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Community Wildfire Protection Plan for the District of Port Hardy

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PROFESSIONALLY RESOURCEFUL

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Community Wildfire Protection Plan

for the District of Port Hardy



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Strategic Natural Resource Consultants Inc.



I certify I personally completed the work described herein.

RPF 4744



2 Executive Summary

Risk analysis reports on other areas of Vancouver Island and throughout BC have ranked wildland urban interface fire as one of the highest risks to residents, compared to other types of natural disasters. With the goal of increasing community safety and to assess and manage the risk of wildfire within its boundaries, the District of Port Hardy (“District”) commissioned Strategic Natural Resource Consultants in January 2016 to prepare a Community Wildfire Protection Plan (CWPP) for the District.

A CWPP is a plan prepared by a qualified forest professional for a community that:

1. Defines risk areas within the community for interface fires,
2. Identifies measures necessary to mitigate those risks, and
3. Outlines a plan of action to implement the measures.

The study area surrounding the District of Port Hardy encompasses a large geographic area, within which there are many values at risk, both in terms of natural values and human development: residences, businesses, transmission lines, working forests/commercially valuable timber, transportation corridors, critical infrastructure and a community watershed. Although large wildfires are not a frequent occurrence in the area, weather conditions can produce high fire danger in some years. Human-caused fires in the area account for at least 81% of all wildfires.

Many structures and other human developments in the District are directly adjacent or are intermixed with the forest or other vegetation. The forest and other vegetation types surrounding the District was assessed using the standards outlined in the BC Ministry of Forests, Lands and Natural Resource Operations (MoFLNRO) – BC Wildfire Service guidance document “Wildland Urban Interface Wildfire Threat Assessments in BC” (January 2013). Groups of vegetation with similar site characteristics were assessed in the field using Wildfire Threat Worksheets to determine a Wildfire Behaviour Class for each polygon. Wildland Urban Interface (WUI) Wildfire Threat Classes were then identified for high risk areas by further analyzing their proximity to structures along with the types of development potentially affected. The final WUI Threat Class ratings were then used to prioritize prevention activities.

In addition to the vegetation analysis, discussions with stakeholders and government agencies identified some key areas of concern that have guided the focus of this study. Specific concerns were noted around Jensen’s Cove/Bear Cove, Seaview Drive and Holberg Road.

Existing conditions within the study area warrant action to be taken to mitigate the hazards and risks.

Recommendations and risk reduction measures are provided to suggest ways to deal with the hazards and risks associated with a wildfire event. The intent of these recommendations is to present the communities with achievable, coordinated options which serve to leverage existing capacity and initiatives in order to reduce the threat of wildfire within the community while respecting the time, cost and political constraints which may be present.

The recommendations are categorized into three broad areas referred to as the 3 E’s of wildfire prevention: education, engineering and enforcement.



The education recommendations focus on developing an effective education program. Specific recommendations include enhancing public knowledge (by using/increasing signage, increasing District social media and website information, and presentations in schools – content could include fire danger, local fire starts, FireSmart principles, Wildfire Act and Regulations and invasive plants information), training (annual wildfire simulation exercises and Port Hardy Fire Rescue to seek out more advanced wildfire specific suppression training) and improve operational knowledge (access, water sources, critical infrastructure and values at risk).

Engineering recommendations typically involve processes that modify our surroundings with an eye towards managing for wildfire or to reduce the potential harm caused by wildfire. Our recommendations include encouraging FireSmart principles on private properties, utilizing Union of British Columbia Municipalities funding to develop a fuel mgmt. demonstration project in a highly visible area and conducting FireSmart assessments on local critical infrastructure and undertake fuel management strategies if and when required.

Enforcement is the final category in a well-rounded fire prevention strategy. Our recommendations in this regard are to consider having interface development permit applications go through applicable external agencies for comment prior to approval (for example, Port Hardy Fire Rescue, BC Wildfire Service) and consider incorporation of FireSmart principles into building and property standards and subdivision layout requirements. FireSmart vegetation management, structural options and infrastructure can be incorporated into local bylaws and form and character guidelines; however, it should be noted that there are multiple references within the Official Community Plan that may conflict with FireSmart recommendations.



3 Acknowledgements

We would like to thank and acknowledge the following people for their assistance and participation in preparing the District of Port Hardy Community Wildfire Protection Plan:

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4 Introduction

Wildfires that occur on BC's forested lands are a natural part of forest ecology, life cycle and seral stage development. Although wildfires are more commonly associated with the interior of BC, coastal BC consistently has significant fire incidence. The incidence of wildfire, both lightning- and human-caused, coupled with the large population living in predominantly forested areas reflects the high percentage of wildland urban interface fires on the coast compared to other regions. Understanding the hazards and risks associated with wildfire helps managers to identify areas that require hazard mitigation and to prepare for an emergency in the event a disaster does occur.

Areas where human development and wildland or forests mix or adjoin each other are known as the wildland urban interface, or WUI (see section 5.14). The WUI poses a special set of challenges to emergency management personnel as well as the residents living in these areas. Emergency management personnel can be challenged with fast moving wildfires spreading quickly from forests to urban areas, thereby threatening residents and their homes. The 2003 wildfire season in BC stands out as a significant reminder of a disastrous event where several major WUI fires destroyed over 300 homes and tens of thousands of residents were evacuated. Following the 2003 wildfire season, the provincial government released the report "Firestorm 2003 Provincial Review" (Filmon 2003) which, among other recommendations, called for the Province to expedite strategies to improve fire prevention in communities with WUI areas. In addition, the Auditor General produced reports in 2001 and 2005 concluding that the provincial government needed to do more to be better prepared for major interface fires (Office of the Auditor General 2001, 2005). A significant problem identified was the lack of complete and reliable information about this issue – forest fuels, interface areas, number of interface fires and their locations and the costs and losses associated with interface fires. As a result of the Filmon Report, Community Wildfire Protection Plans (CWPP) were introduced in order to help communities identify the hazards and risks in their area.

British Columbia has the highest risk of injury and property losses from interface fires in Canada because the climate and topography of the province make it particularly susceptible to wildfires. (Office of the Auditor General 2005)

The Provincial Strategic Threat Analysis (PSTA) is another initiative stemming from the Filmon Report. The PSTA 2015 Wildfire Threat Analysis represents a digital mapping layer that combines three key fire behaviour inputs (fire density, spotting impact, and head fire intensity). These inputs were combined to produce an overall fire threat analysis layer that integrates many different aspects of fire hazard and risk (BC Wildfire Service 2015). The Wildfire Threat Analysis is a high-level GIS raster analysis suitable for provincial-level assessments and provides relative threat information across the landbase (BC Wildfire Service 2015). The CWPP process helps refine PSTA inputs at a smaller, municipal or regional district level.

Strategic Natural Resource Consultants (Strategic) was retained in January 2016 to compile a CWPP for the District of Port Hardy (referred to as the District in this plan). Although no previous wildfire threat assessment or reduction work has been done, the District was aware of local wildfire hazard and risk and as such had been exploring options to create a CWPP for the area. In July 2015 a wildfire burned within one kilometre of town, necessitating the evacuation of some residents, highlighting the threat of wildfire and fast-tracking the initiative to have a CWPP developed. This



project has been funded by the Union of BC Municipalities (UBCM) – Strategic Wildfire Prevention Initiative and the District of Port Hardy.

4.1 Scope

This CWPP aims to, at minimum, address all the applicable requirements of the Strategic Wildfire Prevention Initiative Community Wildfire Protection Plan Program and Application Guide (April 2015). This includes a community description, Wildfire Behaviour and Wildland Urban Interface Threat Assessments, local wildfire history, local fire weather analysis, review of existing plans and bylaws, review and revision of the PSTA fuel type input and recommendations to reduce wildfire threats surrounding the community.

