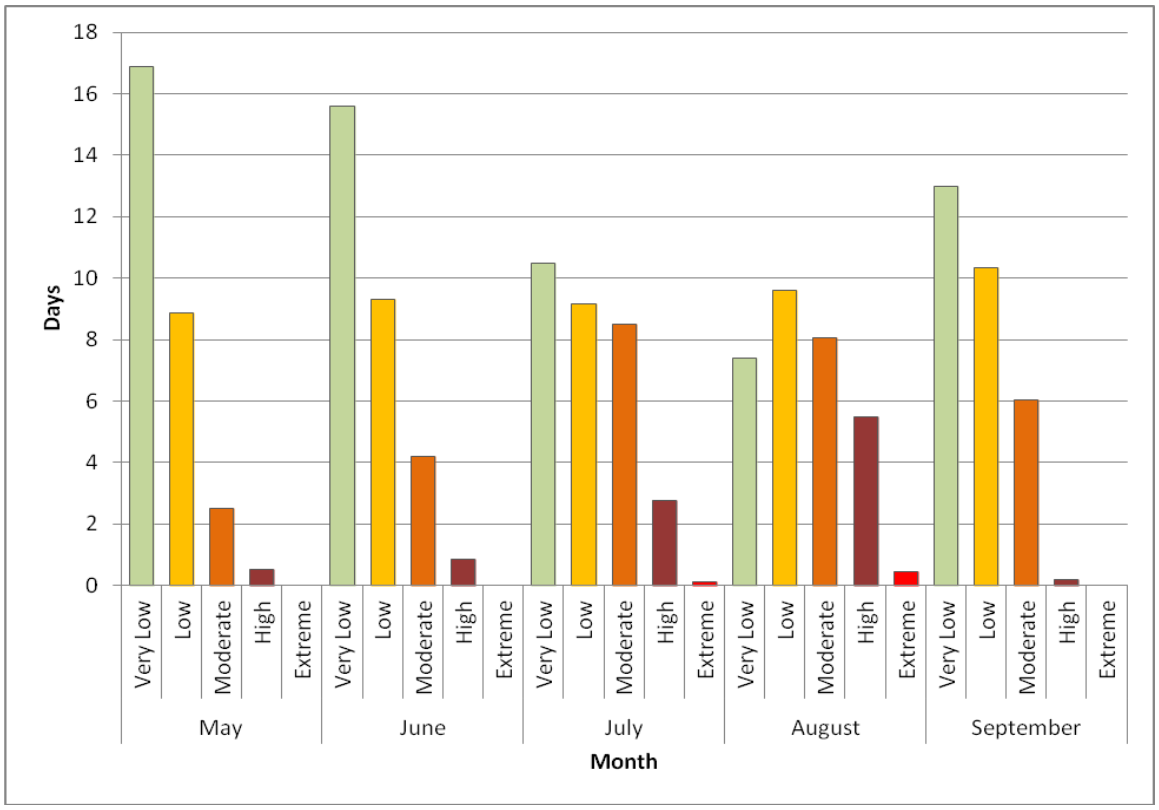


Figure 20. Seasonal variability (May-Sept) in the number of Danger Class days between 1978 and 1997 within the study area as influenced by the regional climate.

6.1.1 Wind

Prevailing wind direction and speed are important considerations during wildfire events and help determine where fuel treatments should be strategically placed. Wind during the fire season is low to moderate and prevails from the west and northwest, with occasional north or northeast winds. Wind speeds reach up to 40km/hr, and average roughly 10km/hr. The topography of the area funnels westerly winds into the Port Alberni channel. The Uchucklesit Inlet is largely sheltered from prevailing winds, but the small inlet could also funnel winds up towards Elhlateese during strong wind and storm events.

In the case of wildfire, wind speed and direction should be considered for its impacts on fire spread, direction, and fire behaivour, as well as its impacts on egress and access ease, safety, and speed.

6.2 Historic Ignitions

The MFLNRO fire reporting system was used to compile a database of fires in the study area between 1950 and 2011 (data for 13 years throughout that period is not available). The fire history database provides an indication of fire history but is not comprehensive. The point locations of fires are also approximate as they are based on a grid system and not the actual location of the fire. Historic fire extents are from a separate spatial database. The boundaries of recent fires are relatively accurate however the boundaries of older fires are approximations of actual fire perimeters.

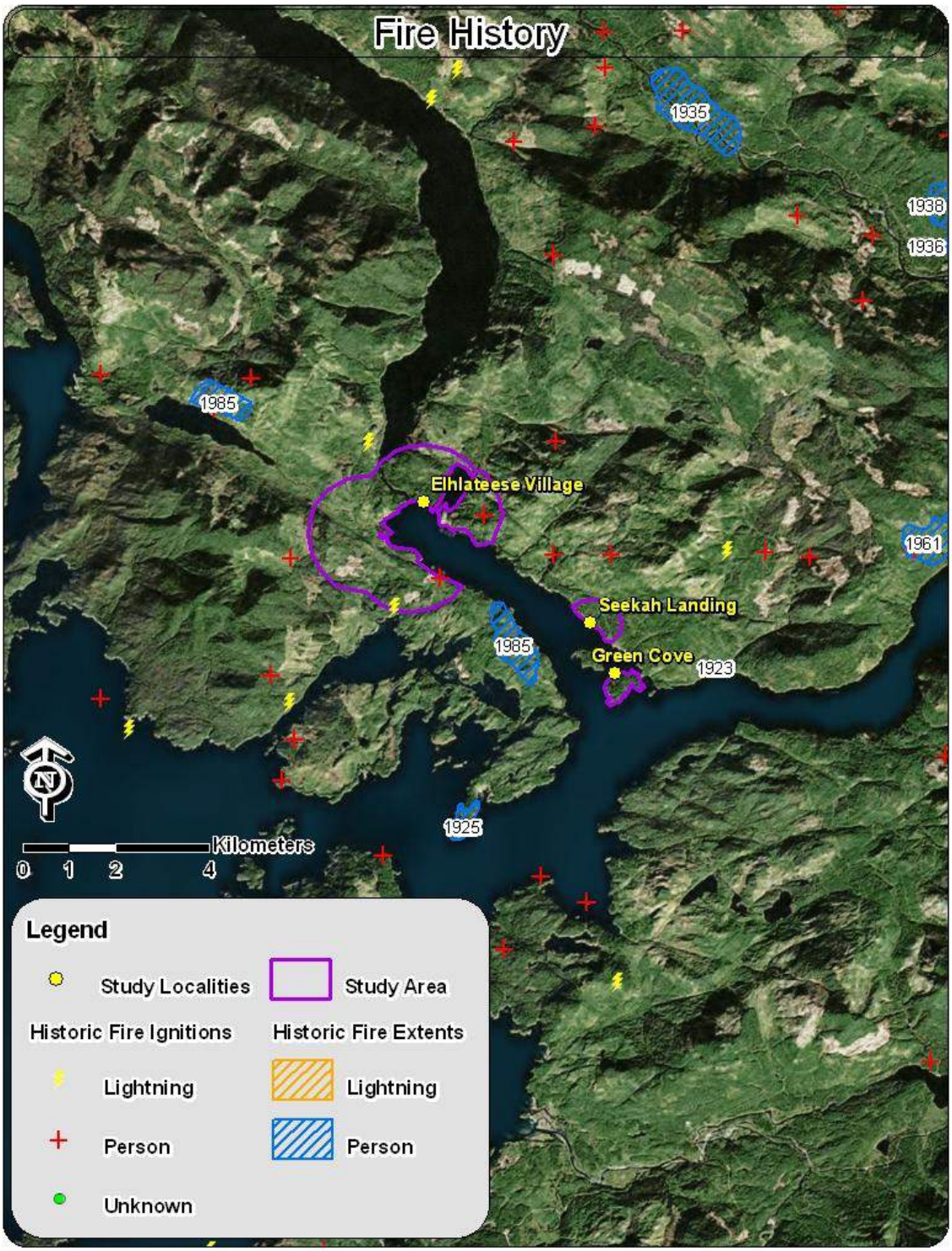
Map 9 illustrates the ignition locations of historic wildfires from 1950 - 2011 and the historic extent (boundaries, fire year, and areas burned) of wildfires between 1917 and 2011. Though the older fire boundaries and sizes are approximate, they indicate the extent to which fire has played a role in the local ecosystems.

Figure 21. December 18, 2012, a structure fire threatens adjacent houses and surrounding vegetation. ***Photo credit: www.hashilthsa.com.***

Within the Elhlateese study area, three historical ignitions are noted. Two ignitions were recorded in 1987; one was caused by lightning, the other by human ignition. In 2011, another human-caused ignition was recorded. These ignitions represent small fires that did not evolve into landscape-level burns, nor do this data capture structure fires which did not spread to wildfires, of which there was one in December 2012 (Figure 21).

In the general Uchucklesit Inlet/ South Henderson Lake geographic area which surrounds the study areas, nine additional ignition points were recorded between 1958 and 2007. Seven of these ignitions were human-caused; the remaining two were lightning-caused. The majority of these ignitions did not result in large fires; however, two large fires in the area burnt 87 and 60 hectares, respectively, in 1985. Both of these larger fires were human-caused. Though these historical fires were not directly within the study areas, they are important to note as they represent fire starts in the same ecosystem (BEC subzone), as well as indicate the risk of human ignitions to the area.

Analysis of the historic fires and ignitions indicate that reducing human ignitions would greatly decrease the fire risk in the study areas; 66% of the ignitions within the study area are human-caused, 78% of the ignitions within 5km were human-caused, and 100% of the large fires in the area were human-caused.



Map 9. Historic fire ignitions from 1950 - 2011 with ignition source shown and historic fire extents from 1917-2011 with year and ignition source shown.

6.2.1 Fuels

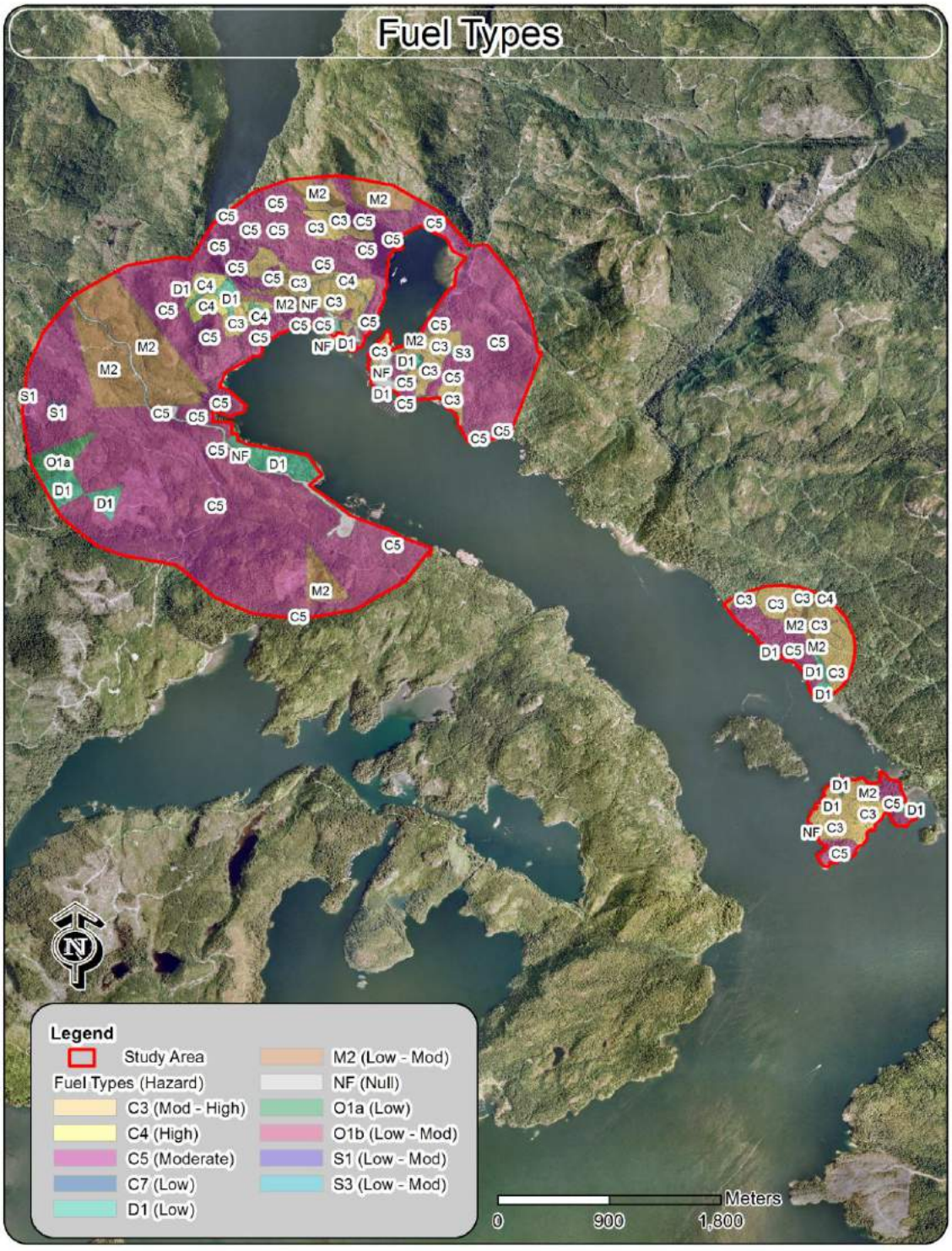
Coarse level fuel types for the study areas are provided by the WMB as part of the PSTA spatial data. Typically, the outputs require refinement and updating, as they do not always adequately describe the variation in fuels present within a given area, nor are they provided at a fine scale sufficient for a document of this nature. For this reason, it is important to ground-truth fuel types in order to improve fuel type accuracy and incorporate local variation.

To that end, stand and fuels data were collected during fieldwork. In total, 5 full field checks and more than 10 visual field checks were completed throughout the three study areas. For each fuel type identified in the field, a best approximation of the CFFDRS classification was assigned. For the 5 full field stops, wildfire threat worksheets were completed and photographs taken. The visual checks were assigned in the field with supporting comments and often were accompanied by photographs.

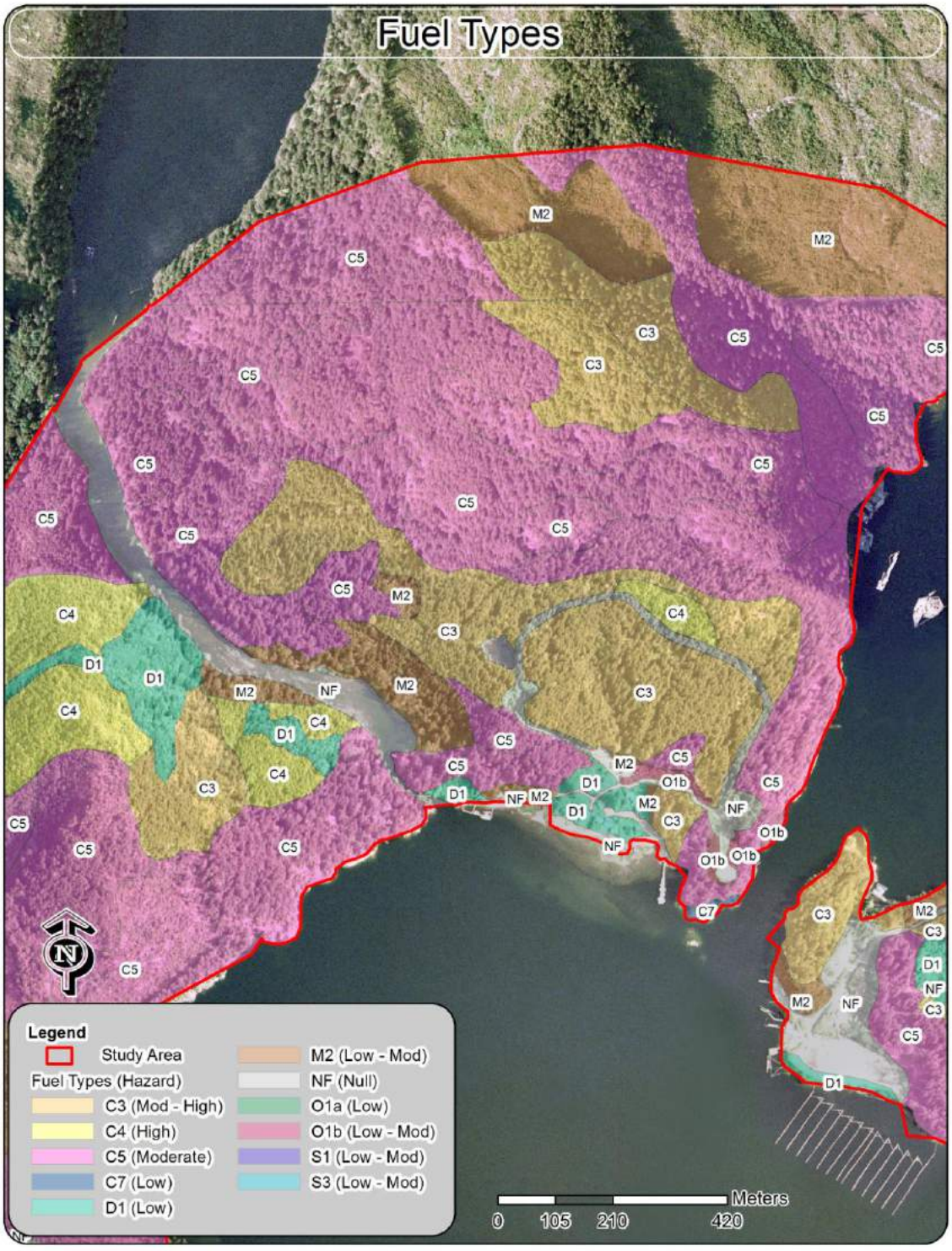
Where additional fuel type updating was needed, forest fuel polygons were typed in ArcGIS 10.1 using a combination of colour orthophotographs and Bing Maps[8]. The orthophotography imagery available for interpretation was 7+ years old, which posed a constraint to updating the fuels data. Because of the age of the orthophotography available, areas further from Uchucklesaht assets which could not be ground-checked or fuel-typed with confidence were not updated and the original PSTA fuel-typing data was retained.

It should be noted that the fuel types used in this report are based upon fire behaviour for each fuel type in the Canadian Forest Fire Behaviour Prediction System (FBP) and not the species composition shown in the FBP. For example the C3 fuel type is called Mature Jack or Lodgepole Pine. The C3 type in this report is a young mature forest dominated by western hemlock Douglas-fir, amabilis fir, and western redcedar. The C3 stand type has low cover of understory vegetation, fairly high crown closure, and is evenly stocked and moderately dense. While the species mix is different from the FBP type, the fire behaviours are similar. The updated fuel typing adjusted to incorporate local variation is illustrated on Map 10, Map 11, and Map 12.

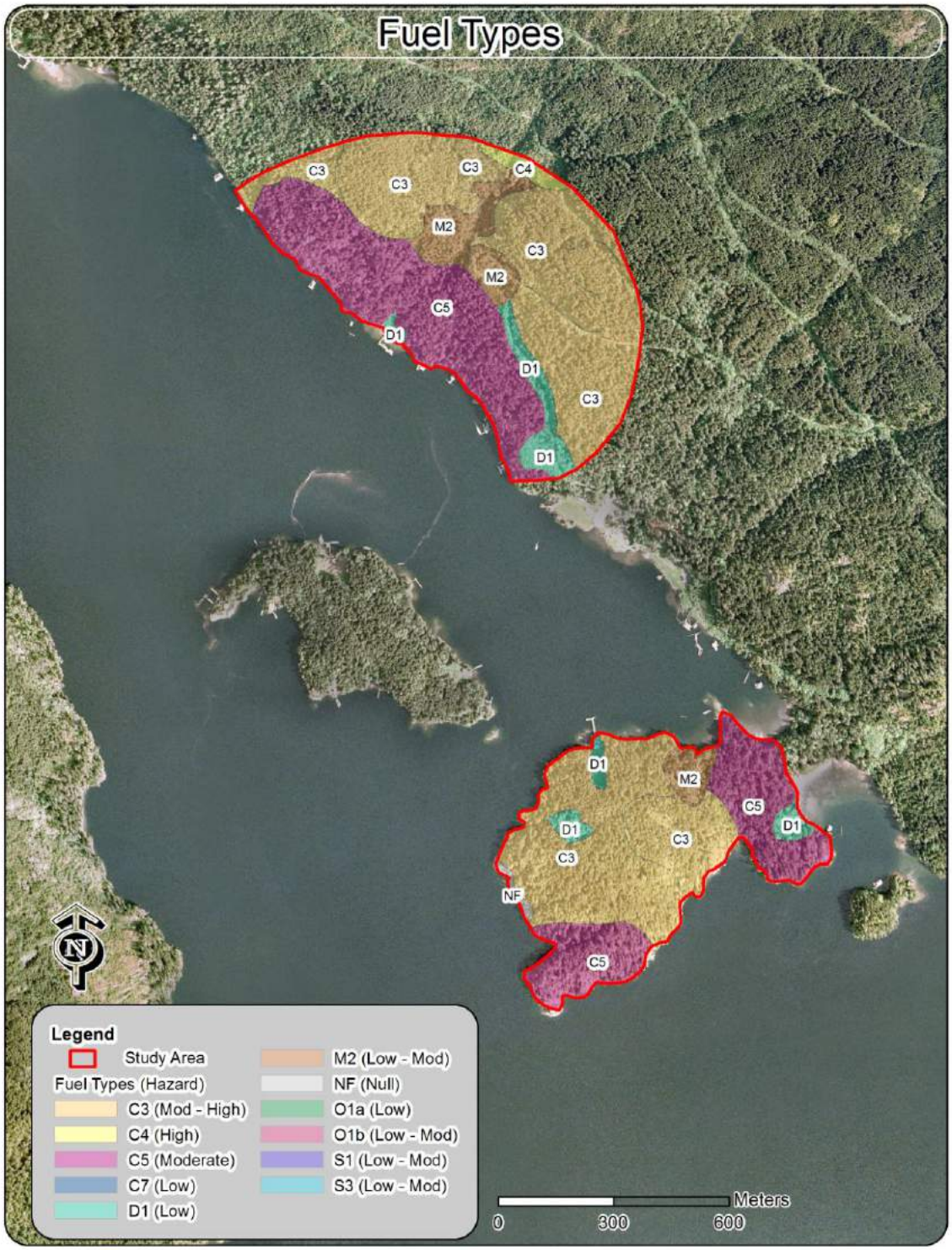
[8] © 2010 Microsoft Corporation



Map 10. Overview of the updated fuel typing for the three study areas.



Map 11. Close-up of the fuel types around the Elhlateese Village.



Map 12. Close up of the fuel types around Seekah point and Green Cove

6.2.2 Fuel Type Summary

Table 3 summarizes the fuel types by general fire behaviour and total area for the study area. In general, the fuel types considered hazardous in terms of dangerous fire behaviour and spotting (lofting burning embers) are C4 and C3. Fuel type M2 can sometimes be hazardous depending on the proportion of coniferous trees in the stand, as can O1b depending on the amount of associated fuel accumulation. Fuel types found within the study areas are summarized in Table 3.

Table 3. A summary of fuel types, associated hazard and areas within the study areas.

Fuel Type	Description	Wildfire Behaviour under High Wildfire Danger Level	Hazard	Area (ha)	% Study Areas
C4	Dense pole-sapling forest, heavy dead and down, dead woody fuel, continuous vertical crown fuel continuity	Almost always **crown fire**, high to very high fire intensity and rate of spread	High	12.8	1.4
C3	Fully stocked, mature forest, crowns separated from ground	**Surface and crown fire**, low to very high fire intensity and rate of spread	Moderate - High	102.8	11.5
C5	Well-stocked mature forest, crowns separated from ground	Low to moderately fast spreading, low to moderate intensity **surface fire**	Moderate	599.8	67.1
M2	Moderately well-stocked mixed stand of conifer and deciduous species, low to moderate dead, down woody fuels, crowns nearly to ground.	**Surface fire, torching and crowning**, moderate to very high intensity and spread rate (depending on slope and conifer percent)	Low - Moderate	105.5	11.8
D1	Moderately well-stocked deciduous stands	Always a **surface fire**, low to moderate rate of spread and fire intensity	Low	36.6	4.1
O1b	Shrub type with volatile species	Rapidly spreading, low to moderate intensity **surface fire**	Moderate	1.0	0.1
O1a	Continuous human modified short grass	Rapidly spreading, low to moderate intensity **surface fire**	Low - Moderate	8.7	0.9
S1	Continuous slash type with moderate depths and retaining some foliage.	Moderate to high intensity **surface fire**	Moderate	2.0	0.2
S3	Continuous and uncompacted slash type with large fuel loads and deep slash depth.	Moderate to high intensity **surface fire**	Moderate	0.6	0.1
NF	Non-fuel	N/A	Null	23.9	2.7

C4 Fuel Type

The close-up map of fuel types in Elhlateese (Map 11) shows that there are very few fuel complexes in and around the Village that are identified as high hazard C4 fuel types. The C4 fuel types (1.4% of the study areas) are comprised of mixed coniferous stands with a layer of dense pole sapling conifers creating ladder fuels to the crown that begin at the ground surface in many cases. Fire suppression in these types can be extremely difficult and there is high potential for extreme fire behaviour and active crown fire in wind driven conditions.

Figure 22. C4 Fuel type.

C3 Fuel Type

Figure 23. C3 Fuel type.

C3 is comprised of young to mature forests with few ladder fuels but generally high crown connectivity. The forests that represent this type in the study area are dominated by Douglas-fir, western hemlock, and western redcedar. These stands generally have less developed layers of understory vegetation due to lack of light reaching the forest floor. Height of the stand varies, but is generally 28 m - 40 m. There is high potential for extreme fire behaviour and active crown fire during wind driven events. During average fire weather conditions, there is moderate potential for extreme fire behaviour. C3 fuel types, while only accounting for 11.5% of the total study area, make up the major component of fuel types which surround the main assets and infrastructure of the Elhlateese Village.

C5 Fuel Type

Fuels classified as C5 fuel types in the study area have the same relative fire behaviour and structural components as described in the FBP system but different species compositions. Rather than red and white pine, C5s within the study area are characterized by mature Douglas-fir, western hemlock, and western redcedar. C5 is by far the most prevalent fuel type in the study area (67.1%). It is characterised by gappy canopies, scattered ladder fuels and often has a well developed understory. Crown fires are possible but are generally wind driven due to the gappy nature of the canopy. Fire suppression efforts in this type are heavily dependent upon topography and weather conditions.

Figure 24. C5 Fuel type.

M2 Fuel Type

Fuels classified as M2 fuel types have a minimum deciduous component of 20%. M2s in the study area are comprised of an intimate mixture of Douglas-fir, western redcedar, cottonwood, bigleaf maple, red alder, and western hemlock (Figure 25). Crown connectivity is moderate to high and the potential for active crown fire depends highly on fire weather, particularly wind, and percentage of coniferous component in the stand. M2 fuel types with a high deciduous percentage can provide excellent fire breaks that support only low intensity fires. Approximately 12% of the study area is identified as M2 fuels.

O1b Fuel Type

O1b fuel type is characterized by shrubs, tall grasses and herbs and covers only 0.1% of the study area. All of the O1b fuel types occur within or adjacent to the Village of Elhlateese near to or under power line right of ways (Figure 26). Fire in this type can be more difficult for suppression crews to fight depending on the amount of fuel.

The remaining fuel types are lower hazard. D1 (deciduous forests – 4.1%) and O1a (short grass, irrigated fields – 0.9%) can generally only support low intensity fires (Figure 27). While spread rates can be high in grass fuel types, suppression crews can successfully control fire in these types.

Figure 25. M2 fuel type with bigleaf maple and western redcedar.

Figure 26. O1b fuel type under the power lines.

Figure 27. D1 fuel type, a red alder forest.

Figure 28. An area classified as non-fuels (NF).

Only 2.4% of the study area was classified as NF or non-fuel; these areas are primarily located directly within the Elhlateese Village. NF areas include short irrigated grasses, such lawns, structures, gravel roads and landings, and other non-vegetated areas, such as cleared areas surrounding key infrastructure (Figure 28). Classification of these areas as non-fuel reflects the fact that they are primarily non-vegetated and no recognized fuel type exists to describe them. However, as the Slave Lake Fire demonstrated, structures can become fuels capable of spreading wildfire throughout a community.

These lower hazard fuel types (NF, D1, M2 with low coniferous component) can act as important natural fuel breaks on the landscape. While they will not stop a wildfire, their lower intensity fire behaviour will make fire suppression easier and they can be used for activities such as back-burning or black-lining by suppression crews. Locations of these fuel types around the community are illustrated in Map 13 and Map 14. As is noticeable in Map 13, the area directly surrounding Elhlateese structures (Priority Zones 1 and 2) is relatively low hazard fuels. Priority Zone 3 is moderate to high hazard fuel types (C5 and C3, respectively). In Seekah Landing, natural fuel breaks do not play a significant role in reducing fire hazard to the area. In Green Cove, D1 fuel type in Priority Zones 1 and 2 help to mitigate risk to the store.

Map 13. Existing fuel breaks around the Village of Elhlateese.

Map 14. Natural fuel breaks in the study areas of Green Cove and Seekah Landing.

6.3 Principles of Fuel Management

Fuel or vegetation management is a key element of the FireSmart approach. Given public concerns, vegetation management may have societal barriers to implementation and must be carefully rationalized in an open and transparent process. Vegetation management should be strategically focused on minimizing impact while maximizing value to the community. Benefits of fuel management for wildfire hazard reduction include:

- Protection of public safety and property within and adjacent the community.
- Reduction of accidental wildfire ignition risk within and adjacent the community.
- Reduction of high intensity fire potential – minimized fire impacts on viewscape, soil quality, slope stability / erosion, watershed, air quality and wildlife.
- Improved wildfire detection and suppression capabilities within and adjacent to the community.
- Improved forest health and maintenance of diverse wildlife habitat.

The decision whether or not to implement vegetation management must be evaluated against the other elements of wildfire risk reduction to determine the best avenue for risk reduction. Its effectiveness also depends on the longevity of treatment (vegetation grows back), cost, and the resultant effect on fire behaviour.

6.3.1 What is fuel management?

Fuel management is the planned manipulation and/or reduction of living and dead forest fuels for land management objectives (*e.g.,* hazard reduction). It can be achieved by a number of methods including:

- Prescribed fire;
- Mechanical means; and
- Biological means.

The goal is to lessen potential fire behaviour proactively, thereby increasing the probability of successful containment and minimizing adverse impacts. More specifically, the goal is to decrease the rate of fire spread, and in turn, the fire size and intensity, as well as crowning and spotting potential (Alexander 2003).

Fire Triangle

Fire is a chemical reaction that requires three main ingredients:

- Fuel (carbon);
- Oxygen; and
- Heat.

These three ingredients make up the fire triangle. If one is not present, a fire will not burn.

Fuel is generally available in adequate quantities in the forest. Fuel must contain carbon. It comes from living or dead plant materials (organic matter). Trees and branches lying on the ground are a major source of fuel in a forest. Such fuel can accumulate gradually as trees in the stand die. Fuel can also build up in large amounts after catastrophic events, such as insect infestations or windthrow.

Oxygen is present in the air. As oxygen is used up by fire, it is replenished quickly by wind.

Heat is needed to start and maintain a fire. Heat can be supplied by nature through lightning. People also supply a heat source through misuse of matches, campfires, trash fires, and cigarettes. Once a fire has started, it provides its own heat source as it spreads through a fuel bed capable of supporting it.

6.3.1.1 Forest Fuels

The amount of fuel available to burn on any site is a function of biomass production and decomposition. Many of the forest ecosystems within British Columbia, including the study areas' ecosystem, have the potential to produce large amounts of vegetation biomass. Variation in the amount of biomass produced is typically a function of site productivity and climate. The turnover or removal of vegetation biomass is a function of decomposition. Decomposition is regulated by temperature and moisture. In wet maritime coastal climates, the rates of decomposition are relatively high when compared with drier, cooler continental climates of the interior. Rates of decomposition can be accelerated naturally by fire and/or anthropogenically by humans.

A hazardous fuel type can be defined by high surface fuel loadings, high proportions of fine fuels (<1 cm) relative to larger size classes, high fuel continuity between the ground surface and overstory tree canopies, and high stand densities. A fuel complex is defined by any combination of these attributes at the stand level and may include groupings of stands.

6.3.1.2 Surface Fuels

Surface fuels consist of forest floor combustibles, understory vegetation (grasses, herbs and shrubs, and small trees), and woody debris (coarse and fine debris) that is in contact with the forest floor (Figure 29). Forest fuel loading describes the relative mass of fuels in an area of forest floor and is a function of natural disturbance, tree mortality and/or human related disturbance.

Surface fuels typically include all combustible material lying on or immediately above the ground. Often roots and organic soils have the potential to be consumed by fire and are included in the surface fuel category.

Figure 29. High surface fuel loading under a forest canopy in the study area.

Surface fuels that are less than 7 cm in diameter contribute to surface fire spread; these fuels often dry and wet quickly (depending on weather and relative humidity) and are ignited more easily than larger diameter fuels. Therefore, this category of fuel is the most important when considering a fuel reduction treatment. Larger surface fuels greater than 7 cm are important in the contribution to sustained burning conditions, but, when compared with smaller size classes, are often not as contiguous and are less flammable because of delayed drying and high moisture content. It should be noted that while assessment of fine fuels use 7 cm as a diameter limit, fuels up to 12 cm can contribute to fire spread and should be considered. In some cases, where these larger size classes form a contiguous surface layer, such as following a windthrow event, they can contribute an enormous amount of fuel, which will increase fire severity and the potential for fire damage.

6.3.1.3 Aerial Fuels

Aerial fuels include all dead and living material that is not in direct contact with the forest floor surface. The fire potential of these fuels is dependent on type, size, moisture content, and overall vertical continuity. Dead branches and bark on trees and snags (dead standing trees) are important aerial fuels. Concentrations of dead branches and foliage increase the aerial fuel bulk density and enable fire to move from tree to tree. The exception is for deciduous trees where the live leaves will not normally carry fire. Numerous species of moss, lichens, and plants hanging on trees are light and flashy aerial fuels. All of the fuels above the ground surface and below the upper forest canopy are described as ladder fuels.

Two measures that describe crown fire potential of aerial fuels are the height to live crown and crown closure (Figure 30 and Figure 31). The height to live crown describes fuel continuity between the ground surface and the lower limit of the upper tree canopy. Crown closure describes the inter-tree crown continuity and reflects how easily fire can be propagated from tree to tree. In addition to crown closure, tree density is an important measure of the distribution of aerial fuels and has significant influence on the overall crown and surface fire conditions. Higher stand density is associated with lower inter tree spacing, which increases overall crown continuity. While high density stands may increase the potential for fire spread in the upper canopy, a combination of high crown closure and high stand density usually results in a reduction in light levels associated with these stand types. Reduced light levels accelerate self-pruning, inhibit the growth of lower branches, and decrease the cover and biomass of understory vegetation.

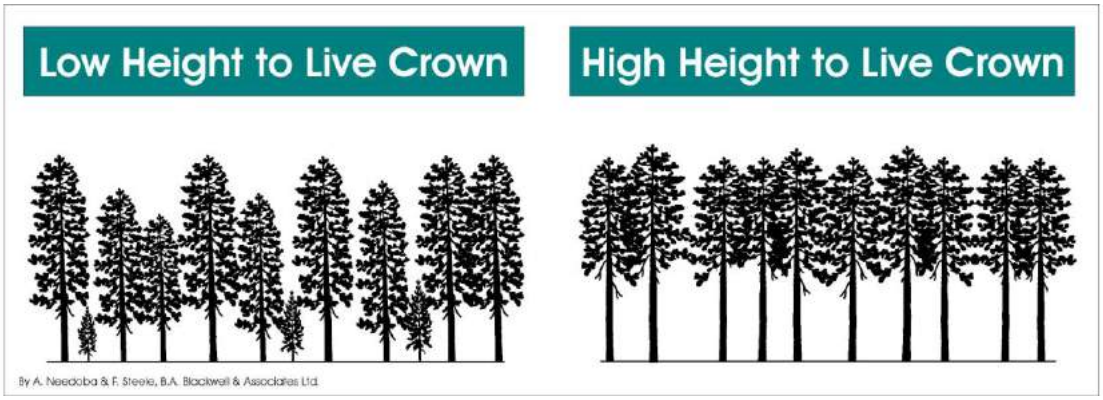


Figure 30. Comparisons showing stand level differences in the height to live crown.

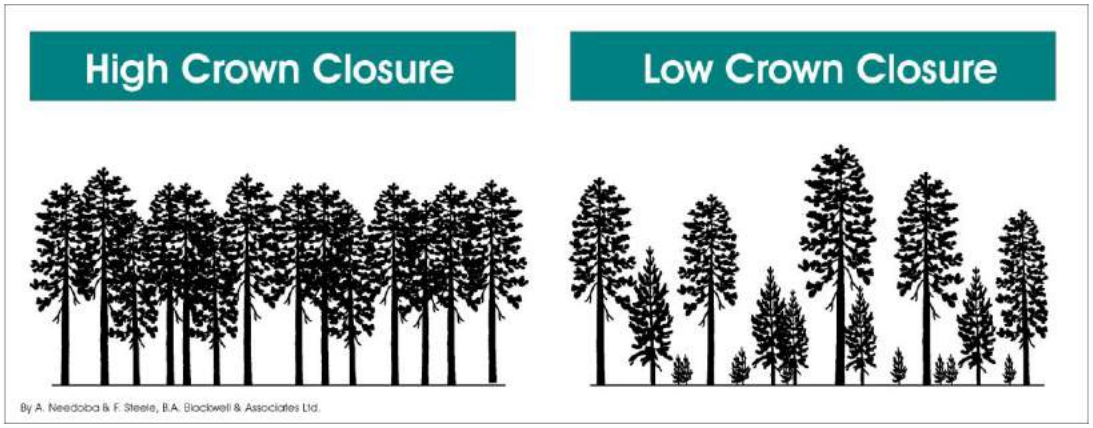


Figure 31. Comparisons showing stand level differences in crown closure.

6.3.1.4 Strategies of Fuel Management

The general fuel management strategy for provision of wildfire protection to WUI communities involves using:

1. Existing fuelbreaks (areas featuring deciduous or low flammability fuels or access/utility infrastructure corridors). There are a number of opportunities to improve the wildfire protection afforded by existing landscape fuelbreaks. Recommendations on fuel treatments in specific areas adjacent fuelbreaks are included in this plan.
2. Stand level fuel treatments involving fuel removal, fuel reduction or fuel conversion in strategic locations (adjacent values at risk - structural, utility, watershed or other resources). Stand level fuel treatments are applied in Priority Zone 2 + 3 or beyond - depending on the level of wildfire hazard protection required.