Due to the large size of the District, this report has focused on four key neighbourhoods: downtown, Bear Cove, Storey's Beach and the Airport, while still considering the entire wildland urban interface and surrounding Crown and privately-owned forest lands. A two kilometre buffer has also been applied to the District in order to consider outside influences. As a CWPP, the goal of this report is to analyze the hazards that exist related to wildfire, assess the risks and propose solutions. Some recommendations are conceptual in nature and some are more detailed. This report will be presented in nine sections and three appendices.



5 The District of Port Hardy

5.1 Area of Interest

The District of Port Hardy ("District") is located on the protected shores of Hardy Bay at the north eastern tip of Vancouver Island. It is the northern terminus of Highway 19, and is the largest of four incorporated communities in the Regional District of Mount Waddington with a current population of approximately 4008 in 2037 private dwellings (Statistics Canada 2016a) and a land base of 4081 hectares. The Districts' Official Community Plan (2011) indicates the local population has been in decline since the 1996 Census, yet population and growth projections conducted by BC Stats indicate that the District will experience slight growth over the coming years. Major industries found in the community include aquaculture, business services and retail trade. Forestry, tourism, commercial fishing and mining are strong economic drivers in the area.

The area of interest (AOI) for this CWPP is the District plus an additional two kilometre buffer. The AOI is made up of numerous land parcels: private land, private managed forest land, forest tenure (Tree Farm Licences, Woodlots, BCTS), District leases (of which the Port Hardy Airport makes up the majority), District properties and public open space. The District is made up of four key neighbourhoods: Downtown, Bear Cove, Storey's Beach and the Airport (See Table 1). Land associated with the former Island Copper Mine at Rupert Inlet is also part of the municipality, is exclusively industrial and is managed by the Quatsino First Nation. The latter area has been included in the discussion for the sake of completeness.

Table 1 District of Port Hardy, neighbourhood details

Neighbourhood	Description	Land-Use Designations
Downtown	South end of Hardy Bay to Tsulquate Reserve	Commercial, residential, institutional, park, comprehensive development
Bear Cove	Jensen Cove Road, Goletas Heights, BC Ferry terminal	Commercial, residential, commercial/industrial, park, comprehensive development
Storey's	Storey's beach, Fort Rupert Reserve	Commercial, residential, industrial, park, rural resource, comprehensive development
Airport	Byng Road, Port Hardy Airport	Commercial, residential, comprehensive development

Downtown encompasses the main commercial area, schools, fire hall, community infrastructure (i.e. sanitary sewage collection liftstations and a treatment facility) and extensive residential, park and open spaces. Adjacent to the downtown area, and subsequently within the two kilometre AOI, is the Tsulquate Reserve. The Bear Cove area is predominantly commercial/industrial but includes some residential as well. Sanitary sewage collection liftstations and Reserve lands are also found here. The Storey's Beach neighbourhood includes the Storey's Beach residential area and the Fort Rupert and Kippase Reserves. Some commercial and industrial space is found here, along with liftstations, a fire hall and schools. The airport neighbourhood includes a small residential area, airport buildings and infrastructure and a sanitary sewage collection and treatment facility.



5.2 First Nations

First Nations which traditional territory overlaps the AOI are the Kwakiutl First Nation and the Quatsino First Nation. The Gwa'sala-'Nakwaxda'xw First Nation live on the Tsulquate Reserve adjacent the District boundary, but their traditional territory is on the mainland of BC encompassing Seymour Inlet, Smith Inlet, Blunden Harbour and surrounding islands (Gwa'sala-'Nakwaxda'xw Nation 2016). The Tsulquate Reserve (50 hectares) has an approximate population of 491 in 107 private dwellings (Statistics Canada 2016e).

Many Kwakiutl First Nation people reside on the Fort Rupert and Kippase Reserves. Fort Rupert Reserve (5 hectares) has an approximate population of 46 in 17 private dwellings (Statistics Canada 2016b). The Kippase Reserve (140 hectares) is directly adjacent the Fort Rupert Reserve and has an approximate population of 211 in 79 private dwellings (Statistics Canada 2016c).

The Quatsino First Nation traditional territory overlaps the old mine area. The Quatsino Subdivision Reserve (23 hectares) has an approximate population of 214 in 85 private dwellings (Statistics Canada 2016d).

5.3 Community Forest Values

The community of Port Hardy places significant value in the forest land that is amongst and surrounding it. Considerable discussion relating to forest and environmental values is found within the District of Port Hardy Official Community Plan (OCP) and the Regional District of Mount Waddington (RDMW) Regional Plan. Common themes noted in both are outdoor recreation and tourism, intrinsic values, clean water and economics.

Outdoor Recreation and Tourism

The park systems in the region play an important role and are used for recreation, tourism, conservation, education and community development. The District OCP supports greater access for residents and visitors to a variety of outdoor activities and emphasizes (through objectives and goals) the creation, management and use of wilderness trails, parklands, open spaces and wilderness areas.

Intrinsic Values

A key vision within the District OCP is to protect and coexist with the unsurpassed pristine natural surroundings. An environmental goal is to grow the community in a manner than respects this surrounding natural environment, which is valued and viewed as an integral component of the community. Throughout the OCP, there is recognition that outdoor space (including forest lands) plays a large role in providing a high quality of life for residents and an ideal medium for encouraging and developing stronger stewardship of the land. The RDMW Regional Plan also recognizes that forests offer significant habitat value.

Clean Water

The District OCP considers the protection of the quality and quantity of ground water and surface water as a goal towards sustainable community development. The Tsulquate River Community Watershed, which is relatively undeveloped, forested and steeply sloped, supplies drinking water to the community of Port Hardy. The District OCP aims to supply Port Hardy's residents with a high quality of potable water, in a sustainable manner based on the watershed's carrying capacity.



Economic

From a regional context, there is a heavy reliance of natural resource extraction and recognition of how forestry is a foundation for employment and revenue generation. Approximately 5% of the provincial Annual Allowable Cut is supplied through local Tree Farm Licences, Timber Supply Areas, Woodlot Licences and a Community Forest Agreement. The District OCP recognizes and supports rural resource activities (including forestry) by preserving resource land and ensuring sustainable management of resources, promoting wood first initiatives, and by encouraging wood related value-added manufacturing and small business. Non-timber forest products are also supported and encouraged within the District.

5.4 The Forest Environment

Understanding the forest environment within the AOI helps to give an idea of historical disturbance and influence on fuels and fire behaviour. Slope aspects are quite variable with a slight majority being flat to northeast facing ("northeast" in this case indicating west-northwest to east-southeast). The majority of the AOI contains slopes less than 30% and elevation ranges from sea level to about 300 m. Flat and rolling terrain dominates the area.

The Biogeoclimatic Ecosystem Classification (BEC) system provides an accurate description of vegetation associations and site moisture content. The AOI is located exclusively within the Coastal Western Hemlock (CWH) BEC zone and the submontane very wet maritime (vm1) subzone. The AOI is at the northern limit of the CWHvm1 subzone which has a wet, humid climate with cool summers and mild winters featuring very little snow (Green and Klinka 1994). Growing seasons are long. Lower precipitation values are found in Port Hardy due to the local rainshadow of northeastern Vancouver Island (Green and Klinka 1994). The ecosystem associated with the CWH zone has a Natural Disturbance Type (NDT) 1, which experiences rare stand-initiating events (such as wind, fire or landslides – these typically resulted in uneven-aged or multi-storied even-aged forest ecosystems). However, the Port Hardy area may be considered to fall within an NDT 3, which experiences frequent stand-initiating events (wind – this resulted in a landscape mosaic of even-aged regenerating stands and usually containing mature forest remnants). This is due to the proximity to exposed coastal areas that have experienced major windthrow events as a result of hurricane-force winds (Province of BC 1995).