Thinning is a preferred approach to fuel treatment (Figure 32) and offers several advantages compared to other methods:

- Thinning provides the most control over stand level attributes such as species composition, vertical structure, tree density, and spatial pattern, as well as the retention of snags and coarse woody debris for maintenance of wildlife habitat and biodiversity.
- Unlike prescribed fire treatments, thinning is comparatively low risk, is not constrained to short weather windows, and can be implemented at any time.
- Thinning may provide marketable materials that can be utilized by the local economy.
- Thinning can be carried out using sensitive methods that limit soil disturbance, minimize damage to leave trees, and provide benefits to

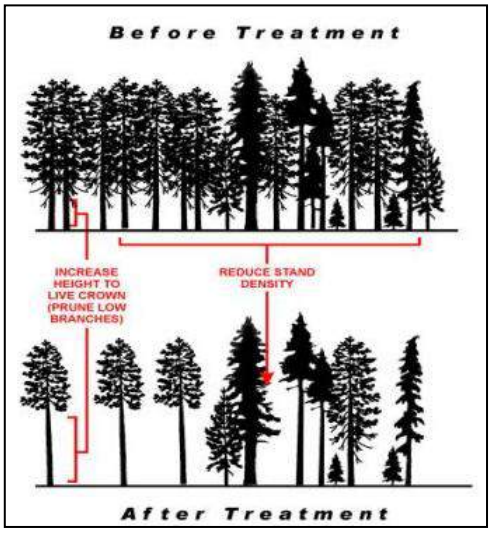


Figure 32. Schematic showing the principles of thinning to reduce stand level hazard.

other values such as wildlife.
- Thinning is most ecologically suitable to the study area ecosystem.

The following summarizes the guiding principles that should be applied in developing thinning prescriptions:

- Protect public safety and property both within and adjacent to the urban interface.
- Reduce the risk of human caused fires in the immediate vicinity of the urban interface.
- Improve fire suppression capability in the immediate vicinity of the urban interface.
- Reduce the continuity of overstory fuel loads and related high crown fire risk.
- Reduce the continuity and loading of surface fuels and related fire spread, intensity, and potential fire behaviour.
- Maintain the diversity of wildlife habitat through the removal of dense understory tree species.
- Minimize negative impacts on aesthetic values, soil, non-targeted vegetation, water and air quality, and wildlife.

The main wildfire objective of thinning is to shift stands from having a high crown fire potential to having a low surface fire potential. In general, the goals of thinning are to:

- Reduce stem density below a critical threshold to minimize the potential for crown fire spread. Target crown closure is generally less than 35%;
- Prune to increase the height to live crown to a minimum of 2.5 meters or 30% of the live crown (the lesser of the two) to reduce the potential of surface fire spreading into tree crowns; and
- Remove slash created by spacing and pruning to maintain surface fuel loadings below 5 kg/m2.

6.3.1.5 The Principles of Landscape Fuelbreak Design

Fuelbreaks can be defined as strategically placed strips of low volume fuel where firefighters can make a stand against fire and provide safe access for fire crews in the vicinity of wildfires, often for the purpose of lighting backfires. Fuelbreaks act as staging areas where fire suppression crews can anchor their fire suppression efforts, thus increasing the likelihood that fires can be stopped, or fire behaviour minimized, so that the potential for a fire to move fluidly through the interface and into a developed community is substantially reduced. The principles of fuelbreak design are described in detail in APPENDIX A – LANDSCAPE LEVEL FUEL MANAGEMENT.

A fuel treatment is created by reducing surface fuels, increasing height to live crown and lowering stand density through tree removal (Figure 33). Fuelbreaks can be developed using a variety of prescriptive methods that may include understory and overstory fuel removal, timing of treatment, synergistic effects with other treatments, species conversion, and placement on the landscape.

When developing fuelbreak prescriptions, the CFFDRS fuel type classification for the area and the potential fire behaviour must be considered in order to predict the change in fire behaviour that will result from altering fuel conditions. The identification of potential candidate areas for

fuelbreaks should be focused on areas that will isolate and limit fire spread, and provide solid anchors for fire control actions.

Prior to finalizing the location of fuelbreaks, fire behaviour modeling using the Canadian Fire Behaviour Prediction system (FBP) should be applied to test the effectiveness of the size and scale of proposed treatments. These model runs should include basic information from fieldwork pertaining to the fuel types, height to live crown base, crown fuel load, surface loads, and topography. The model runs should be used to demonstrate the effectiveness of treatments in altering fire behaviour potential.

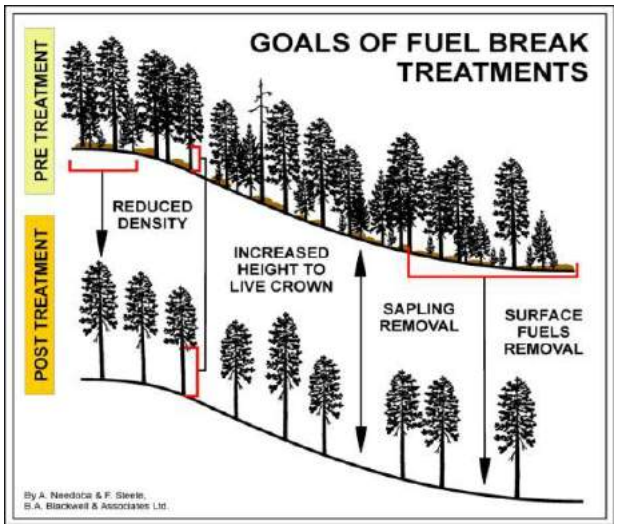


Figure 33. Conceptual diagram of a shaded fuelbreak pre treatment and post treatment.

Treatment prescription development must also consider the method of fuel treatment. Methods include manual (chainsaw) or mechanical, or a combination of these treatments. To be successful, manual and mechanical treatments should be considered in combination with prescribed burning of piled fuels or chipping. Mechanical treatments involve machinery and must be sensitive to ground disturbance and impacts on hydrology, watercourses, and potential archaeological sites. Typically, these types of treatments reduce the overstory fuel loads but increase the surface fuel load. The surface fuel load must be removed in order to significantly reduce the fire behaviour potential. Increased surface fuel loading is the reason that prescribed burning or pile and burn should be addressed in the treatment prescription.

Final selection of the most appropriate fuelbreak location will depend on a number of factors including:

- Protection of recreation and aesthetics;
- Anchor points or natural fuel breaks adjacent;
- Protection of public safety;
- Protection of critical infrastructure or other structural values at risk;
- Reduction of potential liabilities;
- Minimization of future suppression costs;
- Improved knowledge or public demonstration/education;
- Impacts on visual quality;
- Cost and benefits of treatment;
- Treatment cost recovery;
- The impact of treatments on the alteration of potential fire behaviour; and
- Public review and comment.

6.3.1.6 *Principles of Site/Stand Level Fuel Treatment Design*

FireSmart fuel management guidelines recommend that fuel treatments be applied to those fuels adjacent to values at risk: up to 10m from structure exterior (Priority Zone 1). Subsequently, fuels further from values between 10m and 30m from structure exterior and up to 100m from structure exterior should be treated (Priority Zone 2 and Priority Zone 3, respectively).

> **Priority Zone 1 and 2 fuel treatments:** Priority Zone 1 and 2 areas are directly adjacent to private dwellings, structures and infrastructure (0 - 30 m). Usually fuel reduction and FireSmart practices would be undertaken by the home owner or resident.
>
> **Priority Zone 3 fuel treatments:** Further distant from structure exteriors (30 - 100 m), Priority Zone 3 areas are typically not the responsibility of homeowners or residents. Where the subject lands are treaty lands, no publicly funded fuel treatment program currently exists. Because fuel treatments can be quite expensive, it may be beneficial to consider merchantable timber removal to offset some of the expense of treatments.

Fuelbreaks should not be considered stand-alone treatments to the exclusion of other important strategies already discussed in this plan. To be successful, communities need to integrate a fuelbreak plan with strategic initiatives such as communication and education, structure protection, emergency response, and training. An integrated strategy will help to mitigate landscape level fire risk, reduce unwanted wildland fire effects and minimize the potential negative social, economic and environmental effects that large catastrophic fires can cause.

6.3.2 *Maintenance*

Fuelbreaks require ongoing treatment to maintain low fuel loadings. Following treatment, tree growth and understory development start the process of fuel accumulation and, if left unchecked over time, the fuelbreak will degrade to conditions that existed prior to treatment. Some form of follow-up treatment is required. Follow-up is dependent on the productivity of the site, and may be required as frequently as every 10 years in order to maintain the site in a condition of low fire behaviour potential.

Once a community commits to the development of a fuelbreak strategy, the community decision makers, in this case the Uchucklesaht Executive, must recognize that they are embarking on a long-term commitment to these types of treatments and that future maintenance will be required. Regular treatments are usually considerably less expensive than original treatments, though may become more expensive the longer action is delayed. A component of the material to be removed to create fuelbreaks may have economic value and can potentially be used to offset the cost of treatment. Options to sell this component should be explored and may help to provide benefits to the local economy.

7.0 COMMUNITY RISK PROFILE

A community's fire risk can be assessed using a number of different methodologies. The MFLNRO WMB developed spatial data representations (PSTA data) of provincial fire risk and

variables included in risk assessment, such as structure density, fire behaviour potential, and spotting potential. PSTA data was first completed in 2004 and has since been partially updated in 2012. It is available to aid in further community risk analysis and completion of CWPPs (UBCM and MFLNRO, n.d.).

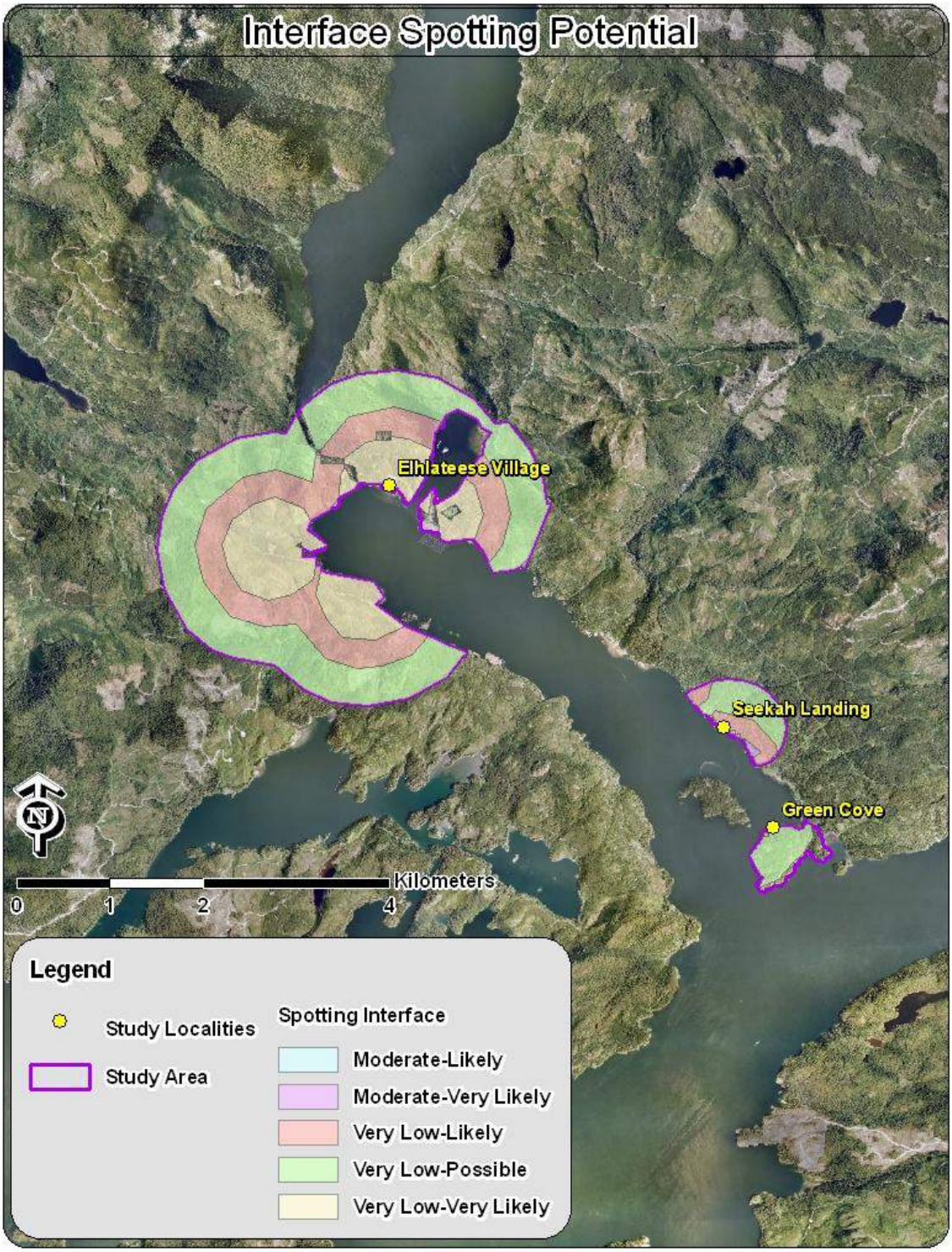
The data often requires some level of further refinement in order to more accurately portray a community's risk profile; these methods can include but are not limited to GIS analysis, use of orthophotography, ground truthing, and the use of provincially developed threat rating worksheets.

7.1 PSTA Data

PSTA data was supplied for the study area by the WMB and outlines structural locations and density, WUI areas, spotting potential, and fire probability. Structural locations identified as points required significant updating for additional development of residences and critical infrastructure in the Elhlateese area. Therefore actual structural density is considerably higher than calculated in the PSTA data. Structural data represented in the maps in this document have been updated after ground truthing and use of gps to confirm locations. Structures outside the main Elhlateese developed area were identified in ArcGIS with the use of orthophotography and Bing Maps[9].

Often it is spotting ignition that is responsible for structure losses, rather than direct flame contact or radiative heat. In order to assess the spotting risk to communities, the PSTA data identifies forest stands and hazardous fuels that have potential fire behaviour that would release embers and threaten nearby WUI. Generally, the Union of British Columbia Municipalities (UBCM) and MFLNRO have used a 2 km spotting zone from communities. Around Elhlateese, Green Cove and Seekah Landing study areas, spotting potential based on surrounding fuel types and their fire behaviour potential is classified as very low, whereas spotting distance in the event of a wildfire is classified as very likley close to developments and reduces to possible further away from developments (Map 15).

[9] © 2010 Microsoft Corporation



Map 15. PSTA data of interface spotting, classified by spotting potential and likelihood based on distance from interface.

7.2 Fire Risk

The overall fire risk is determined based upon a combination of the probability and consequence as per the Fire Risk Matrix below. Similar to the Province's Wildland Urban Interface Wildfire Threat Worksheet method, fire risk determination using the matrix below is more heavily influenced by the probability component that the consequence component.

Table 4. Probability and consequence are used to determine risk.

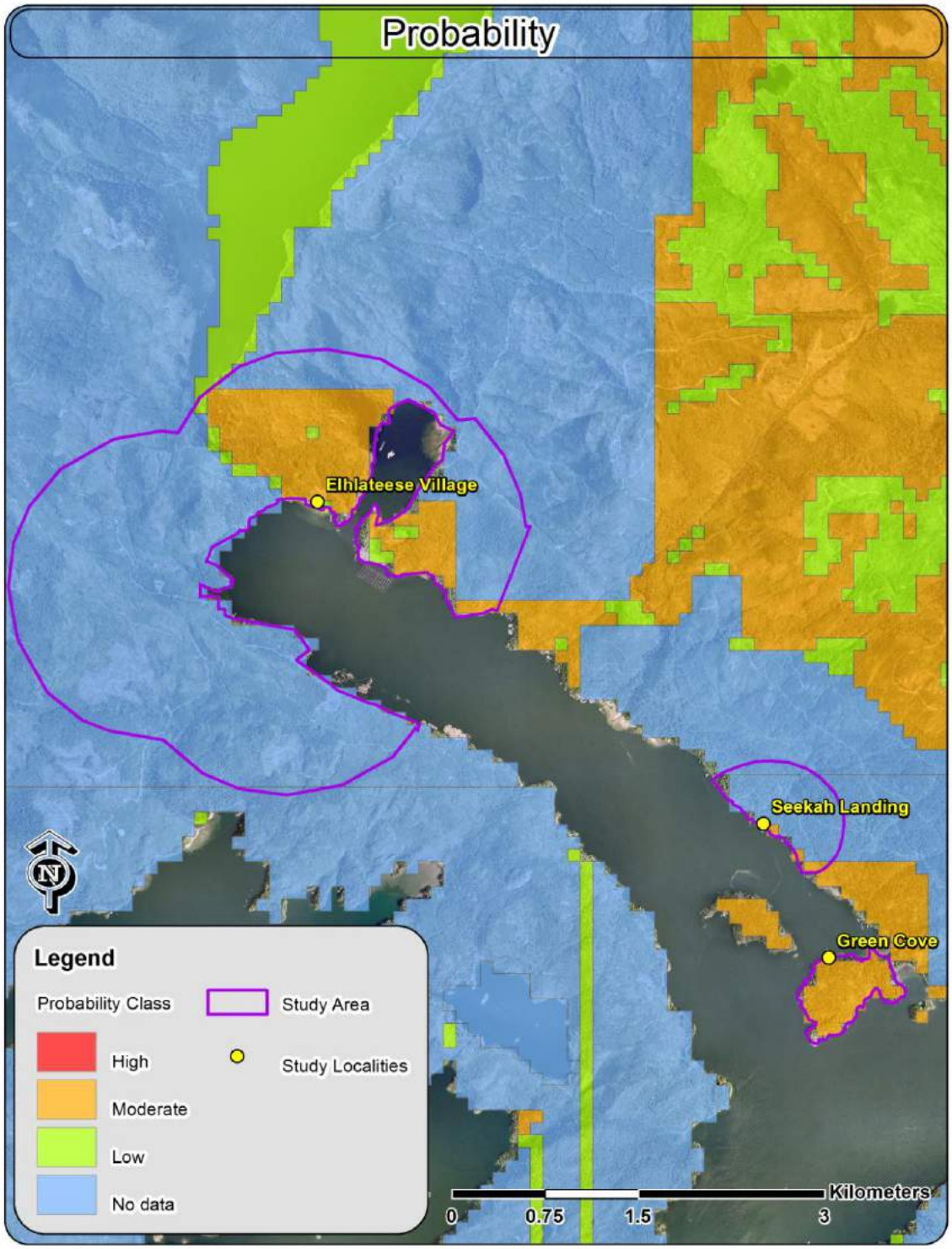
Fire Risk Matrix

		PROBABILITY>>>>				
		No Data	**Low**	**Moderate**	**High**	**Extreme**
CONSEQUENCE>>>>	**Low**	Low	Low	Moderate	High	High
	Moderate	Moderate	Low	Moderate	High	High
	High	N/A	Moderate	High	High	Extreme
	Extreme	N/A	High	High	Extreme	Extreme

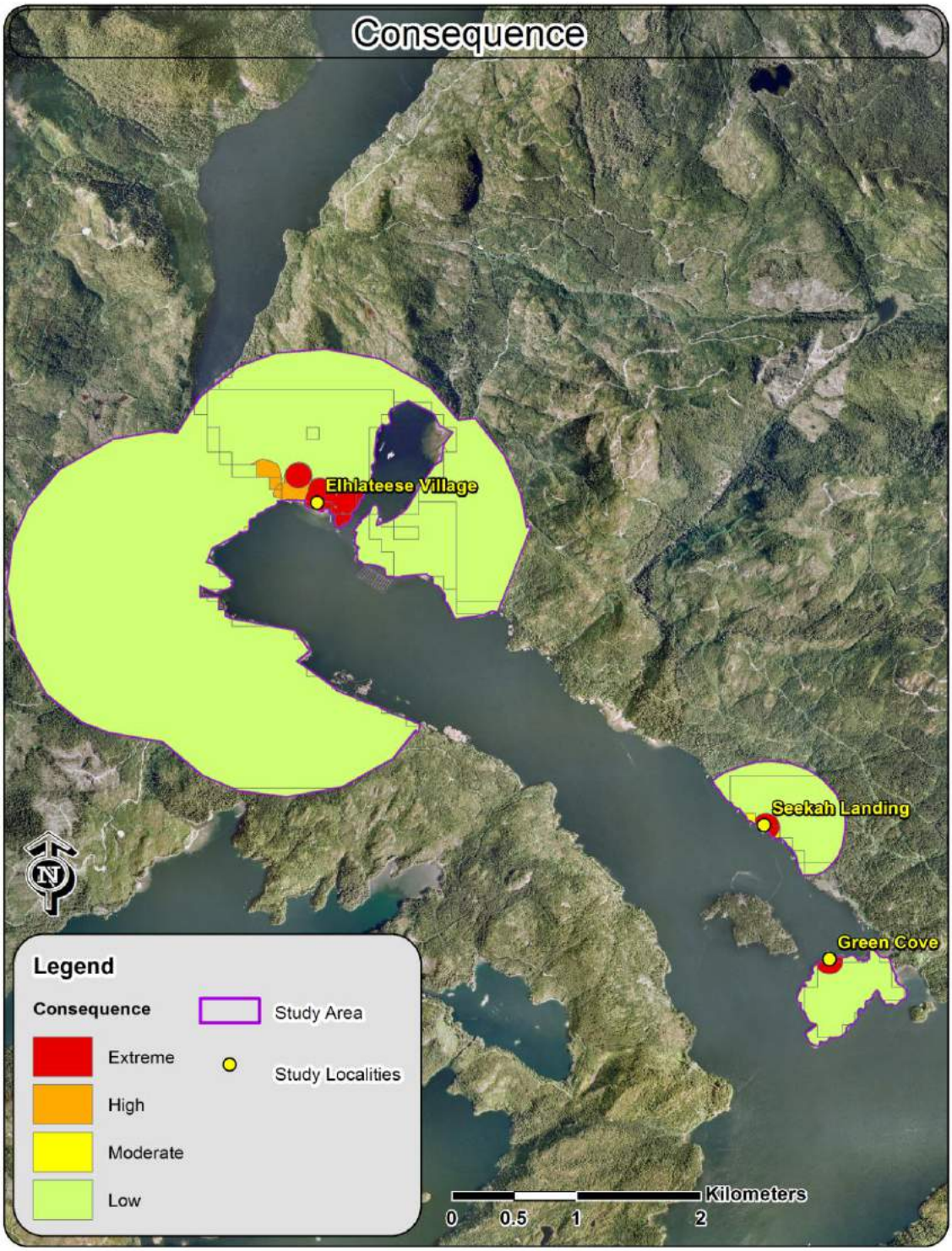
For the purposes of this community risk profile, probability was assigned by FLNRO WMB as part of the Provincial Strategic Threat Analysis (Map 16). A significant number of polygons within the study area had no probability data within the dataset. Probability was assigned for those polygons that were within the interface based upon adjacent probability polygons and professional judgement. Those polygons that were outside the direct interface area were retained as 'no data'.

Consequence was defined by proximity to values at risk. Within 100 m of structures and archaeological sites, consequence of wildfire was rated as high. Within 100 m of critical infrastructure, consequence of wildfire was rated as extreme. Polygons outside of the 100 m buffer were assigned low consequence, though spotting potential to structures and infrastructure remains (Map 17).

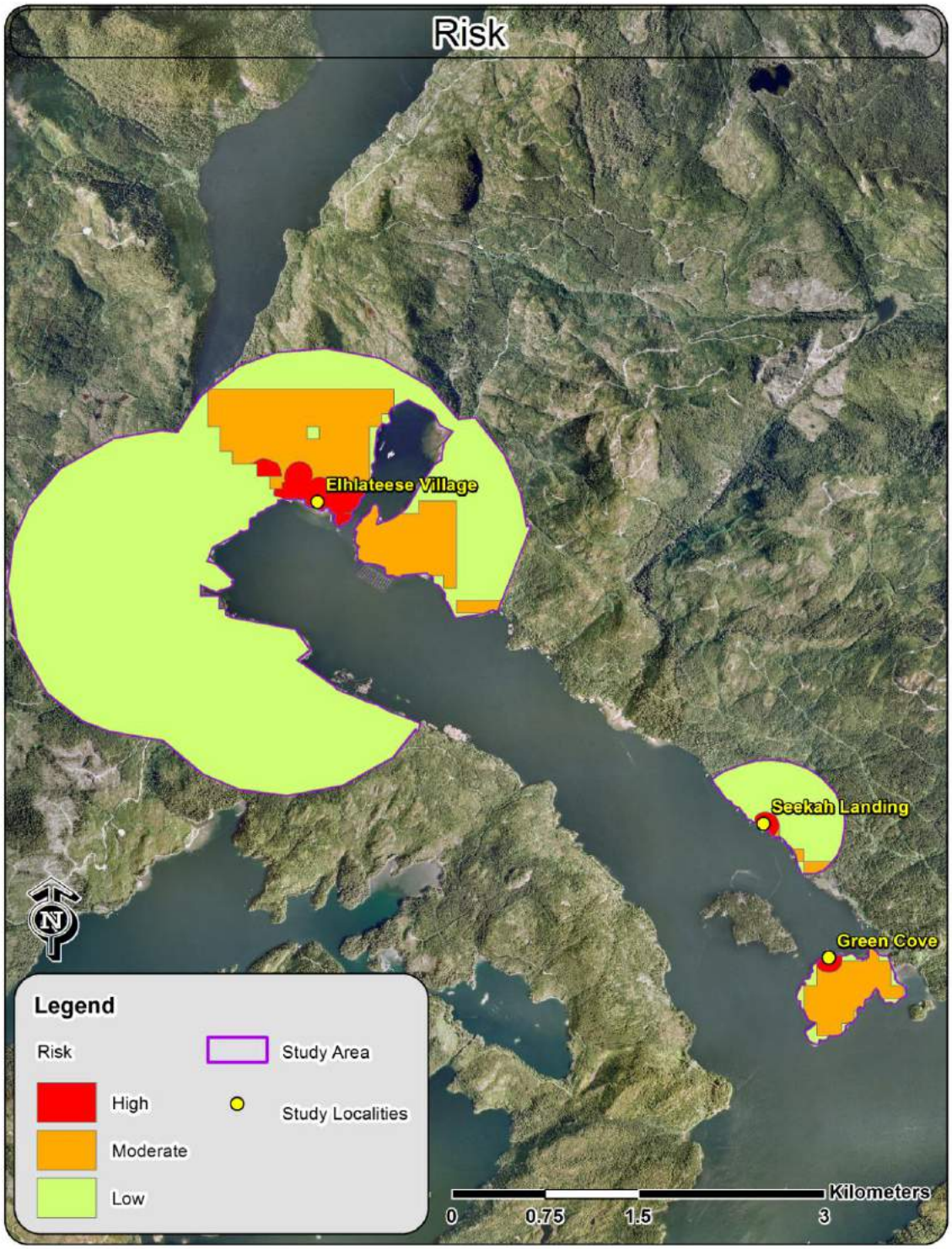
The community risk profile of the three study areas is primarily high adjacent to structures and infrastructure, due to mostly moderate probability and high to extreme consequence. Further from development and Uchucklesaht assets, the wildfire risk to the community decreases to moderate and then to low (Map 18).



Map 16. Probability of wildfire in the study areas, as per the Provincial Strategic Threat Analysis data.



Map 17. Consequence of wildfire in the study areas, as assessed by proximity to values at risk.



Map 18. Wildfire risk in the study areas.

7.3 Provincial Wildfire Threat Rating

To further assess fire risk, the 2012 provincial Wildfire Threat Rating worksheet was used, as required by UBCM[10]. This sheet provides point ratings for four components that contribute to wildfire risk:

1. Fuels,
2. Weather,
3. Topography, and
4. Structural Values at Risk

Data was collected at 5 fuel threat rating worksheet plots. Two of the five threat plots were rated a high wildfire behaviour threat class, while the remaining 3 were rated as moderate (Table 5,Table 6, Map 19). The high ratings are attributable to fuels in the stand and topography rating. The weather subcomponent of the ratings system was low for all plots (4 out of a total 30 points possible). A high rating in the fuel subcomponent was the biggest factor towards determination of wildfire behaviour threat class, as well as total overall rating. The structural values-at-risk subcomponent is only rated for those plots where the Wildfire Threat Behaviour Score is greater than 95 points.

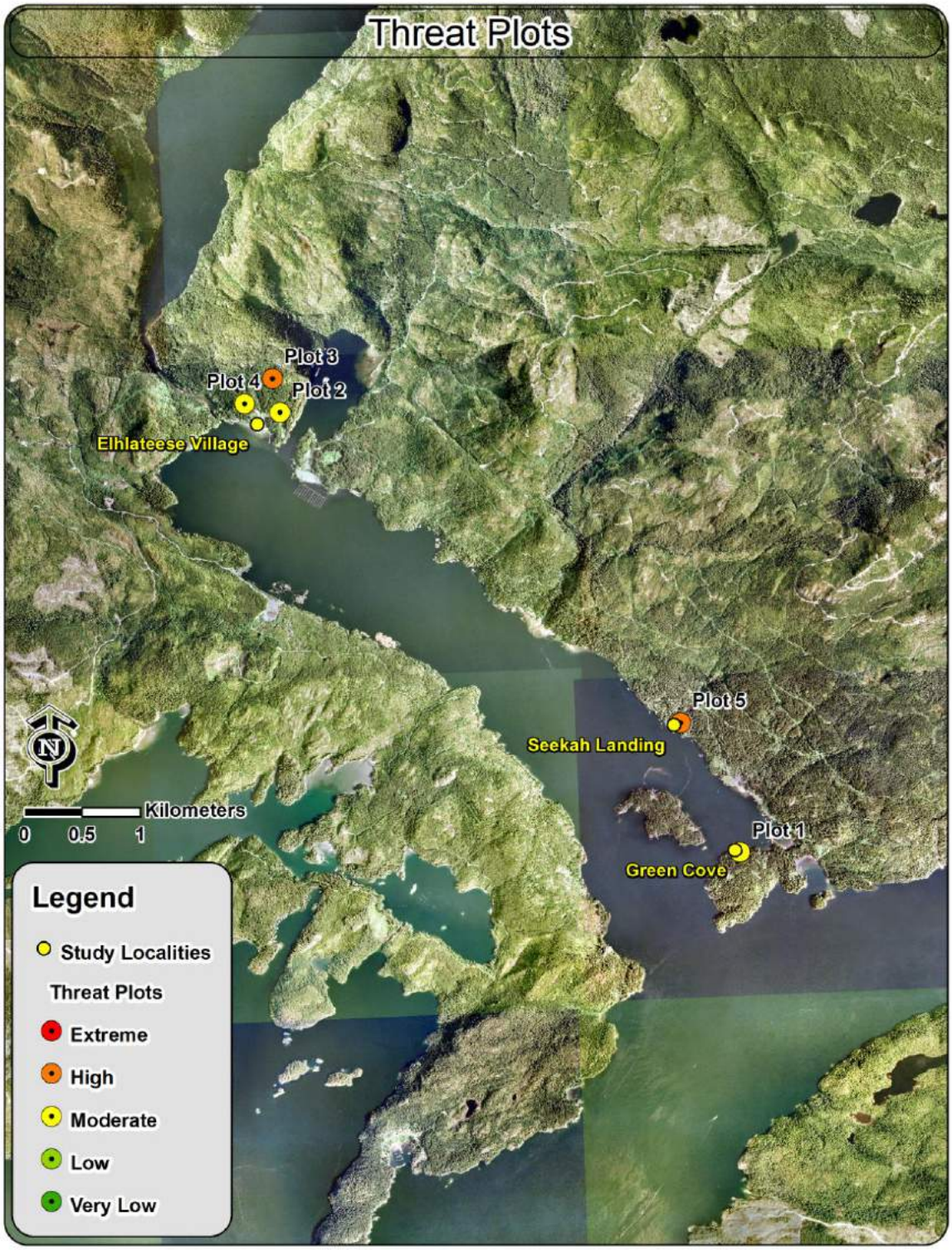
Table 5. Threat rating results, by plot.

Plot	Threat Rating Worksheet Assessments				
	WILDFIRE BEHAVIOUR THREAT SCORE	WILDFIRE BEHAVIOUR THREAT CLASS	WUI THREAT SCORE	WUI THREAT CLASS	TOTAL WILDFIRE THREAT SCORE
1	60	Moderate	N/A		
2	84	Moderate	N/A		
3	105	High	25	Moderate	130
4	90	Moderate	N/A		
5	96	High	35	High	131

Table 6. Number of threat rating worksheet plots shown by ratings and fuel type.

Fuel Type	Threat Rating Worksheet Assessments			
	LOW	MODERATE	HIGH	EXTREME
C3		3		
C4			1	
C5			1	
Total	0	3	2	0

[10] http://www.ubcm.ca/assets/Funding~Programs/LGPS/SWPI/Resources/swpi-WUI-WTA-worksheet-(2012-Update).pdf



Map 19. Locations where 2012 version threat rating worksheets were completed, symbolized by level of risk wildfire behaviour threat class.

8.0 WILDFIRE RISK REDUCTION RECOMMENDATIONS

The Action Plan consists of the key elements of the CWPP and provides recommendations to address each element. The elements discussed in this section include Communication and Education, Community Planning, Structure Protection, Emergency Response, and Fuel Management. At the end of each section is a table with a list of recommendations with a priority rating of **A** – High Priority, **B** – Moderate or long-term priority, and **C** - Low priority or already in progress.

Preventing, preparing for, and responding to wildfire emergencies are important priorities for the Uchucklesaht Tribe. To that end, this section can be used as guide for the future of the wildfire reduction and mitigation program.

8.1 FIRE PREVENTION: COMMUNITY EDUCATION AND COMMUNICATION

A community that understands the dangers that wildfires pose to their community is important to reducing risk and is more likely to support the adoption of tools to reduce fire risk in their community, be more prepared for an interface wildfire, and may help to minimize ignitions. A well-informed community is one of the keystones to building a FireSmart community. Without the support of the community, the efforts of public officials, fire departments, and others to reduce wildfire risk will be hampered. There is generally a lack of understanding about interface fire and the simple steps that can be taken to minimize risk in communities. There are two principle goals of an education and communication campaign: To reduce fire ignitions and to educate people on how to reduce fire risk on properties they own or manage.

To communicate effectively, fire prevention material must be audience specific and delivered in a format and through a medium that will reach each audience. Audiences should include Village residents and home owners, school students, executive and staff, local utilities, and the media. An excellent source of material to help guide fire prevention programs can be found at: http://www.nwcg.gov/pms/docs/wfprevnttrat.pdf

The following subsections outline potential communication methods that the Uchucklesaht might consider.

8.1.1 Reducing Human Ignitions

As noted in Section 6.2, wildfire cause statistics show that the majority of ignitions and every large fire in the last 60 years were caused by humans and therefore were preventable. This knowledge can assist in targeting WUI fire prevention messages. Human caused fire ignitions often occur when fire weather conditions support high fire behaviour. Reducing ignitions can be highly effective at reducing fire starts, especially if educational material is audience specific.

Three main approaches can be used to reduce human ignitions: educational programs, engineering solutions such as fuel treatments or design approaches for things such as vehicles or campgrounds, or the more punitive approach of enforcement.

8.1.1.1 Public Education

Effective public education is important in preventing or minimizing fire risk in the WUI. The Uchucklesaht Tribe and its partners need to work together to present a consistent interface fire risk reduction message to the community.

Though a consistent message over time is ideal, opportunities for higher levels of engagement should be recognized and capitalized upon. These may include formal or informal community events that are already occurring and have a good following, such as monthly Advisory Planning Commission (APC) meetings and more informal community gatherings, such as picnics, particularly those that take place in Elhlateese. School or youth group presentations also provide public education opportunities.

8.1.2 Fire Risk Reduction - Homeowners and Landowners

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, WUI homeowners and residents need to be made aware of their responsibility to implement FireSmart mitigations on their properties and the resultant benefits to community wildfire safety from these actions. FireSmart mitigation strategies include choices in exterior building materials, setbacks from forest edges and landscaping surrounding the home. Currently, there are no programs that assist homeowners to upgrade the fire resistance of their homes or reduce hazardous fuels on their land.

FireSmart informational material is readily available and simple 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.

It is important that residents be informed that FireSmart mitigations are designed to prevent structural ignitions during wildfire impingements on interface areas. Structures that don't ignite don't burn, regardless of whether or not there is a fire department or other fire fighting resources to attend the site.

The Uchucklesaht should consider conducting structural hazard assessments of houses with residents. WMB staff should support this process where possible. This information can be used to offer concrete, home-specific guidance to individual homeowners in Elhlateese on how to reduce the fire hazard around their home. Continued lobbying of FNESS to fund this sort of activity is important to realize change in the WUI.

8.1.3 Fire Risk Reduction –Local Government, Utilities, Business, and Forest Tenure Holders

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, and foster relationships that can be important during a wildfire event. By engaging these multiple stakeholders, expert information and opinion can be used to find unique and local solutions to reducing wildfire risk. The list below provides some general points to consider when dealing with multiple agencies:

- Develop material specific to the educational needs of the officials.
- Present councils with information and encourage cooperative projects between communities, municipalities and regional districts.
- Establish memoranda of understanding between agencies.
- Appoint a spokesperson from each agency or group to act as a representative to help foster inter-agency communication.
- Raise awareness of officials as to the views of the public regarding interface risks in their community.
- Ensure that various groups and organizations are aware of their roles and responsibilities in addressing wildfire risk.
- Do not minimize or exaggerate the level of risk.
- Only make commitments that can be kept.
- Plan carefully and evaluate the efforts of groups and organizations.

8.1.4 General Messages

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. It is important not to minimize or exaggerate the level of risk to the community. Generally, messages should at least have the following three components, much of which can be taken from this CWPP:

1. Background Information
    - Outline general issues facing the community.
    - Communicate specific conditions in the community that cause concern.
    - Provide examples of potential wildfire behaviour in the community.
    - Provide examples of how wildfire has affected other similar communities.
    - Explain the effects that a wildfire could have upon the community.
    - Convey FireSmart principles.
2. Current Implementation and Future Interface Planning
    - Provide information on the current planning situation.
    - Explain who is involved in interface planning.
    - Explain the objectives of interface wildfire planning.
    - Explain the limitations of firefighting crews and equipment in case of a wildfire.
    - Outline the emergency procedure during a wildfire.
3. Responsibilities and Actions
    - Outline the responsibilities of each group in reducing wildfire hazards.
    - Explain the actions that each group may take to meet these responsibilities.

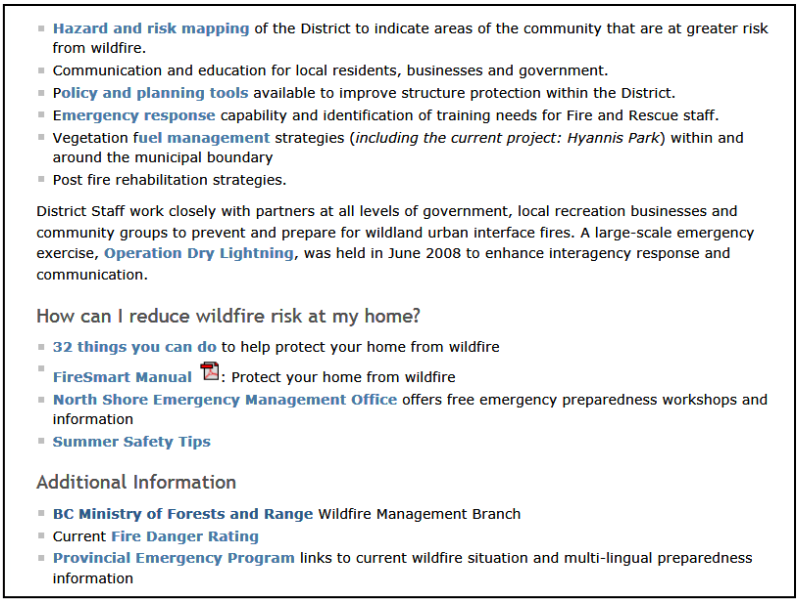
8.1.5 Methods of Communication

Websites

Websites are considered one of the best and most cost effective methods of communication available. Fire related information such as fire danger, fire restrictions, and fire risk assessment information should be included on the Uchucklesaht website. During fire season, it is particularly important that wildfire safety related information be posted so that it is easily accessible to the

community. Generic FireSmart information can be posted, as well. Web communications become particularly important, as this is the main and easiest method of communication to the Village from Port Alberni.