The original old-growth forests along the southwest coast of BC are classified as a temperate rainforest and are not widely recognized as a wildfire-prone regime. Prior to European contact and settlement, small fires were common, caused by both lightning and humans. Large stand-replacing fires do occur in the region but such events can span hundreds (or even thousands) of years (MacKinnon and Trofymow 1998); primarily due to climate, but also due to the stand structure of the original forests. With the proliferation of commercial logging, the forest landscape has changed significantly and there are large expanses of relatively even-aged forests. The increased population and human activities post-European contact has also added potential ignition sources, resulting in an increase in wildfire occurrence. Due to the excellent growing conditions and infrequent reduction of fuels by wildfires, fuel accumulations can be high on the southwest coast of BC.

The forests within and surrounding the District of Port Hardy are dominated by immature and mature stands of coniferous species such as western hemlock, western red cedar, Sitka spruce and lodgepole pine and deciduous species such as red alder and big leaf maple. Within the District boundary, there are a multitude of properties zoned for various uses including commercial, industrial, residential, parks and open space, forestry. This has resulted in various



stand types, where urban interface areas contain significant areas of deciduous, coniferous forests and mixed forests. Land clearing, in particular under the runway approaches near the airport, has resulted in a shrub-dominated vegetation type, sometimes with heavy downed woody debris, sometimes with much mineral soil exposure. Forestry focused areas are nearly pure coniferous types of varying ages. Deciduous stands are typically found on disturbed sites (for example, previously cleared land, roadsides, unstable slopes) and on wetter sites like stream sides.

5.4.1 Forest Disturbance and Health

Forests in the AOI have been impacted by human activity, namely timber harvesting and transmission line right-of-way construction. Natural events that have caused forest change in the area are the 1908 hurricane and a western blackheaded budworm (*Acleris gloverana*) outbreak.

Timber harvesting for market purposes creates a mosaic of forest condition, and subsequently changes fuel loading, structure and drying rates. Road construction for timber harvesting can open up new areas to human activity and may increase the risk of fire starts, but may also provide valuable access to areas for fire suppression purposes. Timber harvesting creates new timber edges which may result in increased susceptibility to windthrow events; however, this type of windthrow event is not considered a significant concern locally¹.

For transmission line right-of-way purposes timber is felled and bucked, and either removed or left on site, the latter leading to higher surface fuel loading from a wildfire perspective. Right-of-ways in the AOI are susceptible to the introduction of flammable invasive plants, namely scotch broom (*Cytisus scoparius*)² as is seen along Georgie Lake Road, north from Holberg Road, and east along Scotia Main². Scotch broom stands commonly establish and spread after soil and/or vegetation disturbance and populations may be perpetuated by continued disturbance (USDA 2016). It achieves the highest relative score in the Vegetation Fuel Composition component of the Wildfire Threat Assessment Worksheet because it is highly susceptible to complete surface consumption by fire due to high levels of volatiles (Morrow, Johnston and Davies 2013).

The budworm outbreak is at the end of its cycle now¹ but remains a concern for possible serious defoliation of western hemlock, true firs (preferred hosts), spruce and Douglas-fir. The budworm prefers to feed on the upper crowns of dominant and codominant trees, but trees can be completely defoliated from a heavy attack (Ministry of Forests and Range 2002). Needle death causes moisture loss and as a result is more susceptible to ignition. Successive years of severe defoliation may result in tree mortality (Ministry of Forests and Range 2002) which results in an increase in fuel load once the trees have fallen over, or being receptive to fire brands. Dead trees may carry red foliage for 1-3 years (red attack) then drop the needles and fine branches (grey attack). Dead trees may fall down about 10-20 years following tree death, adding to the surface fuel loading (Taylor, Thandi and Hawkes 2005).

¹ Pers. comm. Jon Flintoft, RPF, Senior Operations Planner, Western Forest Products (29 February 2016)

² Pers. comm. Mike McCulley, Engineering Specialist, BC Timber Sales (Seaward) (8 March 2016)



5.5 Water Supply & Road Access

5.5.1 Water Supply

Port Hardy is well endowed with natural green areas and waterways. There are over 20 kilometres of coastline and four major rivers within the municipal boundaries: the Tsulquate, Glen Lyon, Quatse and Keogh Rivers. Numerous streams and wetlands criss-cross the AOI, and several small lakes (with the exception of the larger Frances Lake near the former Island Copper Mine) dot the area.

Fire hydrants are found throughout the District in all residential, commercial and industrial areas, with the exception of the industrial area associated with the former Island Copper Mine. Currently, the Port Hardy Fire Rescue (PHFR) relies on local knowledge for information on access and water supply outside hydrant serviced areas. In an effort to record this local knowledge permanently, PHFR has recently (early 2016) purchased the application “Who’s Responding” for new iPads that have been installed in four engines³. This application has the ability to offer pre-planning information to responding crews; for example, map icons and response plans can immediately be viewed. Access issues, such as gates, bridge load limits, inaccessible roads, as well as potential water sources could be shown.

5.5.2 Road Access

Port Hardy is accessed by Highway 19 from the southeast which is a paved, two lane highway. Access through to Coal Harbour to the south is also a paved, two lane road (Coal Harbour Road). Access to Holberg (west) from Highway 19 (Douglas Street) is paved for a short distance and becomes a well maintained gravel road beyond. Within the community itself, most roads are paved or are well maintained gravel roads (for example, Jensen Cove Road). Resource roads radiate out from the community accessing timber harvesting areas, transmission line right-of-ways and infrastructure such as communication towers and the water treatment plant. Gates do exist, although may or may not be consistently closed or maintained. Bridges and culverts may have been removed as part of road deactivation activities.

5.6 Critical Infrastructure

Critical infrastructure includes infrastructure and assets important to public health and safety. District staff provided a list of community critical infrastructure for the AOI and it includes the following: hospital, RCMP detachment, fire halls, evacuation sites, primary Emergency Operation Centre location, public works yard, water treatment and supply facility, sanitary sewage collection and treatment facilities, sanitary sewage collection lift stations, water distribution control and reservoir, power substation and communication towers. Critical infrastructure is shown on the map titled Fire History and Structures in Appendix 1.

³ Pers. comm. Brent Borg, Deputy Fire Chief, Port Hardy Fire Rescue (29 February 2016) and Schell Nickerson, Fire Chief, Port Hardy Fire Rescue (2 May 2016)



5.7 Existing Fire Suppression Capability

5.7.1 Fire Departments

Port Hardy Fire Rescue (PHFR) provides firefighting, road rescue and other emergency response services for the District of Port Hardy and its mutual aid partners (an area encompassing 42 square kilometres). Mutual aid agreements are with the communities of Port McNeill, Coal Harbour and Port Alice, as well as the Coastal Fire Centre, and fire service agreements with the Kwakiutl and Tsulquate Reserves, and the Port Hardy Airport. PHFR currently has three engines, two rescue vehicles and one command vehicle.

PHFR has approximately 28 active members and is exclusively a volunteer department. In order to fight a wildfire, one must have the S-100 Basic Fire Suppression and Safety course. PHFR put ten members through this course in June 2016. In terms of wildfire specific equipment, PHFR has 5000 feet of forestry hose, nozzles, accessories, two pumps (one high pressure and one high volume) and an older, back up engine with a shorter wheelbase that can be used for wildfire applications. The department is due to receive a new engine in the future.⁴ PHFR engines have recently been equipped with iPads with the application “Who’s Responding” (see Section 5.5.1).