Figure 34 is an excerpt from the District of North Vancouver's public wildfire education website. It provides an example of a clear, navigable and informative public communication method. Rather than develop new material, the Uchucklesaht should talk to other communities and municipalities about the use of their information.



- **Hazard and risk mapping** of the District to indicate areas of the community that are at greater risk from wildfire.
- Communication and education for local residents, businesses and government.
- **Policy and planning tools** available to improve structure protection within the District.
- **Emergency response** capability and identification of training needs for Fire and Rescue staff.
- Vegetation **fuel management** strategies (*including the current project: Hyannis Park*) within and around the municipal boundary
- Post fire rehabilitation strategies.

District Staff work closely with partners at all levels of government, local recreation businesses and community groups to prevent and prepare for wildland urban interface fires. A large-scale emergency exercise, **Operation Dry Lightning**, was held in June 2008 to enhance interagency response and communication.

How can I reduce wildfire risk at my home?

- **32 things you can do** to help protect your home from wildfire
- **FireSmart Manual**: Protect your home from wildfire
- **North Shore Emergency Management Office** offers free emergency preparedness workshops and information
- **Summer Safety Tips**

Additional Information

- **BC Ministry of Forests and Range** Wildfire Management Branch
- Current **Fire Danger Rating**
- **Provincial Emergency Program** links to current wildfire situation and multi-lingual preparedness information

Figure 34. Example of web-based information.

Social Media

Social media is a great way to reach a large direct audience, as well as use viewers' network and interest to amplify the message to an audience that might not have otherwise been reached. The use of social media networking websites, such as Facebook, Twitter and YouTube, can be a useful tool for the Uchucklesaht to disseminate information. Information could include updates on fire hazard, upcoming FireSmart and community events, and status on any fires occurring near to the Village. There are a lot of great resources available on the internet that provide instruction and best practices on how local governments can most effectively leverage social media for public education. Figure 35 is an example Facebook page with valuable wildfire and public safety information.

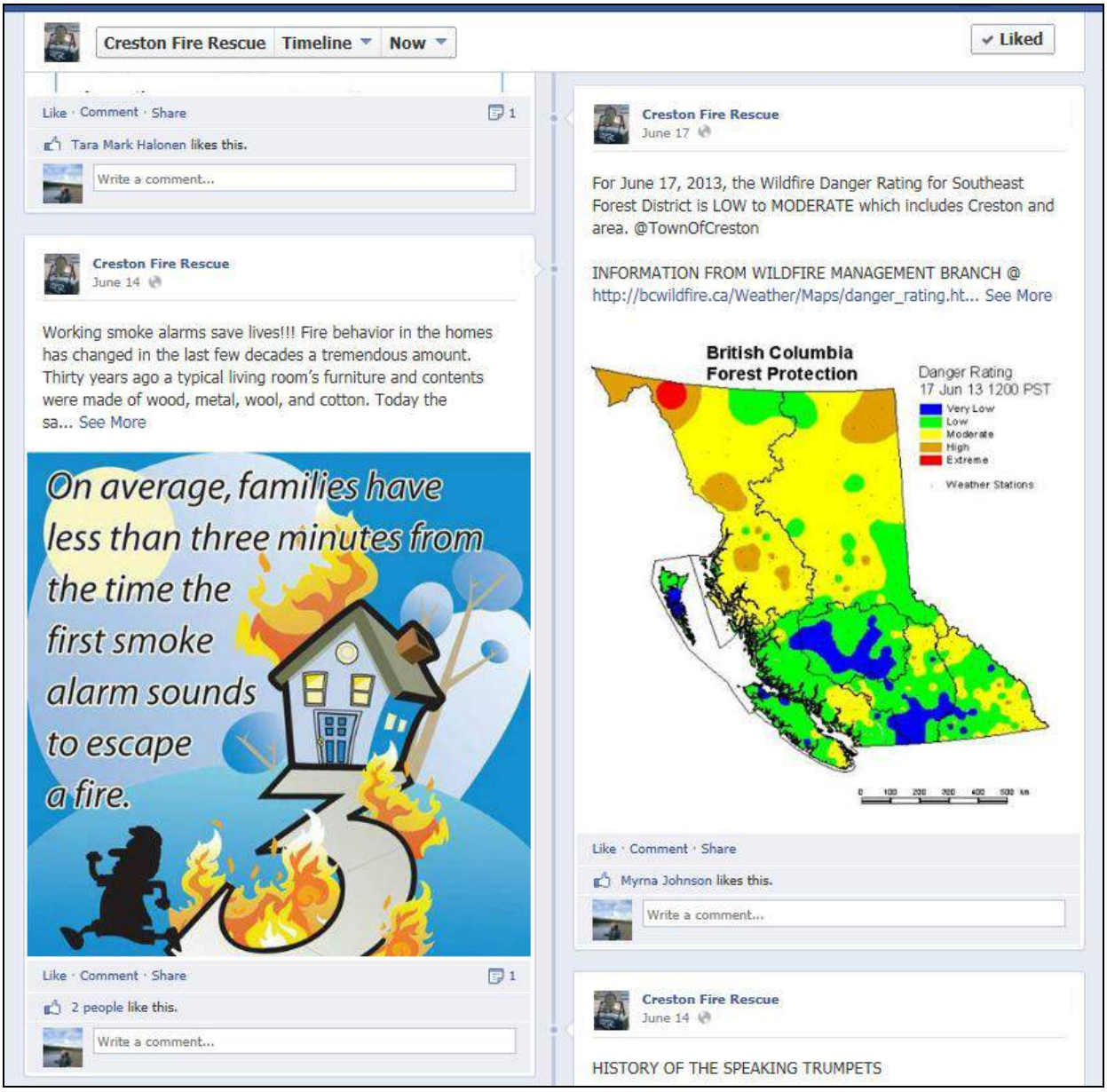


Figure 35. Example of public education and information that can be disseminated using social media outlets. [11]

Signs

Messages on signs should meet the needs of their audience. Signs should be complex enough to provide comprehensive answers, yet simple enough to be easily readable. Signage should be

[11] Creston Fire Rescue. [ca. June 2013]. In Facebook [Government Organization]. Retrieved July 2, 2013, from https://www.facebook.com/CrestonFireRescue.

used for community education in the case that fuel treatments are being planned or implemented.

Mail Outs and Public Education Presentations

Digital mail outs can be used to distribute information to the community to publicise community meetings, FireSmart information, and information relevant to Village residents. Where possible, the inclusion of information that is pertinent to the specific household will have the best result (i.e. structural hazard assessment of that house). Identification of hazardous fuel types or updates on fuel treatments will help keep residents informed and engaged.

Public education presentations should be based on recommendations provided by the **FireSmart – Protecting Your Community from Wildfire** manual. The FireSmart Manual is very comprehensive (173 pages) and contains a great deal of information which can be used to encourage community-based prevention plans or initiatives to reduce the risk of fire losses and enhance safety in the WUI.

Expert Opinion

The proximity of Port Alberni to the Port Alberni fire base and the Thunderbirds Unit Crew is a great resource to leverage. Information provided by experts can resonate very effectively with an audience. This partnership should be explored, as the Thunderbird Unit Crew was started as an all First Nations Crew and continues to employ and encourage engagement with various First Nations around the Alberni Valley. WMB staff should be invited to all public information sessions to provide their experiences and professional advice on what the community can do to reduce the community risk profile. Faciliate the travel of WMB staff and Unit Crew to informal and more formal gatherings in Elhlateese, when possible.

Fire Danger Monitoring and Communications

The Village is remote and communications between its residents and the Uchucklesaht Tribe offices or other wildfire information may experience delays. It is important that accurate and up to date information on wildfire status be conveyed to the residents in times of high wildfire activity.

During periods of high wildfire activity in the area of the Village, the Tribe should appoint an Informations Officer to monitor the WMB website, which features a ‘Current Wildfire Situation’ link (http://bcwildfire.ca/Situation/) and provides details on active wildfires in the Uchucklesit Inlet area. This may help to increase wildfire awareness, as well as maintain regular and accurate communications regarding in the event that wildfire threatens the Village.

School Education Programs

Educating children and teenagers is an effective and long-term approach to changing beliefs and behaviours related to wildfire and human caused fires. Presentations that target important behaviour-modifying or guideline compliance messaging at children and youth via school programs have proven to be highly effective in structural fire prevention initiatives, as youth often take the message home and foster adoption by parents and relatives. FireSmart education programs, often developed jointly by WMB staff, Fire Department staff and local educators, and

can range in complexity to communicate age appropriate messages to the students. The Tribe should consider working with Port Alberni and School District 70 to add FireSmart lesson plans to the local elementary school curriculum.

Material can be developed or adapted from existing material to address the specific age groups that are targeted. Comics, colouring books, online games and other materials with basic information are available. In older age groups, the information presented should increase in complexity to ensure students are challenged and continue to grow their knowledge and attitudes towards wildfire risk reduction. Fire ecology can also be incorporated as part of secondary school biology courses. An excellent source for educational material for young children and youth is: http://www.wildlandfire.com/docs/wildfire_edu.htm#child.

8.1.5.1 *Education and Communication Recommendations*

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
1	A	Educate residents and homeowners regarding hazardous conditions around houses	Home owner education levels and engagement around wildfire risks vary through the community	Widespread recognition of hazardous fuels and materials around house	Treatment of hazardous fuels on in Priority 1 and Priority 2 zones surrounding houses	Digital mail outs of FireSmart and CWPP information to residents in the Village.
2	A	Youth education	No formal youth education program currently exists	Annual FireSmart campaign in elementary schools and high schools	Established communication strategy adequately resourced	1) Encourage elementary and secondary school educators to develop a lesson plan on FireSmart and Wildfire for use at the District Level. 2) Encourage the Ministry of Education to develop material for elementary and high schools. 3) Work with Port Alberni and District 70 (Alberni) to include FireSmart materials in their annual curriculum.
3	A	Improved use of internet for messaging	Uchucklesaht Tribe has a functioning and easy-to-navigate website. No wildfire information is available on the website.	Prominent website and social media FireSmart messaging and Fire Danger updating	Community website has up to date and accessible information, active Twitter or Facebook campaigns	1) Upgrade the website and use other media to provide current and locally relevant wildfire related information such as Danger Class and FireSmart information. 2) Post information from the CWPP on the website showing areas with hazardous fuel complexes. 3) Start official Uchucklesaht Tribe Facebook page to disseminate information regarding public safety, fire danger, upcoming FireSmart events, etc.
4	A	Raise community awareness about fuel treatments	No FireSmart educational information scheduled in organized community events	WMB Fire Zone staff and Thunderbird Unit Crew at community events providing expert opinion and information	FireSmart information provided at 100% of community events	1) Invite WMB Staff and Thunderbirds Unit Crew to community events to provide expert opinion and information on FireSmart. Facilitate their travel out to Elhlateese events when possible. 2) Provide FireSmart stock material at all community events.

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
5	A	Reduce ignitions	No ignition reduction program exists	Zero ignitions along trails and pull-outs.	Reduced number of human caused ignitions	1) Seek to develop and distribute targeted WUI fire prevention materials at the Village, Uchucklesaht Tribe office, and on the website. 2) Erect signage regarding fire danger and campfire etiquette/ rules at most populous camping area on Henderson Lake.
6	A	Reduction of hazardous fuels surrounding houses	Majority of houses are close to meeting FireSmart vegetation standards	Treatment of hazardous fuels in Priority 1 and Priority 2 zones	Increase in the amount of treated hazardous fuels on private land versus untreated hazardous fuel complexes	1) Inform homeowners of what constitutes hazardous fuels near to their home. 2) Request that residents address hazardous fuels prior to the fire season. 3) Conduct structural hazard assessments and communicate ratings to homeowners and residents.
7	A	Provide accurate and timely wildfire information during periods of high wildfire activity	The Uchucklesaht does not provide updates	Appointed Informations Officer for periods of high wildfire activity or wildfire activity in the Uchucklesit inlet area	Daily reports on wildfire activity in or around the Village, office staff educated to provide responses to inquiries	1) Appoint an Informations Officer to monitor WMB website and liaise with WMB staff. 2) Provide daily updates for website and Facebook updates and internal circulation.

8.2 COMMUNITY PLANNING AND BYLAWS

Official Community Plans (OCPs) and resultant zoning regulations are key tools available to the Uchucklesaht to control and guide growth in the community. Regulations come from the OCP process and are made such that they support the overall vision of the OCP. Numerous communities around the province have begun to develop these tools, and others, such as Development Permit Areas (DPAs) to help reduce wildfire risk.

Two types of wildfire safety regulations are most commonly used by local governments: 1) regulations that restrict the use of fire; and 2) regulations that restrict building materials, require setbacks or restrict zoning. These regulations contribute significantly to wildfire risk reduction. Several regulation options are generally available to local governments and primarily relate to:

- Burning regulations stipulating size, location, and timing of burning allowed (Type 1)
- Voluntary fire risk reduction for landowners (building materials and landscaping) (Type 2)
- Regulations for building materials and subdivision design (siting, form, exterior design and structure finish, for example) (Type 2)
- Zoning regulations or bylaws requiring setbacks and vegetation spacing and restricting type and proximity of vegetation to development (Type 2)
- Site hazard assessments that determine requirements and recommendations (Type 2)
- Community education
- Fuel management treatments in FireSmart Priority zones (commercial thinning, non-commercial mechanical thinning, clear-cut commercial harvesting or prescribed burning)

In the short term, Type 2 policy options can be difficult to implement given the significant cost to homeowners. However, over the long-term, altering building codes or zoning regulations to encourage changes in siding or roofing materials during replacement, renovations, or during new development is generally a viable option.

Other examples of issues which can be corrected through bylaws include:

- Minimum setbacks for new houses from forested areas.
- All roofing installations and materials meet class “B” fire rating requirements contained within the B.C. Building Code.
- Fuel modified areas maintained from home to 10 m distance.
- Requirement to maintain flammable materials a minimum of 10 m from residence during fire season.
- All eaves, attics, decks and under floor openings are screened to prevent the accumulation of flammable material.
- All wood burning appliances are installed with approved spark arrestors.

8.2.1 Status of Uchucklesaht Tribe Acts and Regulations

Currently, there are no land use controls or long range planning in place for Uchucklesaht Tribe treaty lands[12]. In order to help guide the future development and planning of Elhlateese and other Uchucklesaht lands, a draft Official Community Plan (OCP) is in development. The OCP is an Act that will identify the vision of the community's future land use and will help to direct goals, policies, and objectives in order to meet that vision. It is the aim of the Uchucklesaht to have a draft OCP in place by fall of 2013[13].

After the OCP is drafted and approved, the Uchucklesaht Tribe can look into the addition of regulations which support the overall vision set by the OCP. These may include regulations which designate no burn areas or specific areas in the village where incineration may occur, set seasonal or fire danger-based burning restrictions, set restrictions on the type and placement of trees and vegetation in proximity to homes and development, set restrictions on placement of flammable materials near to structures, place building material requirements on new developments and renovations, and regulate campfire use and timing.

For planners developing DPAs and Bylaws, the National Fire Protection Association in the United States offers a more comprehensive approach that can be used to draft regulations. Codes and standards such as NFPA 1144 (Protection of Life and Property from Wildfire) and NFPA 1142 (Water Supplies for Suburban and Rural Fire Fighting) provide standards to be used to develop specifications (http://www.nfpa.org).

8.2.2 Enforcement

A significant challenge facing the community in regards to regulations is limited mechanisms of enforcement for contraventions. Contraventions within Elhlateese can be largely self-enforced as community members become aware of new regulations and their importance in regards to improving public safety and reducing fire risk to their community. Additionally, visits by Uchucklesaht staff can be used for intermittent spot checks of various public safety-based regulations.

Enforcement of regulations in treaty areas further from the WUI is unlikely to occur. This is due to limited access, time, and resources of Uchucklesaht staff. Non-compliance with campfire and burning regulations becomes a particular concern in the situation of increased camping and recreating on treaty settlement lands. The new access route to Henderson Lake from Port Alberni has cut driving time to Henderson Lake to 90 minutes. This has already led to an increase in recreational use and camping; unattended or inappropriate use of campfires are a significant ignition risk. Should official campsites be developed, revenues can be used to provide enforcement of burning regulations. The timeline on this development is unknown.

[12] http://www.uchucklesaht.ca/cms.asp?wpID=229

[13] Horton, Monty. Personal communication. 9 May 2013.

8.2.2.1 Planning and Bylaw Recommendations Continued

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
8	C	Complete and approve OCP with wildfire risk identified and mitigation as part of the overall vision	Draft OCP is in progress	Zoning regulations that guide development in the WUI	Zoning regulations that result in FireSmart building and development practices in new and renovated homes	A zoning regulation that requires that new developments and renovations be built in accordance with FireSmart guidelines for structural design, setbacks, and vegetation fuel reduction should be developed.
9	A	Draft Wildfire Regulations	No regulations related to building setbacks or construction practices exist. No burning regulations exist.	FireSmart construction and design practices implemented. Burning implemented safely.	Adoption and enforcement of bylaws that support FireSmart guidelines	1) Regulations should be developed to ensure that home owners are required to abate high fire hazards around their homes. 2) Regulations should be developed to limit size, location, and timing of burning activities in the village and across treaty lands.
10	B	Conduct FireSmart assessment of high hazard properties to enable the encouragement of residents to reduce the hazard on their property.	Hazard abatement is not systematic and is dependent upon residents' knowledge and willingness to reduce hazards	Conversion of areas of high hazard to moderate or low hazard	Percent reduction of the number of high hazard structures	The Uchucklesaht should conduct FireSmart hazard assessments of high risk properties in the community. This information should be communicated to homeowners/ residents. UBCM/ FNESS should be lobbied for funding for this activity (currently it is not funded).

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
11	A	Provincial coordinated regulations related to fire and activity bans	No burning regulations are in place in the community.	Complementary and supporting wildfire regulations at all levels of government	Burning/ campfire regulations and industrial closures are aligned with provincial bans and closures.	Ensure that all newly created burning bylaws, and regulations on activities such as campfire bans, industrial closures, fire tool requirements, and prevention activities are consistent with provincial regulations and bans, as set by the Coastal Fire Centre.

8.3 STRUCTURE PROTECTION

Building a FireSmart community will help reduce losses and impacts related to a wildfire. Critical infrastructure is distinct as it provides important services that may be required during a wildfire event or may require additional considerations or protection. An example of this is the generating station and the water treatment station and reservoir. FireSmart principles are important when reducing wildfire risk to critical infrastructure and are reflected in the recommendations included in this section.

8.3.1 Critical Infrastructure

Critical infrastructure is important to consider when planning for a wildfire event. The use of construction materials, building design and landscaping that applies to residential and commercial structures must also be considered for critical infrastructure (Figure 36). Maintaining power to critical infrastructure and maintaining water for fire suppression and public health are important areas of planning.

Key critical infrastructure was visited during the field portion of the CWPP. In general, the key infrastructure for Elhlateese meets FireSmart standards for building materials and vegetation setback (Table 7). Many infrastructure buildings and envelopes were constructed of fire resistant material and roofing (flat roofs were not inspected). Vents on some structures may require finer screens to prevent embers from entering the building envelope and eaves and decks should be closed off. As scheduled building improvements or renovations occur, FireSmart building materials should be preferred, with particular focus on updates to Green Cove and Seekah Landing infrastructure, as it is higher hazard than most in Elhlateese.

Setbacks from vegetation were generally compliant with FireSmart recommendations, though high levels of vegetation in Priority Zone 1 exist around the Nurse's Station, the Green Cove Store and Generator, and the Seekah Landing Cabin. The Uchucklesaht Tribe should ensure that the vegetation surrounding critical infrastructure meets or exceeds the FireSmart guidelines. Ideally this would include fuel free areas in Priority Zone 1 or minimally low flammability fuels (deciduous and herbaceous plants and green grass) in the Priority Zones 1 and 2. Monitoring of vegetation re-growth in the Priority Zones and regular maintenance to remove vegetation will likely be required.

Wooden docks and their creosote pilings are vulnerable to ember showers and ignitions. Boats with flammable fuels tied to the docks increase the fire risk to the transportation infrastructure. The importance of water access to the study areas makes the protection of the docks and boats vital, though difficult.

Table 7. FireSmart recommendations for critical infrastructure and other important structures in the three study areas.

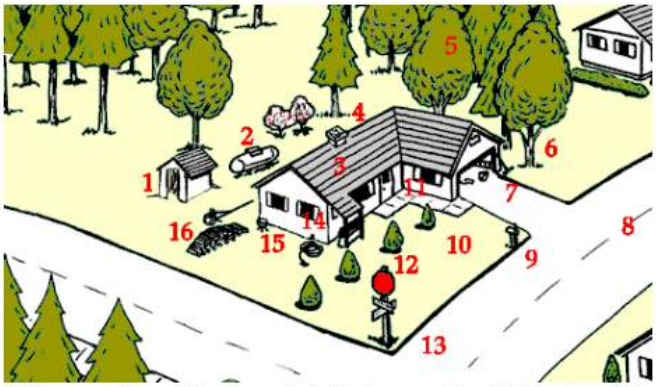
Facility	Study Area	Building Materials/ FireSmart Vulnerability	Vegetation Setback	Recommendations
Generating Station	Elhlateese	FireSmart	Fuel free P1 and P2 zones	Monitor vegetation and maintain fuel free in P1 and P2 zones. Consider fuel treatments in P3 zone.
Water Treatment Plant	Elhlateese	FireSmart	Fuel free P1 and P2 zones	Monitor vegetation and maintain fuel free in P1 and P2 zones. Burn slash piles in P3 zone. Consider fuel treatments in P3 zone.
Water Reservoir	Elhlateese	FireSmart	Fuel free P1 and P2 zones	Same as water treatment plant.
Health Clinic	Elhlateese	Wood siding, open deck, open vents, wood shingles	Coniferous vegetation in P1 zone	Prefer FireSmart building materials as renovations occur or treat wood siding with fire retardant chemicals. Remove coniferous vegetation in P1 and P2 zones. Maintain non-flammable vegetation under deck. Ensure vents are screened with 3 mm mesh.
Internet/ Satellite Dish	Elhlateese	FireSmart	Vegetation encroaching into P1 zone	Create and maintain fuel free P1 zone
Dock	Elhlateese	Creosote pilings, concrete decking	N/A	
Hydrants	Elhlateese	FireSmart	Fuel free P1 zone	None
Maintenance Building	Elhlateese	Wood siding, open deck	Flammable fuels in P1 zone	Create and maintain fuel free P1 zone, maintain P2 zone with non-flammable vegetation. If maintenance shed houses flammable fuels inside, consider moving shed further from residences.
Power Lines	Elhlateese	Wood pole	O1b under right of way	Maintain low fuel complex under power lines. Monitor and remove danger trees from along power lines right of way.

Facility	Study Area	Building Materials/ FireSmart Vulnerability	Vegetation Setback	Recommendations
Store	Green Cove	Wood siding, open deck, open eaves,	Mostly deciduous vegetation in P1 zone	Remove coniferous vegetation from P1 zone. Update building to FireSmart as renovations or building improvements occur (close eaves, close deck, treat wood siding, etc). Remove flammable fuels (gas tanks, etc) from P1 zone.
Generator	Green Cove	Wood siding, open eaves	Mostly deciduous vegetation in P1 zone	Prefer FireSmart building materials as improvements occur. Close or screen openings, vents, or other areas that could trap embers. Maintain low flammability vegetation in P1 zone. Clear vegetation from around the diesel tank.
Dock	Green Cove	Wood dock, creosote piling	N/A	
Gas Station	Green Cove	Wood siding,	N/A	Prefer FireSmart building materials as improvements occur. Close or screen openings, vents, or other areas that could trap embers.
Dock	Seekah Landing	Wood dock	N/A	
Cabin	Seekah Landing	Wood siding, open deck	Deciduous vegetation in P1 zone, flammable material stored under deck and in P1 zone	Maintain low flammability vegetation in P1 zone. Remove combustibles from under deck or close deck off. Treat wood siding.

Every year many families lose their homes and possessions to the ravages of wildfire.

It only takes few moments of time to become aware of the safety measures that can reduce the risk of losing your home to wildfire. Only you can decide if it's worth the effort!

Just 10 m of defensible space may save your Home!
(Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure)



[1] Store gasoline and other flammable liquids in approved safety containers and away from occupied buildings.

[2] Liquified Petroleum Gas (LPG) tanks should be far enough away from buildings for valves to be shut off in case of fire. Keep area clear of flammable vegetation.

[3] Clean roof surfaces and gutters regularly to avoid accumulation of flammable materials.

[4] Maintain a screen constructed of non-flammable material over the flue opening of every chimney or stovepipe. Mesh openings of the screen should not exceed 1 cm.

[5] Remove portions of any tree extending within 3 metres of the flue opening of any stove or chimney.

[6] Remove branches from trees to a height of 3-4.5 metres.

[7] Have fire tools handy such as: ladder long enough to reach the roof, shovel, rake, and bucket for water.

[8] All roads and driveways should be at least 5 metres in width.

[9] Name and address should be posted at driveway entrance.

[10] Clean leaves and flammable debris from around structures.

[11] Each home should have at least 2 different entrance and exit routes.

[12] Fire resistant shrubs should be spaced at least 4.5 metres apart.

[13] Names of roads should be indicated at all intersections.

[14] Garden hose should be connected to outside water outlet.

[15] Dispose of stove or fireplace ashes and charcoal briquettes in a fire safe container.

[16] All combustibles such as firewood, picnic tables, boats, etc., should be kept away from structures.

Figure 36. "Is your home FireSmart?" information. Accessed 4 July, 2013. http://novascotia.ca/natr/forestprotection/wildfire/firecentre/fire-smart.asp.

8.3.1.1 *Critical Infrastructure Recommendations*

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
12	B	Fire Resistant Building Materials	Critical infrastructure is generally well constructed of FireSmart materials.	Compliance with FireSmart guidelines	Building materials and design meets or exceeds FireSmart recommendations	Review all critical infrastructure and upgrade materials to FireSmart when doing renovations and/or building upgrades (Nurse's Station, Green Cove Store, Seekah Landing Cabin).
13	A	Secure power source or backup power	Back-up power is currently not on-site.	Backup power source for all critical infrastructures.	No or minimal interruption of power in event of main power loss	Purchase mobile generators for use at the water treatment plant/ water reservoir and communication site (internet) in the case of power failure.
14	B	Increase relative humidity and reduce the potential for ember induced fires	No critical infrastructure buildings have rooftop sprinklers	All critical infrastructure should have rooftop sprinklers	Percent of critical infrastructure with sprinklers	1) Rooftop sprinklers should be installed on critical infrastructure buildings to help reduce structure loss, prioritizing those structures that do not currently comply with FireSmart building material recommendations, or 2) Purchase mobile sprinkler protection units for critical infrastructure protection.
15	A	Achieve FireSmart compliance with respect to vegetation management to reduce radiant heat ignition of buildings	Most sites comply with FireSmart standards	FireSmart Priority zones 1 and 2	10 m fuel free zone, 10-30 m fuel modified zone	1) Implement vegetation management in Prioity Zones 1 and 2 (0 - 30 m). 2) Maintain communication with BC Hydro to ensure that fuels adjacent to the generating station and in the power line right of way are maintained at a fuel free and low level, respectively. 3) Monitor vegetation re-growth at regular intervals and perform vegetation management maintenance, as necessary.

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
16	B	Achieve FireSmart compliance with respect to Priority Zone 3	Most critical infrastructure sites are surrounded by C3 or C5 fuel complexes	Priority zone 3 with C5, M2 and D1 fuel complexes	Percent of critical infrastructure Priority Zone 3 with low - moderate fire hazard fuel complexes	Implement fuel treatments in Priority Zone 3 (30 - 100 m) of critical infrastructure. Include planting deciduous where ecologically appropriate and/or encourage deciduous regeneration where possible.

8.3.2 Residential Structures

There are 14 residences in the Elhlateese study area, most of which partially comply with FireSmart standards for building materials or surrounding vegetation. Significant improvements could be made to the majority of the homes to dramatically reduce their wildfire hazard. Some of these measures can be applied with very little cost, while others require greater cost and a long-term commitment (Partners in Protection 2003).

A good start for the homeowner would be to complete a FireSmart Home and Site Assessment Form (APPENDIX D - EXAMPLE FIRESMART HOME ASSESSMENT FORM[14]). The Uchucklesaht Tribe should encourage and facilitate the completion of these assessments. This can be done by providing the forms to Village residents, having staff help residents through the assessment form completion process, or hiring a professional consultant to complete the forms for homeowners and engage in follow-up meetings with homeowners to go over individualized recommendations for action.

Forest vegetation in Priority Zones 1 and 2 of Elhlateese residences is generally a mix of deciduous shrubs and trees, herbaceous vegetation, and coniferous tree species (western redcedar and western hemlock). Homeowners should target to remove coniferous vegetation within Priority Zones 1 and 2 and maintain deciduous and herbaceous vegetation green, non-continuous, and short. The study area around the village is treaty land, which makes it ineligible for any current provincial or federal funding programs for fuel management. FireSmarting homes is one of the most effective methods for reducing the Village's fire risk profile.

Many of the structures located in the study areas do not comply with FireSmart recommended guidelines with respect to structural options. While some structures feature rated roofs (metal or asphalt shingle roofing), many roofs are wood shake or shingles or have accumulated forest debris. Structural features such as open decks and eaves, wood or vinyl siding, and firewood and other combustible material piles adjacent houses are common. Though changing building materials can be costly, FireSmart building materials can be preferred or required during renovations or in newly built structures. Also, lower cost measures should be implemented to reduce wildfire hazard to homes; regularly clean roofs and maintain free of vegetation and litter, screen in vents, and move woodpiles, propane tanks, and other flammable fuels a minimum of 10 m from residence.

To help protect existing houses that cannot be retrofitted to FireSmart standards, homeowners should be encouraged to put sprinklers on their roofs. In the event of a wildfire, these sprinklers can be turned on to raise relative humidity around the home and wet flammable material. This will help protect the structures in the absence of structural fire suppression and FireSmart improvements.

[14] Ministry of Natural Resources fire management office, Provincial Government of Ontario. http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@affm/documents/document/243924.pdf. Accessed 4 July 2013.

8.3.2.1 *Residential Infrastructure Recommendations*

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
17	A	Decrease hazardous fuel accumulations around private houses	Residences in varying states of low to moderate hazard fuels	All housing with low hazard fuels around	Percent of houses with low hazard fuels	Uchucklesaht Tribe to facilitate a program to help residents dispose of hazardous vegetation removed from around their home. Provide a chipping program, organize community work days, or provide direction or bylaws on safe-burning practices.
18	B	Increase use of fire resistant building materials	Most residences are not built according to FireSmart principles	Compliance with FireSmart guidelines	Building materials and designs meet or exceed FireSmart recommendations for new and renovated buildings	Develop a regulation that requires renovations and new structures be built to FireSmart guidelines.
19	A	Reduce house ignition due to radiant heat	Residential structures FireSmart compliance is varied	FireSmart Zones 1 and 2 fuel treatments to meet FireSmart recommendations	10 m fuel free zone, 10-30 m fuel modified zones are in place next to most residences	Encourage residents to conduct FireSmart treatments on their own properties. Removal of vegetation in P1 zones and maintain P2 zone with low flammability vegetation. Clean vegetation and litter from roofs.
20	A	Reduce house ignition due to flammable materials	Woodpiles and other flammable materials are commonly kept under eaves or adjacent to structures	No moderately or highly flammable materials in FireSmart Zone 1	Elimination of all flammable debris within 5 m of buildings and a reduction within 10 m of buildings	1) Encourage homeowners to move woodpiles and other combustibles 10 m from home during fire season. 2) Facilitate program where community members help other, less mobile community members move and/or eliminate flammable material within 5 m of their residence.
21	B	Increase sprinkler use in high hazard areas	Zero residences have rooftop sprinklers	All houses have rooftop sprinklers or have access to mobile sprinkler unit	Increase in the number of rooftop sprinklers	Residents should be encouraged to install rooftop sprinklers to help reduce structure loss.

22	A	Improve structure mapping and identification	Structure (residential and infrastructure) mapping is available, but outdated	All residences and critical infrastructure mapped accurately with address and owner	Decrease in the number of homes and infrastructure inaccurately mapped	1) The Uchucklesaht Tribe should update the Elhlateese mapping to account for changes in residences and new infrastructure built. Mapping should be updated every five years or after new development. 2) Include up to date mapping in the updated Community Emergency Plan.
23	B	House structural and site hazard assessments	No assessments have been completed	All houses in Elhlateese are hazard rated and mapped	Increased number of houses hazard rated	1) Provide FireSmart home assessment forms to Village residents. 2) Facilitate or help residents to complete assessments and discuss resulting recommendations for action to reduce wildfire hazard to their house.

8.4 EMERGENCY RESPONSE – TRAINING, EQUIPMENT, EVACUATION

Wildfire suppression on treaty lands and the adjacent Crown lands is the responsibility of the MFLNRO WMB. The closest base is the Port Alberni Fire Base located at the Port Alberni airport, part of the Mid-Island Fire Zone within the Coastal Fire Centre. The Port Alberni base is home to the Thunderbirds Unit Crew, a 20-person crew which can be broken into smaller five-person units depending on firefighting needs. There are also smaller, 3-person Initial Attack crews based out of Errington Base in Parksville.

There is no official emergency response unit for the three study areas. Currently, the Uchucklesaht Tribe provides suppression equipment to Elhlateese residents for use in the case of structural fire or wildfire. First response falls to the general population, or in essence, whoever is closest and available. Due to the structure of first response, it is integral that: 1) Elhlateese residents are equipped with functioning and dependable suppression equipment; 2) residents are aware and accepting of their responsibility; and 3) residents are trained properly regarding fire suppression, including but not limited to use and location of equipment, safety procedures, closest water supply, and communications. Use of safe and effective wildfire response procedures by trained Village members may be able to contain small wildfire ignitions before WMB initial attack crews are able to arrive on scene and before the fires escape control and become major wildfire incidents.

8.4.1 Training and Equipment

Insufficient training is a severe limitation to fire suppression within Elhlateese. Ongoing training in wildland fire suppression, interface fire operations and Incident Command System (ICS) basics is recommended to ensure safe and effective response to wildfire incidents. The S-100 course curriculum covers basic use of wildland firefighting equipment, such as pump and hose set-up, as well as basic safety and fire behaviour. The S-215 course provides training on fire operations in the WUI. It is recommended that all those residents, staff, and community members that are capable of responding to incidents to have annual training in these courses. A partnership with the Thunderbirds Unit Crew should be explored to have basic training be provided by crew members during their slow pre-season time.

The Uchucklesaht Tribe provides fire suppression equipment caches at the fire hydrants. At the time of the site visit, cache equipment varied from nothing to hoses and nozzles. It is recognized that during this time, the inventory and equipment updating was in process. Ideally, the equipment cached at each hydrant and in any other locations would be fully inventoried and would be stored in a manner that they were protected from the elements. Minimum equipment at each hydrant should include:

- 2 x 100’ x 1 ½” quick connect hose,
- nozzle,
- hydrant key,
- hand tools (shovel and pulaski),
- 2 sets of wildland personal protective equipment including Nomex coveralls, eye protection (wildland goggles), hard hats, and gloves.

The Village should also have a minimum of one complete pump unit (pump, tool box, intake hose, 1 1/2 hose, gas container with 24:1 mixed gas, hose strangler, hose wrench, spare spark plugs, gas line, foot valve, water thief, gated Y, variety of nozzles, backcheck valve, variety of tools, etc). The WMB uses the low-volume, high-pressure Wajax Mark 3. This equipment should be kept in a boxed cache close to a natural water source, such as the Uchucklesit Inlet and/or the pond at the top of the hill by the water reservoir. All equipment should be compatible with the equipment used by the WMB.

A basic sprinkler kit package for the interface areas of the three study areas are recommended to increase humidity and reduce spotting and radiant heat ignitions. An mobile sprinkler kit would include sufficient equipment (sprinkler heads, hoses, valves and adapters, mounting poles and brackets) to provide sprinkler coverage for 300 m of sprinkler line.

8.4.2 Water Supply

Tactical response that requires water delivery will be hydrant supported with alternative water supply areas identified in the case of power outage or necessity of additional water supply. Hydrant infrastructure is adequate in pressure, as hydrants are gravity fed from the reservoir. There are four hydrants spread through the main developed area of the Village. Additional water supply locations are the Uchucklesit Inlet and the pond above the water reservoir (Map 20).

There is no hydrant capability at Green Cove or Seekah Landing. Suppression water supply would need to be pumped from the Uchucklesit Inlet.

Map 20. Elhlateese hydrant locations and potential interface water delivery sites.

8.4.3 Evacuation

One of the most challenging situations facing the three study areas during a wildfire is evacuation of the populace. Effective pre-planning reduces confusion, increases efficiency, and can save lives.

Evacuation (access and egress) from the study areas is limited to boat, air, or boat and drive combination. Further complications can arise from smoke, fire, car accidents or other road blockages, and Alberni Inlet weather. These complications should be identified as part of the emergency response procedure and a number of alternatives provided in the case of such complexities. Limited methods of communication and/or delays in communication can further complicate evacuation response.

An evacuation procedure would be triggered by:

1) a major wildfire or fires starting or advancing to within a pre-determined distance of the study areas or;
2) a fire ignition immediately adjacent to or within the Village that spreads aggressively and threatens the safety of residents.

During times of high fire activity in the area, the Uchucklesaht should appoint an information officer to monitor wildfire activity in the vicinity via regular communication with WMB fire officials and provide regular updates of this communication with residents and study area users, as required.

In the event of a wildfire, many deaths are the result of vehicle accidents or fire related deaths during evacuation. In general, evacuation from the study areas is limited and via high risk modes of transport (isolated rough roads, boat and air transport). This risk should be identified, communicated, and measures to mitigate the risk should be included in the emergency access plan.

The implementation of coordinated and complimentary emergency planning practices between local and regional levels is important. Taking a more unified approach could improve efficiency and create consistent regulation and messages related to interface fire issues and risk. As part of interagency cooperation, the relevant Uchucklesaht Tribe staff should meet with WMB and Provincial Emergency Program (PEP) representatives to review and update the wildfire evacuation plan on a regular basis. The current Community Emergency Plan is outdated and should updated to include, but not be limited by:

1. Identify evacuation routes (primary, secondary, and if possible tertiary) for all three study areas.
2. Map and identify safe zones, marshalling points, reception centre, and aerial evacuation locations.
3. Identify evacuation resources (i.e. boats and planes), their capacity, owners, and how to contact drivers and pilots in the case of emergency.
4. Identify resources required to implement evacuation plan.
5. Map potential locations of evacuation centres in Port Alberni and where and how services would be provided to evacuees.
6. Identify volunteers or volunteer organizations that can assist during and/or after evacuation.
7. Create an education/communication strategy to deliver this information to residents.

8. Identify if there are residents that will require special aid during emergency evacuation and outline resources needed in order to provide assistance.

It is important that the plan be reviewed and updated annually prior to the fire season (*i.e*. emergency plan key contacts).