Traditionally, a BC Wildfire Service (BCWS) representative attends the North Island Fire Chiefs Association meeting in June and presents the previous year’s wildfire statistics and seasonal forecasts. PHFR has previously requested BCWS staff (from the Quinsam Fire Base) come to Port Hardy to undertake interagency training, yet this has been unsuccessful due to scheduling conflicts. The Fire Chief and Deputy Fire Chief both support the idea of wildfire exercises through interagency training opportunities⁴.

5.7.2 BC Wildfire Service

The Port Hardy AOI is located within the North Island/Mid Coast Zone of the Coastal Fire Centre, BC Wildfire Service (BCWS). The Quinsam Fire Base is located in Campbell River (approximately 212 km away, direct) and has three, 3-person initial attack crews staffed during the summer. There is also a 20-person unit crew located in Port Alberni (approximately 250 km away, direct) which can provide suppression support beyond the initial attack phase. The BCWS also maintains a fleet of contract air tankers during the fire season, the closest of which is located at the Campbell River Airport. The Campbell River tanker base is the primary base for the Coastal Fire Centre, with a secondary base located in Abbotsford (approximately 415 km away, direct). Air tanker groups are strategically moved around the province as fire load or fire preparedness requires. The Campbell River tanker base went through a significant upgrade in 2013 and now has the capacity to load two medium sized air tankers simultaneously⁵.

Upon a request from a local authority, and if resources are available, the BCWS may support the local fire department; however, this support will be limited to wildfire suppression, not structural firefighting. The BCWS may support the Office of the Fire Commissioner structural specialist for structural or values protection (Ministry of Forests and Range 2008). Consequently, BCWS may utilize local fire departments on fires outside their fire protection local service area; however, fire department response to these fires needs to occur in accordance with the authority provided by their respective local authority.

⁴ Pers. comm. Brent Borg, Deputy Fire Chief, Port Hardy Fire Rescue (29 February 2016) and Schell Nickerson, Fire Chief, Port Hardy Fire Rescue (2 May 2016)

⁵ Pers. comm. Clint Parker, former Forest Protection Officer, North Island Mid Coast Fire Zone (September 2012)



5.7.3 Private Forest Landowners and Tenure Holders

One private forest land owner within and adjacent the District is Island Timberlands Limited Partnership (Island Timberlands). On lands outside the local government Fire Protection Area, Island Timberlands has entered into a Wildfire Response Agreement with the BC Wildfire Service (BCWS) which means the company pays an annual fee and in return, the BCWS undertakes wildfire suppression on their land at no additional cost, except in identified circumstances (BC Wildfire Service 2016). BCWS provides initial attack fire suppression services, after which the company assumes control at the final mop-up stage. The Agreement ensures quick and efficient fire response without delays for ownership verification. This ensures fires are attacked by well trained and effective crews when they are small and therefore results in a higher success rate at the initial attack stage and mitigates the chance of larger fires⁶. Given the general visibility of the private forest lands on Vancouver Island to the public and air traffic, fires are often detected early.

Island Timberlands maintains a six-person contract crew on retainer for mop-up activities and numerous other contractors are available upon request as required⁶. Operational (harvesting, road building, etc) related fire starts represent less than five percent of all fires across Island Timberlands private managed forest lands and the majority of operational ignitions are extinguished immediately by the crews on site. The majority of fires on Island Timberlands private forest lands are initiated by the public and lightning strikes⁶.

Western Forest Products (WFP) manages Crown tenure Tree Farm Licence 6 (TFL 6) adjacent the District boundary to the south. WFP has a cost share agreement with the BCWS where a small percentage is taken from stumpage revenues for fire control⁷. Emergency response plans are operations specific, and internal procedures guide post timber harvest fire hazard assessments on the TFL lands⁸.

5.8 Community Wildfire Education and Awareness

Port Hardy Fire Rescue is heavily involved in the community and fire education, but has not included discussion around wildfire⁹. In addition, the District has not held any open houses or other public information sessions regarding wildfire or FireSmart¹⁰. However, after two wildfires relatively close to town in 2015 and 2016, there is recognition that community education and awareness will need to start including a wildfire component.

The District website (www.porthardy.ca) has a link to emergency information from the main page which provides updates for local emergencies (for example, wildfires), what to do in the event of an emergency and information on wildfire preparedness, including FireSmart links. There is a link to the Port Hardy Emergency Facebook page where up-to-date information is provided for local emergencies. Port Hardy Fire Rescue's website (www.porthardfire.ca) does not include any wildfire or FireSmart information.

There are currently no BCWS fire danger or wildfire awareness signs within the AOI.

⁶ Pers. comm. Morgan Kennah, RPF, Manager, Sustainability, Island Timberlands (30 March 2016)

⁷ Pers. comm. Pete Laing, RFT, Acting Fuels Management Specialist, BC Wildfire Service (Coastal Fire Centre)

⁸ Pers. comm. Jon Flintoft, RPF, Senior Operations Planner, Western Forest Products. (29 February 2016)

⁹ Pers. comm. Schell Nickerson, Fire Chief, Port Hardy Fire Rescue (2 May 2016)

¹⁰ Pers. comm. Allison McCarrick, Chief Administrative Officer, District of Port Hardy (31 May 2016)



5.9 Wildfire Prevention by Stakeholders

5.9.1 Island Timberlands¹¹

Emergency Planning and Response

Island Timberlands staff and contractors must have their S-100 certification in order to action fires. Annual refreshers are completed with company crews and contractors early in the year, which includes a review of wildfire behaviour, suppression techniques and operation of fire equipment. Island Timberlands actively maintains an emergency planning and response program detailed for all company staff and contractor use, aptly titled the Emergency Preparedness and Response Plan (EPRP). An EPRP is expected to be available on any worksite on Island Timberlands private land. The EPRP covers:

- Emergency preparedness (i.e. fire tool and suppression systems requirements, weather monitoring procedure, fire weather shutdown requirements, emergency drills),
- Emergency response (i.e. safety protocols, including radio communication),
- Reporting (i.e. internal and external stakeholders reporting expectations, investigation procedures),
- Woods evacuation procedures, and
- Emergency reporting contacts and phone numbers

Island Timberlands conduct monthly harvest and road construction fire equipment inspections, and maintains several portable weather stations monitored daily for fire weather information, from which data can be drawn in real-time as necessary in elevated fire danger periods. Information such as crossover periods can be attained from this monitoring network providing invaluable information for fire risk mitigation. Third party weather stations are also employed for monitoring efforts.

Fuel Management

Following harvest, Island Timberlands completes a detailed site review and assessment for each cutblock inspecting multiple values to determine future forestry plans. Fire hazard potential associated with forest debris accumulated on site is a primary consideration during this site review, especially with respect to public interface potential and fire ignition opportunities. Hazard abatement plans result from this review which is required under provincial legislation. Strategies used to abate the hazard are sometimes in conjunction with salvage opportunities (i.e. hog fuel, firewood); debris piling and burning is used as a last resort. Under Island Timberlands' "good neighbour policy," communication with direct neighbours may include door to door conversations with respect to fire hazard abatement decisions such as pile burning (Island Timberlands 2009).

Access Restrictions

Given the Port Hardy properties are much more discontinuous, smaller and isolated compared to other areas managed by Island Timberlands, significantly fewer resources are invested when it comes to access management (i.e. gates, security). Public access onto Island Timberlands' private lands is curtailed when 'Schedule 3' of the Wildfire Regulation indicates a 'fire watch' is required or if there are harvesting/road building activities in progress. Island Timberlands maintains a policy of no camping and no campfires without written authorization through permit. General access closures and fire information is posted on their blog (<http://blog.islandtimberlands.com/>).

¹¹ Pers. comm. Morgan Kennah, RPF, Manager, Sustainability, Island Timberlands (30 March 2016)



5.9.2 Western Forest Products¹²

Emergency Planning and Response

A number of Western Forest Products (WFP) staff, crew and contractors at the North Island Forest Operation (NIFO) have their S-100 certification in order to action fires. Annual refreshers are completed by staff, crews and contractors, which includes a review of wildfire behaviour, suppression techniques and operation of fire equipment. WFP maintains an Emergency Preparedness and Response Plan (EPRP); key WFP staff are provided with this Plan and covers items such as fire weather shutdown guidelines, safety protocols, communication and evacuation procedures. A Fire Standby Guidelines document is also prepared to provide direction in the event of a wildfire. WFP maintains ten portable weather stations for monitoring daily fire weather information which are spread strategically across the operating area.

Fuel Management

WFP has developed internal guidelines on Cutblock Slash Management and Fire Hazard Assessment/Abatement Planning. These guidelines are consistent with the *Wildfire Act* and *Regulations* and guide WFPs forest professionals and crews in meeting this legislation. Once the waste and residue survey has been completed and approved by the MFLNRO, harvested cutblocks are open for firewood cutting. A local log chipping operation has entered into an agreement with WFP - NIFO for the opportunity to recover logging debris from recently harvested cutblocks as feedstock for a chip plant.

Access Restrictions

WFP does not have the authority to restrict public access to the Tree Farm Licence area; however, when the fire danger reaches a particular level¹³ WFP will curtail its harvesting operations as per the *Wildfire Act* and *Regulations*. Access to certain active areas may only be restricted to prevent vandalism and log theft.

5.9.3 Other Stakeholders

BC Hydro maintains approximately 20 kilometres of major transmission lines through the AOI, with many more kilometres of distribution lines, and a substation south of the junction of Trustee Road and Highway 19. BC Hydro prepares for wildfires by evaluating assets at risk so resources can be mobilized to use FireSmart initiatives at their substations, microwave sites and lines, by removing extensive flammable fuels¹⁴. Operationally, BC Hydro engages contractors and fire retardant applicators in the event of the need to protect their assets from a wildfire. BC Hydro works closely with local and provincial emergency authorities in the event of a wildfire, and integrates real-time information from the BCWS for planning and response purposes. BC Hydro has developed a state of the art geographical information systems (GIS) risk tool that identifies lightning strikes and wildfires close to their assets as an early warning mechanism¹². The BCWS has all relevant contact details for BC Hydro personnel involved in emergency response. A 24 hour, 7 days per week duty coordinator is the main contact point for external sources such as the BCWS. The BC Hydro duty coordinator communicates the need for response to grid operation and/or local vegetation management personnel for involvement with firefighting operations¹².

¹² Pers. comm. Jon Flintoft, RPF, Senior Operations Planner, Western Forest Products. (28 May 2016)

¹³ Fire Danger Class 3: maintain fire watch for prescribed period of time; Class 4: maintain fire watch for prescribed period of time, and after three consecutive days at Class 4, cease operations between 1pm and sunset; Class 5: maintain fire watch for prescribed period of time, cease operations between 1pm and sunset, and after three consecutive days at Class 5, cease activity all day.

¹⁴ pers. comm. Rajan Dhariwal, Emergency Preparedness Manager, BC Hydro (5 April 2016)



Cape Scott Wind LP maintains approximately five kilometres of transmission lines and right-of-way under a Utility Statutory Right-of-Way (SRW) within the AOI to connect the generating facility at Knob Hill Plateau to the grid and supply its power customer, BC Hydro¹⁵. The right-of-way area was felled and bucked during construction in 2013, and danger trees were removed along the edge of the right-of-way to minimize the risk of trees falling on the lines, which is a potential source of wildfire ignition. This program will be continued for the life of the project (20 years) and the right-of-way will be periodically inspected for danger trees. Cape Scott Wind LP also has a vegetation management program which includes monitoring of the right-of-way corridor and removal of vegetation when required. The area around the base of the poles is inspected regularly and kept clear from debris and large vegetation. With regards to emergency response in the vicinity of the transmission line, Cape Scott Wind LP has its own safety policies for electrical safety and in general follows the Worker Safety Training provided by BC Hydro for workers around powerlines and safe distances for machinery near high voltage lines. Regarding fuel accumulations under the transmission lines, a fuel hazard assessment was completed at the completion of construction¹³ (as per the *Wildfire Regulation*).

5.10 Existing Plans and Bylaws

5.10.1 Regional Fire Management Plan

The North Island – Central Coast Regional Fire Management Plan is a ‘base’ plan and is essentially a collection of maps and values information¹⁶. Fire effects and operational restrictions with regards to values are covered in the plan. The maps include local data layers provided by the District, and are considered sensitive data. Generally speaking, there are four priority value themes in the North Island – Central Coast Fire Regional Fire Management Plan which are based on the Provincial Resource and Strategic Wildfire Allocation Protocol:

1. Human life and safety. For example communities, logging camps, campgrounds.
2. Property. For example highways, ferries, infrastructure.
3. High environmental/cultural values. For example community watershed, karst features, First Nations cultural sites, species at risk, water sources, ungulate winter ranges, old growth management areas.
4. Resource values. For example, timber and range values, protected areas, recreation sites/trails, scenic areas.

5.10.2 Higher Level Plans

A review of higher-level plans overlapping the AOI did not reveal any specific information with regards to the need for wildfire protection, with the exception of the Regional Plan for the Regional District of Mount Waddington. This Plan recognizes the potential impact of climate change and the subsequent increasing threat of wildfires. The Regional District, through its Regional Plan, has made a commitment to “continue to develop an understanding of potential impacts of climate change on all sectors of the region, identify potential opportunities and risks, and include adaptive strategies in all infrastructure, land use and community planning decisions.” The Vancouver Island Land Use Plan (VILUP) (British Columbia 2000), a higher-level plan which establishes different land use categories or regional zones and identifies those with particular or significant resource values, only mentions fire with regard to timber recovery after wildfire. This is carried forward to Western Forest Products’ Forest Stewardship Plan for the area.

¹⁵ Pers. comm. David Cousins, P.Eng., Site Manager, Cape Scott Wind LP (16 May 2016)

¹⁶ Pers. comm. Ed Korpela, Fire Management Specialist, Ministry of Forests, Lands and Natural Resource Operations (22 Feb 2016)



5.10.3 Relevant Legislation, Bylaws and Policies

A review of relevant legislation and local government bylaws, policies and plans was done to provide an overview of community recognition and management of wildfire hazard and risk.

Wildfire Act and Regulation

The *Wildfire Act* and *Regulations* define and set requirements for industrial activities, high risk activities and hazard assessment and abatement (Queen's Printer 2016). On April 1, 2016, increased fines for a variety of wildfire-related violation tickets came into force. BC now has some of the highest wildfire-related violation ticket fines in Canada. The BC government has taken a tougher stand on irresponsible behaviour that contributes to increased wildfire risks, in an effort to protect communities, natural resources and infrastructure from wildfire damage (Province of BC 2016). Activities within the District are subject to the Act and Regulations.