8.4.3.1 Emergency Response Recommendations

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
24	A	Clarity of fire suppression roles and responsibilities	Fire suppression responsibility is spread among village residents	Identification of physically capable and available key personnel for lead positions during interface fires.	Key personnel identified, trained, and prepared for fire suppression duties	Establish volunteer fire department to respond to fires (structural or wildland) in the direct vicinity of Elhlateese, Green Cove, or Seekah Landing.
25	A	Wildland fire training	Training is insufficient (0% of Village residents have up to date S100 training)	All capable residents have training in fighting wildfire	Percent of capable residents and staff that have S100 training	Partner with WMB and the Thunderbirds Unit Crew to provide annual S100 training and basic fire fighting training to Village residents and Uchucklesaht staff
26	B	Incident command and WUI fire training	Training is insufficient (0% of Village residents have up to date S215 or ICS100 training)	Assignation of emergency response key personnel from Village residents and train them accordingly.	S215 and Incident Command System training (ICS100) be given to key personnel	Partner with WMB and the Thunderbirds Unit Crew to provide annual S215 and ICS100 training to key personnel and other interested relevant parties
27	C	Fire suppression equipment	No wildland PPE available. Minimally adequate equipment is available.	Adequate PPE and wildland firefighting equipment to engage in fire suppression activities until WMB assumes control.	PPE and equipment suitable for six fire fighters	1) Purchase 6 complete sets of PPE (Nomex coveralls, gloves, goggles, hardhats). 2) Purchase: 3 pulaskis and 3 fire shovels; complete pressure pump and kit; 1,000' x 1 ½" lined fire hose; and 500' x ¾" econoflow hose. 3) Maintain inventory in weather protected cache boxes in the Village (by additional natural water source and hydrants)
28	A	Water supply	Hydrant access is adequate. The water reservoir lacks secondary power. Additional sources of water are available and have good access.	No water shortages due to supply or power supply issues. Accessible water sources to draft from in times where reservoir levels are low are identified.	Water source is secure and can provide current suppression needs uninterrupted during a wildfire.	1) Purchase backup generator for use at the water reservoir in the case of power outage. 2) Identify alternate water sources and construct suitable access to them in case of low reservoir levels and/ or inability to re-fill reservoir.

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
29	A	Sprinkler kits	There is no sprinkler kit availability	Mobile sprinkler kit capable of defending 250 - 300 m of interface	Access to mobile sprinkler kit capable of defending 250 - 300 m of interface kept at Elhlateese Village and available at all times.	1) Purchase basic structural protection sprinkler system to provide interface protection of approximately 250 - 300 m. 2) Cross train with Thunderbirds Unit Crew/ Fire Zone Base staff on sprinkler deployment
30	A	Ensure safe and rapid evacuation of residents	Uchucklesaht Tribe 667 Community Emergency Plan is outdated	Evacuation planning is in place and communicated to residents	Complete and comprehensive evacuation plan that has been communicated to local residents	1) Review and update Community Emergency Plan, including emergency communication framework. 2) Review Community Emergency Plan with WMB and PEP to improve interagency cooperation. 3) Communicate plan to Village residents, Uchucklesaht staff, WMB, and community partners who are identified as resources.

8.5 FUEL (VEGETATION) MANAGEMENT

To strategically focus fuel treatments on high hazard and consequence areas, hazardous fuel complexes (C4 or C3 fuel types) within 30 m of structures, critical infrastructure and archaeological values are identified as Priority 1 fuel treatment polygons. Priority 2 polygons are hazardous fuel complexes (C3 or C4) that are between 30 m and 100 m of structures, infrastructure, infrastructure access, or archaeological values.

One notable exception to the above priority methodology is along the newly constructed road right of way. Slash piles along the newly constructed infrastructure access right of way should be considered top priority for fuel management, though they are not spatially identified on the map.

8.5.1 Objectives of Fuel Management

- To proactively reduce potential fire behaviour, thereby increasing the probability of successful suppression and minimizing adverse impacts.
- To reduce the hazardous fuel types (C3, C4) found within and adjacent to the study areas. Ideally, over the next five years, the majority of these fuel types within the study areas would be converted to less hazardous fuel types.
- Establish, or increase, natural fuel breaks supplied by deciduous component in the stand where ecologically appropriate.

Fuel treatment can be an effective method of reducing fire behaviour. However, fuel treatments do not stop wildfires; they should be designed to reduce surface and crown potential fire behaviour through the reduction in surface fuels, ladder fuels, and crown fuels. This threshold of reduction varies by ecosystem type, fuel type present, fire weather, slope, and other variables. However, as a rule of thumb, tree crown continuity should be discontinuous, fine surface fuels must be below 1kg/m^2, and ladder fuels must be at least 3 m above surface fuels.

In general, the following steps should be followed to conduct fuel treatments:

1. A qualified professional forester should develop the prescription;
2. Public consultation should be conducted during the process to ensure community support;
3. Treatment implementation must weigh the most financially and ecologically beneficial methods of fulfilling the prescription goals;
4. An environmental monitor should be involved in ensuring that the treatments are correctly implemented;
5. Appropriate qualified professionals should review the prescription, as relevant (*i.e.* P.Eng or geotech for areas on steep slopes, hydrologist for polygons that may put community water supply at risk, RP Bio for areas with species at risk);
6. Pre- and post-treatment plots should be established to monitor treatment effectiveness over time;
7. A long term maintenance program should be in place to ensure that the fuel treatment is maintained in a functional state.

Fuel breaks require periodic maintenance to address ingrowth such as coniferous regeneration. If not maintained, fuels will again accumulate over time and return the site to a higher hazard condition. Additionally, windthrow and other forest health related mortality can reduce the effectiveness of a fuel break, and secondary treatment may be required in these cases.

In ecologically appropriate areas, planting deciduous after fuel treatment should be considered to establish, or build upon, naturally occurring fuel breaks provided by the deciduous component in the stand.

Currently, there are no public funding programs in place to prescribe or treat fuels on treaty lands, which poses a serious challenge to implementation. Opportunities to combine fuel treatments with commercial harvesting opportunities may be the only economical way to reduce hazardous fuel types in the study areas.

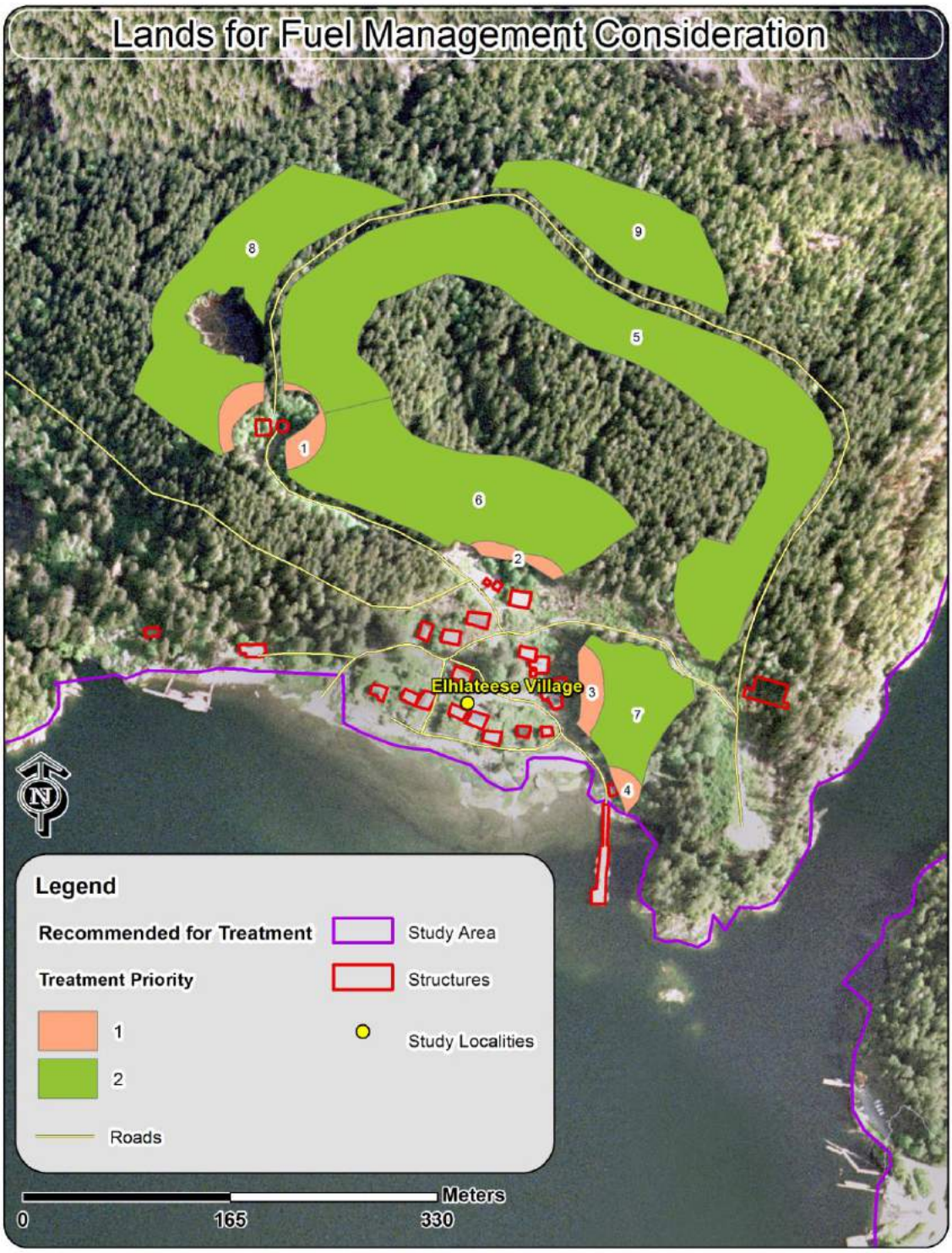
Maintenance of fuel treated areas is dependent upon many factors, however a general maintenance schedule with periodic assessments every 5-7 years and maintenance approximately every 10-15 years should be adequate. In general, maintenance decisions should be guided by cost, effectiveness, impact upon ecosystem function, structure, and biodiversity. Mechanical methods (machine or manual thinning) are often employed to maintain fuel treatments. These are often the most cost effective means of maintenance and the recommended course of maintenance in the study areas. In historically fire maintained ecosystems, treatments such as prescribed burns that emulate natural disturbance types are often effective in long-term maintenance regimes. Prescribed burns are not recommended in the ecosystems of the study area, due to the natural disturbance type. Funding for treatment area maintenance should be committed at the project outset.

Figure 37. Slash accumulation as a result of clearing land for the water reservoir facility.

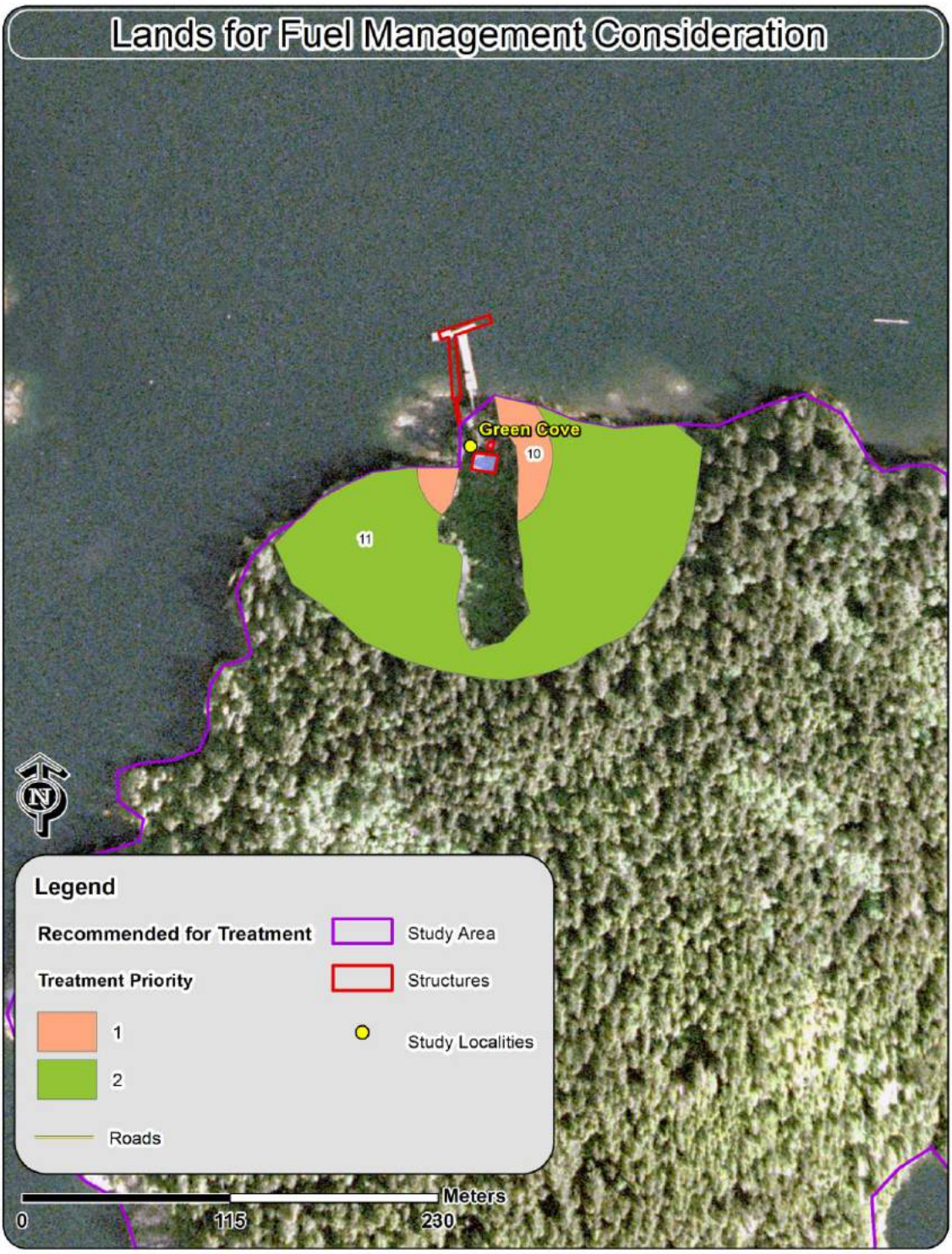
Of the highest importance is removing the large, hazardous slash piles along the new road right of way and adjacent to the new water treatment plant/ water reservoir (Figure 37, Figure 38, Figure 39).

Figure 38. Slash accumulation as a result of clearing road right of way. Issues with burning of piles include accumulations directly under canopy (left) and household garbage intermingled with woody debris (right).

Of equivalent importance as reducing hazardous fuels is maintaining low hazard fuel complexes which are already in a low hazard state. If fuels are monitored and accumulation reductions are acted upon early, fuel treatment costs are generally considerably lower than the initial treatment of high hazard fuel types. For example, the right of way under the power lines is currently not a high fire hazard. Re-growth of coniferous vegetation, woody surface fuel accumulation and heavy shrub growth will likely increase the fuel hazard over time. A proactive monitoring and maintenance program can reduce overall costs to the Uchucklesaht Tribe.



Map 21. Polygons for fuel management consideration in and around Elhlateese (Detailed recommendations are in Table 8. Numbers on the map refer to Polygon Numbers in the table).



Map 22. Polygons for fuel management consideration in the Green Cove study area (Detailed recommendations are in Table 8. Numbers on the map refer to Polygon Numbers in the table).

Table 8. Polygons on which fuel treatment or other remedial actions should be considered. To use this table locate the Polygon Number on Map 21 and Map 22 and the Threat Rating Worksheet Number in APPENDIX C – WILDFIRE THREAT RATING WORKSHEET.

Polygon Number	Fuel Type	Fire Behaviour Threat Rating	Area (ha)	Priority	Ownership	Action
1	C3	Moderate	0.2	1	Uchucklesaht	Polygon surrounds critical infrastructure (water treatment facility and reservoir). Treatment should include thinning and surface fuel reduction. Thinning material can be used distributed for community firewood. Treatment should be considered in conjunction with the other Priority 1 polygons in Elhlateese.
2	C3	-	0.1	1	Uchucklesaht	Polygon surrounds critical infrastructure and community structures (communication and residential). Treatment should include thinning, flammable understory removal, and surface fuel reduction. Thinning material can be used distributed for community firewood. Treatment should be considered in conjunction with the other Priority 1 polygons in Elhlateese.
3	C3	-	0.1	1	Uchucklesaht	Polygon surrounds community structures (residential, nurse's station). Treatment should include thinning, flammable understory removal, and surface fuel reduction. Thinning material can be used distributed for community firewood. Treatment should be considered in conjunction with the other Priority 1 polygons in Elhlateese.
4	C3	-	0.1	1	Uchucklesaht	Polygon surrounds critical infrastructure (dock). Treatment should include thinning, flammable understory removal, and surface fuel reduction. Thinning material can be used distributed for community firewood. Treatment should be considered in conjunction with the other Priority 1 polygons in Elhlateese.
5	C3	Moderate	3.8	2	Uchucklesaht	Polygon builds on pre-existing fuel free access road. Should be considered a priority due to strengthening of fuel break and maintenance of access to critical infrastructure (water reservoir, treatment plant, and power generating system). Treatment should include thinning, flammable understory removal, and surface fuel reduction.

Polygon Number	Fuel Type	Fire Behaviour Threat Rating	Area (ha)	Priority	Ownership	Action
5	S3	-	Spot	*	Uchucklesaht	Spot slash piles within polygon #5 should be the highest priority for action. Action should include: 1) moving slash piles from under canopy or clearing around slash piles (burning preparation); 2) burning of slash piles as soon as is safe after 2013 fire season; and 3) removing household debris.
6	C3	Moderate	1.8	2	Uchucklesaht	Polygon builds on pre-existing fuel free access road. Should be considered a priority due to strengthening of fuel break and maintenance of access to critical infrastructure (water reservoir, treatment plant, and power generating system). Treatment should include thinning, flammable understory removal, and surface fuel reduction.
7	C3	-	0.6	2	Uchucklesaht	Polygon builds on pre-existing fuel free access road. Should be considered a priority due to strengthening of fuel break and maintenance of access to critical infrastructure (water reservoir, treatment plant, and power generating system). Treatment should include thinning, flammable understory removal, and surface fuel reduction.
8	C3	-	1.5	2	Uchucklesaht	Polygon builds on natural fuel break and would improve access to one of the supplementary, natural source for fire suppression. Should be considered a priority due to strengthening of fuel break and maintenance of access to critical infrastructure (water reservoir, treatment plant, and power generating system). Treatment should include thinning, flammable understory removal, and surface fuel reduction.
9	C4	High	1.0	2	Uchucklesaht	Polygon builds on fuel free access road. Treatment should include thinning from below, pruning, and surface fuel reduction.
10	C3	Moderate	0.2	1	Uchucklesaht	Polygon treatment should be considered in conjunction with polygons #11.

Polygon Number	Fuel Type	Fire Behaviour Threat Rating	Area (ha)	Priority	Ownership	Action
11	C3	Moderate	1.9	2	Uchucklesaht	Polygon treatment should be considered in conjunction with polygons #10.

8.5.1.1 *Fuel Management Recommendations*

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
31	A	Reduce hazardous fuels	No fuel treatments have been implemented	Treatment of all Priority 1 and Priority 2 hazardous fuels polygons within the study areas	Percent of treated/ untreated Priority 1 and Priority 2 polygons	Explore opportunities for funding treatments. Options include working with FNESS towards possible future funding for works on treaty lands, exploring future funding opportunities with Aboriginal Affairs and Northern Development Canada (AANDC), and working with Uchucklesaht managing forester and logging contractors to offset the cost of fuel treatments with simultaneous commercial harvesting opportunities. Smaller areas can be done with social work bees or other community events.
32	B	Maintain low hazard fuels in low hazard state	Power line ROWs and many P1 and P2 zones around infrastructure and residences are in low to moderate fuel hazard state.	Monitoring program and treatment implementation, as needed to maintain low-hazard state	100% of fuel treated areas maintained in low hazard state.	1) Monitor right of ways and areas impacted by forest health factors, such as IBD or windthrow. Schedule treatments as necessary to maintain the low hazard areas in low hazard state. 2) In areas where implementation occurs, establish a regular monitoring schedule of previously treated areas at a 5 - 7 year interval. Perform maintenance treatments, as necessary (every 10 – 15 years). Regular treatments are considerably less expensive than original treatments, though become more expensive the longer action is delayed.