Bylaws

1. **The District of Port Hardy Official Community Plan, Bylaw No. 15-2011.** There are objectives and policies within the OCP which are relevant to wildfire and FireSmart principles, although not specifically stated as such. Some examples of relevant objectives and policies are as follows:
 - Protection of wildlife via the encouragement of native landscaping in all new subdivisions, developments and redevelopments,
 - Stewardship of the area via invasive plant control,
 - Retention of a natural setting via protection and preservation of parks, open space and other natural areas, and connection of such spaces, and
 - Form and character and the use of wood for building materials, tree retention corridors and the use of natural vegetation to buffer utilities and/or mechanical equipment.
2. **Regulations for the Control of Burning and Smoke, Bylaw No. 15-2012.** This bylaw covers open air burning and permit requirements (excludes ceremonial, recreational or beach fires), linkage to Coastal Fire Centre fire bans, Category A and B fire definitions and restrictions, minimum distance to buildings and facilities, maximum duration, supervision, prohibited materials, inspection and orders, favourable weather for smoke dispersion, cost recovery, liability and damages, and scope and penalties.
3. **Regulation of the Possession and Discharge of Fireworks, Bylaw No. 05-2010.** This bylaw covers prohibitions, permit requirements and enforcement with respect to fireworks.
4. **Fire Department Establishment and Procedures Bylaw No. 16-2011.** This bylaw covers administration, scope (including mutual aid and prevention), powers and duties of the Fire Chief, fire protection and life safety, territorial jurisdiction, mutual aid agreements and enforcement.

Emergency Plans

The Regional District of Mount Waddington has a comprehensive emergency plan (titled North Island Regional Emergency Plan - Emergency Operations Centre Response Guidelines, September 2015). This plan includes a contingency plan for "Fire – wildland / interface," and covers possible major effects, possible incident site actions, agencies/persons responsible, potential emergency operations centre actions and equipment and potential sources. The plan indicates evacuation authority is provided under the *Wildfire Act*, amongst other Acts and Codes.



The Tsulquate Reserve has an emergency plan (titled Gwa'sala-'Nakwaxda'xw #724 Emergency Plan) which includes emergency management organization, response and recovery structure and procedures, evacuations and identifies, through a hazard, risk and vulnerability assessment, wildfire as a likely event to occur.

5.11 Fire Weather

Weather and climate are two very significant aspects affecting wildfire danger. Understanding the history of weather patterns can influence how fire preparedness, prevention and control is carried out. Port Hardy experiences a variety of weather phenomena that can affect fire weather and these are discussed below.

Port Hardy is affected by two semi-permanent weather features: the Aleutian Low, a subpolar area of low pressure centred over the Gulf of Alaska and the North Pacific High, a subtropical area of high pressure in the North Pacific Ocean (NOAA 2016). These two weather features produce a generally west-to-east flow of air masses across this region. During the summer, the Aleutian Low is weaker, retreating northwards towards the North Pole and becoming almost non-existent. During this time, the North Pacific High pressure system dominates (NOAA 2016). The high pressure ridge that results on the BC coast generally shunts low pressure weather systems northward and around BC, resulting in extended periods of dry, warm weather during the summer. As this strong surface high builds, pressure gradients pack along the coast with north winds often reaching storm force values¹⁷.

Another local weather phenomenon is how Port Hardy is on the edge of the 'West Coast Fog Zone' as defined within the Coastal Fire Centre. It includes all land running inland 2 kilometres around Cape Scott Provincial Park and the northern end of Vancouver Island to Shushartie Bay then east along Goletas Channel ending at the boundary of the District of Port Hardy¹⁸. Fog is significant in that it increases the relative humidity¹⁹ (RH) when it occurs; when RH is high, forest fuels cannot dry. Fog can occur in any month and depends on the synoptic pattern of the day¹⁶. A high pressure airmass off Vancouver Island to the north gives a northerly air flow into Queen Charlotte Sound and can create a stable airmass around Port Hardy, resulting in fog. This situation is not very predictable more than a couple days out, and can be difficult to forecast¹⁶.

Outflow winds can significantly affect fire behaviour and fire danger. They are generated in this area when a ridge of high pressure forms over the interior plateau regions of mainland BC and air flows out of major coastal fjords and drainages. As the air descends out major inlets along the coast, the air warms and the relative humidity drops. Although an outflow wind may not reach the Port Hardy area (Cracroft Island typically "blocks" the outflow winds from reaching Port Hardy²⁰), the phenomenon still creates a warmer and drier situation for the coast as a whole. This is important from a wildfire standpoint as there can be an increase in fire danger.

Atmospheric lightning can ignite wildfires. Lightning is usually produced by strong convective activity caused by day-time heating and atmospheric instability. Due to the moderating effect of the ocean, weather patterns in the region do not commonly produce the high day time heating required to initiate the strong convective activity that produces

¹⁷ Pers. comm. Dan Morrison, former Fire Weather Forecaster, BC Wildfire Service (2012)

¹⁸ Pers. comm. Jesse Ellis, Fire Weather Forecaster, BC Wildfire Service (2 February 2016)

¹⁹ The ratio, expressed as a percentage, of the amount of water vapour or moisture in the air to the maximum amount of moisture that the air would hold at the same dry-bulb temperature and atmospheric pressure (RH can vary from 0 to 100%). For example, 60% RH means that the air contains 60% of the moisture it is capable of holding (CIFFC 2003)

²⁰ Pers. comm. Eric Meyer, Superintendent, Fire Weather, BC Wildfire Service (28 January 2016)



lightning. Lightning fires in the Port Hardy area account for only 5% of all reported wildfires from 1944-2015 (see Section 5.12); this number is significantly lower than the provincial average of 60% over a ten year period (2005 to 2015).

Climate change is another factor that could impact the occurrence of wildfire in the Port Hardy area. Although the causes are being debated, most experts agree that the earth's climate is currently in a warming trend. An average temperature rise of 1-2 degrees Celsius would likely lead to an overall increase in wildfire activity within coastal temperate rainforests.

Weather stations provide hourly observations and are supplemented with data from other agency stations to support fire weather forecasting and the Canadian Forest Fire Danger Rating System (CFFDRS)²¹. The Port Hardy Airport has a weather station that has been in place since 1970 (see Map titled Fire History and Structures in Appendix 1). Weather readings from this station and fuel condition information contribute to the identification of Fire Danger Classes through the CFFDRS. Fire Danger is a relative index of how easy it is to ignite vegetation, how difficult a fire may be to control, and how much damage a fire may cause (See Table 2). Figure 1 indicates how often these conditions have occurred at the Port Hardy Airport weather station between 1995 and 2015. At Danger Class 3 and above, the *Wildfire Act* and *Regulations* start to prescribe limitations on certain activities that have a higher risk of starting a fire.

Table 2 Canadian Forest Fire Danger Rating System, Fire Danger Rating (Natural Resources Canada 2016)

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

²¹ Developed by the Canadian Forest Service, CFFDRS is the national system of rating fire danger in Canada. The CFFDRS includes all guides to the evaluation of fire danger and the prediction of fire behaviour such as the Canadian Forest Fire Weather Index System and Canadian Forest Fire Behaviour Prediction System (Canadian Interagency Forest Fire Centre 2003).



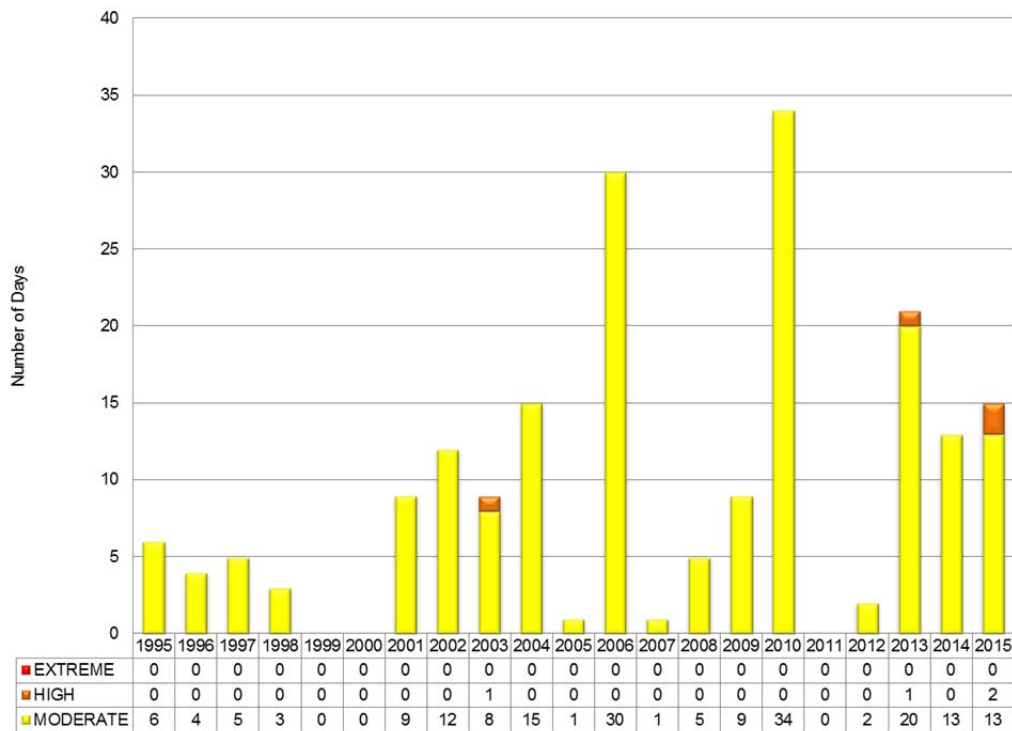


Figure 1 Number of days at Danger Class 3 and above (Port Hardy Airport, 1995-2015)

Two of the weather readings that are used in the Fire Danger Class determinations include temperature and relative humidity. As these two values approach each other, fire danger increases significantly. When relative humidity is lower than the temperature it is referred to as “crossover” and indicates the potential for extreme fire behaviour. However, extreme fire behaviour can occur in the absence of crossover. Figure 2 indicates that crossovers have not occurred at this weather station between 1995 and 2015; however, these are daily readings taken at 1300 hours Pacific Standard Time and further daytime drying may in fact result in crossover conditions later in the day.



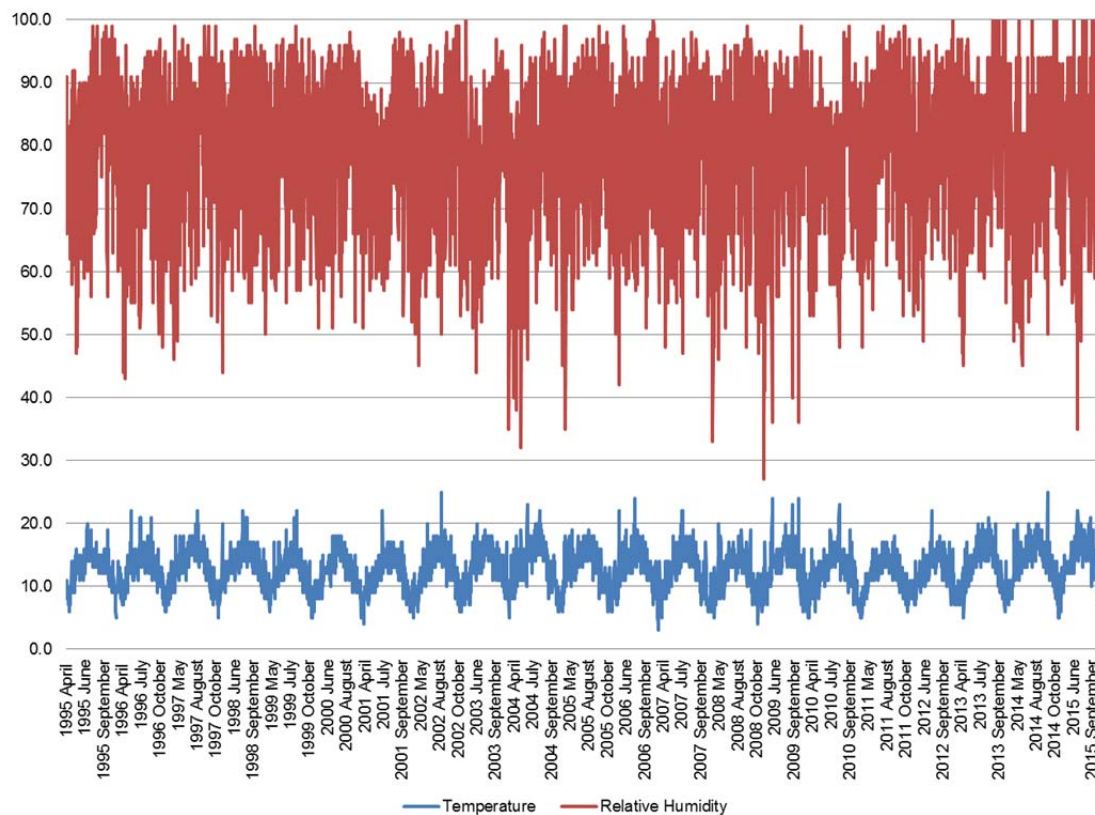


Figure 2 Temperature vs relative humidity, Port Hardy Airport, April 1 - October 31, 1995 to 2015

The number of days with a Moderate or higher Fire Danger varies from year to year and there is difficulty in predicting what a fire season will bring. An unusually dry spring and/or summer can allow for fire behaviour that is not typical of the area, as was seen during the wildfire that occurred in July 2015 just west of Port Hardy. The fire weather conditions at that time show that, although not common in the past, fire behaviour can indeed exhibit greater intensity than what may have been previously thought. The possibility of future drought and changing weather patterns should be taken into account when considering the necessity of managing the risk of wildfires in the Port Hardy area.

5.12 Historical Fire Information

Examining historical wildfire occurrence of an area can give insight into future wildfire occurrence. Historical wildfire analysis provides managers with a guide to (1) plan when education, engineering and enforcement activities are most critical to wildfire prevention and suppression, and (2) indicate what geographic areas require the greatest attention or priority of resources. Wildfires happen when there is an ignition source, weather conducive to burning and a receptive fuel bed. When multiple wildfires happen over time in a given area one can infer that recurrences of the coincidence of conditions that result in a wildfire will re-occur with similar frequency.

This section includes analysis of wildfire occurrences within the Port Hardy AOI from 1944 to 2015. Historical wildfire data was obtained from records maintained by the BC Wildfire Service. Wildfire ignition is classified into two general causes: lightning and human. Lightning-caused wildfires occur when atmospheric lightning strikes forest fuels and ignites them. From a prevention plan standpoint, there is little humans can do to prevent wildfires caused by lightning. The only thing we can do is analyze how prone an area is to lightning-caused wildfire and manage for it. This can mean



developing various preparedness strategies to respond effectively when a lightning-caused wildfire starts, and having strategies in place to aid in decision-making when a lightning wildfire occurs. Person-caused wildfires are those ignited by the actions of people. Prevention planning focuses more on these wildfires as theoretically they could be reduced to zero. They may be intentional and malicious, such as arson, or unintentional, completely accidental or as a result of carelessness. A large and growing population embedded within extensive semi-rural areas and various industrial activities within the forest are the main human ignition reasons.

From 2005 to 2015, for the entire Province of BC, BC Wildfire Service data indicates a breakdown of 40% person-caused (7718 fires) and 60% lightning caused (11691 fires) (Figure 3).