Item #	Priority	Objectives	Current Conditions	Optimal Conditions	Performance Indicators	Recommendations
33	A	Reduce fuel adjacent to road ROW	Slash piles due to new road and water infrastructure construction are high hazard	100% removal of slash piles along road ROW	Low hazard fuels maintained along the ROW	Burn slash piles as soon as possible after the fire season. Piles that area located under the canopy will need to be moved into the open or the surrounding canopy cleared prior to burning. Burning of household materials may emit hazardous air pollutants and contribute to potential health problems. It is recommended that pile(s) with household material be shipped to a landfill, rather than be burned.
34	A	Power line ROWs- in low hazard conditions	Power line ROWs are in a low to moderate hazard state	Low hazard fuels on all ROWs	Maintenance of low to moderated hazard fuels on ROWs	Maintain power line ROW in low hazard fuel state. Maintenance costs, if done regularly before fuel accumulations grow, should be relatively low. Mechanically brush sapling conifers, drag surface fuels and slash to roadside and burn material outside fire season when fire danger is low. Monitor danger trees along power line and remove as required. Work with BC Hydro where relevant to share cost and workload.
35	B	Fuelbreak maintenance	No secured funding exists for fuelbreak maintenance	Legacy fund to maintain fuelbreaks	Hectares treated and estimated cost/ha to maintain treated areas vs. legacy fund reserve	A legacy fund should be established to maintain fuel treatments around the community.

APPENDIX A – LANDSCAPE LEVEL FUEL MANAGEMENT

The information contained within this section has been inserted from “The Use of Fuelbreaks in Landscape Fire Management” by James K. Agee, Benii Bahro, Mark A. Finney, Philip N. Omi, David B. Sapsis, Carl N. Skinner, Jan W. van Wagtendonk, and C. Phill Weatherspoon. This article succinctly describes the principles and use of fuelbreaks in landscape fire management.

The principal objective behind the use of fuelbreaks, as well as any other fuel treatment, is to alter fire behaviour over the area of treatment. As discussed above, fuelbreaks provide points of anchor for suppression activities.

- Surface Fire Behaviour

Surface fuel management can limit fireline intensity (Byram 1959) and lower potential fire severity (Ryan and Noste 1985). The management of surface fuels so that potential fireline intensity remains below some critical level can be accomplished through several strategies and techniques. Among the common strategies are fuel removal by prescribed fire, adjusting fuel arrangement to produce a less flammable fuelbed (e.g., crushing), or "introducing" live understory vegetation to raise average moisture content of surface fuels (Agee 1996). Wildland fire behaviour has been observed to decrease with fuel treatment (Buckley 1992), and simulations conducted by van Wagtendonk (1996) found both pile burning and prescribed fire, which reduced fuel loads, to decrease subsequent fire behaviour. These treatments usually result in efficient fire line construction rates, so that control potential (reducing "resistance to control") can increase dramatically after fuel treatment.

The various surface fuel categories interact with one another to influence fireline intensity. Although more litter and fine branch fuel on the forest floor usually results in higher intensities, that is not always the case. If additional fuels are packed tightly (low fuelbed porosity), they may result in lower intensities. Although larger fuels (>3 inches) - are not included in fire spread models, as they do not usually affect the spread of the fire (unless decomposed [Rothennel 1991]), they may result in higher energy releases over longer periods of time when a fire occurs, having significant effects on fire severity, and they reduce rates of fireline construction.

The effect of herb and shrub fuels on fireline intensity is not simply predicted. First of all, more herb and shrub fuels usually imply more open conditions. These should be associated with lower relative humidity and higher surface wind speeds. Dead fuels may be drier - and the rate of spread may be higher - because of the altered microclimate compared to more closed canopy forest with less understory. Live fuels, with higher foliar moisture while green, will have a dampening effect on fire behaviour. However, if the grasses and forbs cure, the fine dead fuel can increase fireline intensity and localized spotting.

- Conditions That Initiate Crown Fire

A fire moving through a stand of trees may move as a surface fire, an independent crown fire, or as a combination of intermediate types of fire (Van Wagner 1977). The initiation of crown fire behaviour is a function of surface fireline intensity and of the forest canopy: its height above ground and moisture content (Van Wagner 1977). The critical surface fire intensity needed to initiate crown fire behaviour can be calculated for a range of crown base heights and foliar moisture contents, and represents the minimum level of fireline intensity necessary to initiate crown fire (Table 1); Alexander 1988, Agee 1996). Fireline intensity or flame length below this

critical level may result in fires that do not crown but may still be of stand replacement severity. For the limited range of crown base heights and foliar moistures shown in Table 3, the critical levels of flame length appear more sensitive to height to crown base than to foliar moisture (Alexander 1988).

Table 1. Flame lengths associated with critical levels of fireline intensity that are associated with initiating crown fire, using Byram's (1959) equation.

Foliar Moisture Content (%)	Height of Crown Base in meters and feet			
	2 meters	6 meters	12 meters	20 meters
	6 feet	20 feet	40 feet	66 feet
	M ft	M ft	M ft	M ft
70	1.1 4	2.3 8	3.7 12	5.3 17
80	1.2 4	2.5 8	4.0 13	5.7 19
90	1.3 4	2.7 9	4.3 14	6.1 20
100	1.3 4	2.8 9	4.6 15	6.5 21
120	1.5 5	3.2 10	5.1 17	7.3 24

If the structural dimensions of a stand and information about foliar moisture are known, then critical levels of fireline intensity that will be associated with crown fire for that stand can be calculated. Fireline intensity can be predicted for a range of stand fuel conditions, topographic situations such as slope and aspect, and anticipated weather conditions, making it possible to link on-the-ground conditions with the initiating potential for crown fires. In order to avoid crown fire initiation, fireline intensity must be kept below the critical level. Managing surface fuels can accomplish this such that fireline intensity is kept well below the critical level or by raising crown base heights such that the critical fireline intensity is difficult to reach. In the field, the variability in fuels, topography and microclimate will result in varying levels of potential fireline intensity, critical fireline intensity, and therefore varying crown fire potential.

- Conditions That Allow Crown Fire To Spread

The crown of a forest is similar to any other porous fuel medium in its ability to burn and the conditions under which crown fire will or will not spread. The heat from a spreading crown fire into unburned crown ahead is a function of the crown rate of spread, the crown bulk density, and the crown foliage ignition energy. The crown fire rate of spread is not the same as the surface fire rate of spread, and often includes effects of short-range spotting. The crown bulk density is the mass of crown fuel, including needles, fine twigs, lichens, etc., per unit of crown volume (analogous to soil bulk density). Crown foliage ignition energy is the net energy content of the fuel and varies primarily by foliar moisture content, although species differences in energy content are apparent (van Wagtendonk et al. 1998). Crown fires will stop spreading, but not necessarily stop torching, if either the crown fire rate of spread or crown bulk density falls below some minimum value.

If surface fireline intensity rises above the critical surface intensity needed to initiate crown fire behaviour, the crown will likely become involved in combustion. Three phases of crown fire behaviour can be described by critical levels of surface fireline intensity and crown fire rates of spread (Van Wagner 1977, 1993): (1) a passive crown fire, where the crown fire rate of spread

is equal to the surface fire rate of spread, and crown fire activity is limited to individual tree torching; (2) an active crown fire, where the crown fire rate of spread is above some minimum spread rate; and (3) an independent crown fire, where crown fire rate of spread is largely independent of heat from the surface fire intensity. Scott and Reinhardt (in prep.) have defined an additional class, (4) conditional surface fire, where the active crowning spread rate exceeds a critical level, but the critical level for surface fire intensity is not met. A crown fire will not initiate from a surface fire in this stand, but an active crown fire may spread through the stand if it initiates in an adjacent stand.

Critical conditions can be defined below which active or independent crown fire spread is unlikely. To derive these conditions, visualize a crown fire as a mass of fuel being carried on a "conveyor belt" through a stationary flaming front. The amount of fine fuel passing through the front per unit time (the mass flow rate) depends on the speed of the conveyor belt (crown fire rate of spread) and the density of the forest crown fuel (crown bulk density). If the mass flow rate falls below some minimum level (Van Wagner 1977) crown fires will not spread. Individual crown torching, and/or crown scorch of varying degrees, may still occur.

Defining a set of critical conditions that may be influenced by management activities is difficult. At least two alternative methods can define conditions such that crown fire spread would be unlikely (that is, mass flow rate is too low). One is to calculate critical wind speeds for given levels of crown bulk density (Scott and Reinhardt, in prep.), and the other is to define empirically derived thresholds of crown fire rate of spread so that critical levels of crown bulk density can be defined (Agee 1996). Crown bulk densities of 0.2 kg m^{-3} are common in boreal forests that burn with crown fire (Johnson 1992), and in mixed conifer forests, Agee (1996) estimated that at levels below 0.10 kg m^{-3} crown fire spread was unlikely, but no definitive single "threshold" is likely to exist.

Therefore, reducing surface fuels, increasing the height to the live crown base, and opening canopies should result in (a) lower fire intensity, (b) less probability of torching, and (c) lower probability of independent crown fire. There are two caveats to these conclusions. The first is that a grassy cover is often preferred as the fuelbreak ground cover, and while fireline intensity may decrease in the fuelbreak, rate of spread may increase. Van Wagtendonk (1996) simulated fire behaviour in untreated mixed conifer forests and fuelbreaks with a grassy understory, and found fireline intensity decreased in the fuelbreak (flame length decline from 0.83 to 0.63 m [2.7 to 2.1 ft]) but rate of spread in the grassy cover increased by a factor of 4 (0.81 to 3.35 m/min [2.7-11.05 ft/min]). This flashy fuel is an advantage for backfiring large areas in the fuelbreak as a wildland fire is approaching (Green 1977), as well as for other purposes described later, but if a fireline is not established in the fuelbreak, the fine fuels will allow the fire to pass through the fuelbreak quickly. The second caveat is that more open canopies will result in an altered microclimate near the ground surface, with somewhat lower fuel moisture and higher wind speeds in the open understory (van Wagtendonk 1996).

- Fuelbreak Effectiveness

The effectiveness of fuelbreaks continues to be questioned because they have been constructed to varying standards, "tested" under a wide variety of wildland fire conditions, and measured by different standards of effectiveness. Green (1977) describes a number of situations where traditional fuelbreaks were successful in stopping wildland fires, and some

where fuelbreaks were not effective due to excessive spotting of wildland fires approaching the fuelbreaks.

Fuelbreak construction standards, the behaviour of the approaching wildland fire, and the level of suppression each contribute to the effectiveness of a fuelbreak. Wider fuelbreaks appear more effective than narrow ones. Fuel treatment outside the fuelbreak may also contribute to their effectiveness (van Wagtendonk 1996). Area treatment such as prescribed fire beyond the fuelbreak may be used to lower fireline intensity and reduce spotting as a wildland fire approaches a fuelbreak, thereby increasing its effectiveness. Suppression forces must be willing and able to apply appropriate suppression tactics in the fuelbreak. They must also know that the fuelbreaks exist, a common problem in the past. The effectiveness of suppression forces depends on the level of funding for people, equipment, and aerial application of retardant, which can more easily reach surface fuels in a fuelbreak. Effectiveness is also dependent on the psychology of firefighters regarding their safety. Narrow or unmaintained fuelbreaks are less likely to be entered than wider, well-maintained ones.

No absolute standards for width or fuel manipulation are available. Fuelbreak widths have always been quite variable, in both recommendations and construction. A minimum of 90 m (300 ft) was typically specified for primary fuelbreaks (Green 1977). As early as the 1960's, fuelbreaks as wide as 300 m (1000 ft) were included in gaming simulations of fuelbreak effectiveness (Davis 1965), and the recent proposal for northern California national forests by the Quincy Library Group (see web site http://www.qlg.org for details) includes fuelbreaks 390 m (0.25 mi) wide. Fuelbreak simulations for the Sierra Nevada Ecosystem Project (SNEP) adopted similar wide fuelbreaks (van Wagtendonk 1996, Sessions et al. 1996).

Fuel manipulations can be achieved using a variety of techniques (Green 1977) with the intent of removing surface fuels, increasing the height to the live crown of residual trees, and spacing the crowns to prevent independent crown fire activity. In the Sierra Nevada simulations, pruning of residual trees to 3 m (10 ft) height was assumed, with canopy cover at 1-20% (van Wagtendonk 1996). Canopy cover less than 40% has been proposed for the Lassen National Forest in northern California. Clearly, prescriptions for creation of fuelbreaks must not only specify what is to be removed, but must describe the residual structure in terms of standard or custom fuel models so that potential fire behaviour can be analyzed.

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APPENDIX C – WILDFIRE THREAT RATING WORKSHEET

These ratings were completed using the 2012 version of the Wildfire Threat Rating Worksheet. Tables below are provided by subcomponent.

Table 9.Wildland urban interface wildire threat assessment worksheets: fuels subcomponent.

	GENERAL				FUELS											
Plot	Date	Photo #	UTM E	UTM N	Duff and Litter Depth	Surface Fuels Cont. (% cover)	Veg Fuel	Fine Woody Debris (<7cm)	Large Woody Debris (>7cm)	Conifer Crown Closure (%)	Decid. Crown Closure (%)	Conifer Base Height (m)	Suppressed Understory Stems/ha	Coniferous Forest Health	Continuous Forest/ Slash Cover w/in 2 km	Fuels Subtotal
1	2013-05-09	1222-1226	354995	5427883	6	4	2	5	2	10	5	0	2	0	2	38
2	2013-05-09	1267-1271	351186	5431817	8	2	2	7	5	15	5	0	2	0	5	51
3	2013-05-09	1274-1279	351134	5432110	10	3	2	7	10	10	5	7	5	0	7	66
4	2013-05-09	1282-1286	350887	5431903	8	2	2	7	5	15	5	0	2	0	5	51
5	2013-05-09	1305-1309	354517	5429007	8	4	2	7	5	10	5	5	2	0	5	53

Table 10. Wildland urban interface wildire threat assessment worksheets: weather and topography subcomponents. Wildfire behaviour threat score and threat class are determined by fuels, weather, and topography subcomponents.

	WEATHER			TOPOGRAPHY						
Plot	BEC Zone	Historic Wildfire Occurr.	Weather Subtotal	Aspect	Slope	Terrain	Landscape/ Topographic Limitations to Fire Spread	TOPOGRAPHY SUBTOTAL	Wildfire Behaviour Threat Score	Wildfire Behaviour Threat Class
1	3	1	4	0	5	5	5	15	60	Moderate
2	3	1	4	12	5	7	5	29	84	Moderate
3	3	1	4	15	10	5	5	35	105	High
4	3	1	4	15	10	5	5	35	90	Moderate
5	3	1	4	15	12	7	5	39	96	High

Table 11. Wildland urban interface wildire threat assessment worksheets: structural subcomponent. WUI wildfire threat score and threat class are determined solely by the structural subcomponent. Total wildfire threat score is additive of the wildfire behaviour threat score and WUI wildfire threat score. The total threat score is only applicable to those polygons with wildfire behaviour threat score ≥96 (rating of high or extreme).

	STRUCTURAL					TOTAL	
Plot	Position of Structure/ Community on Slope	Type of Development	Position of Assessment Area Relative To Values	WUI Wildfire Threat Score	WUI Wildfire Threat Class	Total Wildfire Threat Score	Comments
1	5	10	20	35	High	N/A	C3 - Total wildfire threat score not calculated, as wildfire behaviour threat score <96
2	12	10	25	47	Extreme	N/A	C3 - Total wildfire threat score not calculated, as wildfire behaviour threat score <96

	STRUCTURAL					TOTAL	
Plot	**Position of Structure/ Community on Slope**	**Type of Development**	**Position of Assessment Area Relative To Values**	**WUI Wildfire Threat Score**	**WUI Wildfire Threat Class**	**Total Wildfire Threat Score**	**Comments**
3	10	10	10	30	High	135	C4
4	12	10	30	52	Extreme	N/A	C3 - Total wildfire threat score not calculated, as wildfire behaviour threat score <96
5	5	10	20	35	High	131	C5

APPENDIX D - EXAMPLE FIRESMART HOME ASSESSMENT FORM

FireSmart Home Assessment Form

Do your own home and site hazard assessment by assigning your property points for each assessment area.
The fewer points you get, the more prepared your property is to successfully survive a wildfire.
For information on how to address the problem areas refer to the FireSmart Home Owners Manual
or contact your local fire department or Ministry of Natural Resources fire management office

Important Factors	Characterisitcs of Materials	Point Rating	Your Points
What kind of roofing material do you have?	Asphalt, metal, tile, ULC rated shakes	0	
	Unrated wood shakes	30	
How clean is your roof?	No needles, leaves or other combustible materials	0	
	Scattering of needles and leaves	2	
	Clogged gutters and extensive leaf and needle litter	3	
What is the exterior of your home built out of?	Non combustible material, stucco, brick, metal siding	0	
	Logs or heavy timbers	1	
	Wood, vinyl siding or wood shakes	6	
Are your eaves and vents closed up and screened?	Closed eaves and vents with 3mm wire mesh	0	
	Closed eaves and vents with no mesh	1	
	Open eaves, open vents	6	
Have you screened in your balcony, deck or porch?	All deck, balconies and porches are screened or sheathed in fire resistant material	0	
	All decks, balconies and porches are screened or sheathed with non combustible material	2	
	Decks, balconies and porches are not screened or sheathed in	6	
How fire resistant are your windows and doors?	Tempered glass in all doors /windows	0	
	Double pane glass: (Small/Medium) or (Large)	1 or 2	
	Singel pane glass: (Small/Medium) or (Large)	2 or 4	
Where is your woodpile located?	More than 10 metres from any building	0	
	Between 3 and 10 metres from any building	3	
	Less than 3 metres from any building	6	
Is your home set back from the edge of a slope	Building located on the bottom portion of a hill	0	
	Located on the mid to upper portion or crest of a hill	6	
What type of forest surrounds your home, and how far away is it? **Must complete 10m and 10-30m**	Deciduous trees (poplar, birch) within 10 metres	0	
	Deciduous trees 10-30 metres from any building	0	
	Mixed wood (poplar, birch, spruce, pine) within 10 metres	30	
	Mixed wood 10-30 metres from buildings	3	
	Conifers (spruce, pine) within 10 metres of building separated or abundant	30	
	Conifers within 10-30m of buildings separated or abundant	10 or 30	
What kind of vegetation grows in the zone around your buildings? **Must complete 10m and 10-30m**	Well watered lawn or non combustible landscaping material	0	
	Uncut wild grass or shrubs witin (10m) or within (10-30m) of building	30 or 3	
	Dead and down woody debris within 10 metres of buildings scattered or abundant	30	
	Dead and down woody material within 10-30 metres of buildings (scattered) or (abundant)	3 or 30	
Are there abundant underbrush and ladder fuels in the surrounding forest?	None within 10 metres or within 10-30 metres of buildings	0	
	Scattered within 10 metres or within 10-30 metres of buildings	4 or 3	
	Abundant within 10 metres or within 10-30 metres of buildings	10 or 7	
	The Wildfire Hazard Value for your home is:	**Total Points**	

Hazard Risk Assessment
Low <21 points
Moderate 21-29 points
High 30-35 points
Extreme >35 points

For more information visit the following websites:
ontario.ca/fireprevention ; www.ofm.gov.on.ca ;
www.partnersinprotection.ab.ca

Figure 39. An example of a FireSmart home hazard assessment form (Field Services Division 2008).