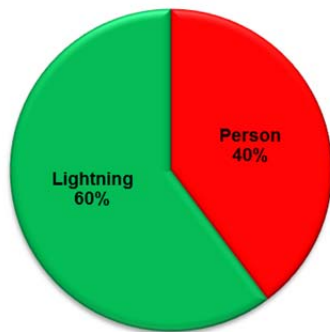


Figure 3 Wildfire cause, BC, 2005 to 2015

From 1944 to 2015, for the Port Hardy AOI, BC Wildfire Service data indicates a breakdown of 82% human-caused (51 fires), 13% unknown cause (8 fires) and 5% lightning-caused (4 fires) (Figure 4).

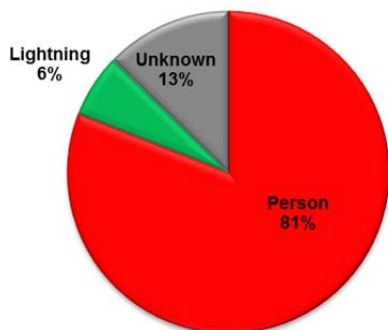


Figure 4 Wildfire cause, Port Hardy AOI, 1944 to 2015

The larger percentage of human-caused wildfires in the Port Hardy AOI compared to the provincial average is in part due to the lower incidence of lightning on Vancouver Island as compared to the entire province. The 81% person-caused wildfire statistic indicates that there is potential for a drastic reduction in the incidence of local wildfires with various prevention strategies such as education and enforcement activities. Person-caused wildfires by specific cause, as defined by the BC Wildfire Service, are shown in Figure 5. This information can provide details of common specific causes and thus be used to target efforts to reduce their future occurrence.



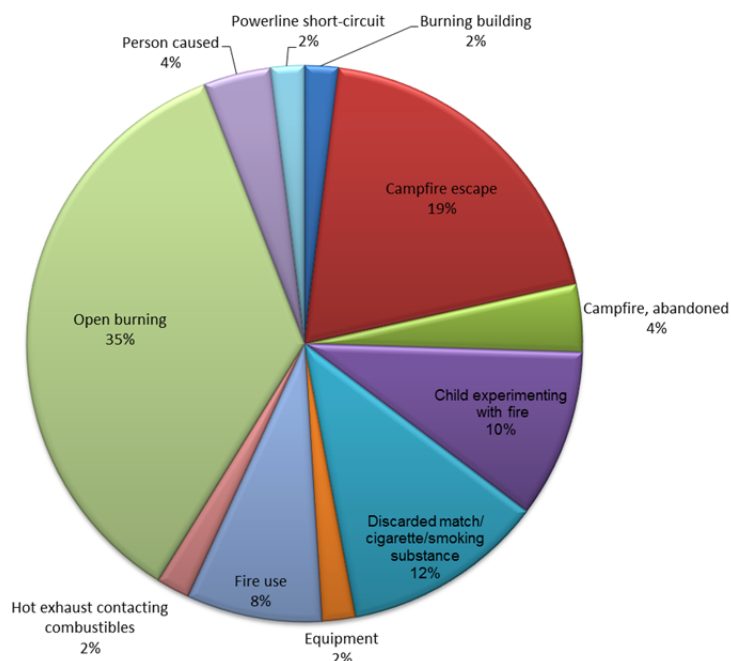


Figure 5 Person-caused wildfires, by specific cause, 1944 to 2015

Locations of previous wildfire ignitions can assist in determining where to concentrate wildfire prevention efforts. The map titled “Fire History and Structures” in Appendix 1 shows the location of wildfires in the Port Hardy AOI from 1944 to 2015.

5.12.1 Wildfire Concerns of Stakeholders

The Port Hardy Fire Rescue Fire Chief (Schell Nickerson) and Deputy Chief (Brent Borg) noted concerns for wildfire starts as being recreation in the forest surrounding town (campfires, cigarettes), private and industrial land clearing and forestry operations. In particular, Jensen’s Cove/Bear Cove area, Seaview Drive, Stink Creek, Holberg Road (red gate)²² are areas of concern. Jon Flintoft²³ of Western Forest Products also noted the occurrence and concern for campfires in the area. Mike McCulley²⁴ of BC Timber Sales also noted his concerns with the Jensen’s Cove/Bear Cove area (slash, old shakemills, dryland sort).

5.13 Fuel Types

The main variables affecting wildfire behaviour are fuels, weather and topography. The term “fuels” encompasses vegetation and biomass structure, biomass loading, dominant species (especially for treed landscapes), and other characteristics such as forest floor features and forest health issues that affect flammability and availability of biomass for combustion (Perrakis 2016). Most forest ecosystems in temperate and colder climate regions grow more biomass

²² Pers. comm. Brent Borg, Deputy Fire Chief, Port Hardy Fire Rescue (29 February 2016) and Schell Nickerson, Fire Chief, Port Hardy Fire Rescue (2 May 2016)

²³ Pers. comm. Jon Flintoft, RPF, Senior Operations Planner, Western Forest Products. (29 February 2016)

²⁴ Pers. comm. Mike McCulley, Engineering Specialist, BC Timber Sales (Seaward) (8 March 2016)



every year than what decomposes, resulting in a build-up of organic material over time. All organic material, live, dead or in various stages of decomposition, is combustible and is considered fuel.

In BC, the primary modeling system used by the BCWS for fire behaviour prediction is the Fire Behaviour Prediction (FBP) System, a component of the CFFDRS. There are 16 “benchmark” FBP fuel types (some of which are seasonal variants) for all of Canada. The original dataset, provided by the BCWS, is called the Provincial Fuel Type Layer (FTL; part of the Provincial Strategic Threat Analysis) and was obtained by SNRC in April 2016. The FTL is a raster dataset that provides forest fuel type information for all of BC for fire behaviour prediction and related purposes. One requirement of the CWPP process is to provide an updated, or “ground-truthed,” FTL within the AOI. There are difficulties associated with fitting the various fuel types found within the AOI with the benchmark fuel types that are predominantly found elsewhere in Canada; therefore, the FBP fuel typing process is inherently subjective, and the vegetation communities of BC frequently fall through the cracks between the FBP fuel types (Perrakis 2016). The BCWS produced a Working Paper in February 2016 (Perrakis 2016) that provides the technical description of the FTL, including all assumptions and limitations. It is worth noting that there are exceptional knowledge gaps and a high level of uncertainty with fitting certain vegetation communities found within the AOI into the FBP fuel types. These vegetation communities are shrublands/shrub-dominated communities, pine bog/wetlands, coastal conifer plantations and recent harvested areas with piled slash from second growth forests. Their assumed FBP associations are found in Table 3 below. Other typical FBP fuel types found within the AOI are C-3, C-5, M-1/2, D-1/2, S-3 and O-1a/b.

Table 3 FBP Fuel Types, as found within the Area of Interest

FBP Fuel Type	Local Description	Comments
C3	Dense, pure conifer dominated by western red cedar, western hemlock and/or Sitka spruce. 4-15m height, or >15m height and < 60 years old.	
C5	Dense, pure conifer dominated by western red cedar, western hemlock and/or Sitka spruce. High crown base height (18 m).	Surface fuel loading in older stands can be much greater than in the benchmark red and white pine stands from Ontario, particularly if coarse woody debris are included. As a result, fuel consumption and fire intensity can be higher than predicted by the C-5 fuel type under drought conditions.
M-1/2	Mixed stands of deciduous and conifer species such as western red cedar, western hemlock, Sitka spruce, red alder and/or big leaf maple.	Percent of conifer is multiplied by a decimal proportion to reduce the effective percent conifer; this has the effect of reducing the predicted fire behaviour (spread rate and intensity). This is because the original M-1/2 fuel type is based on the more flammable and volatile species of black and/or white spruce.
S-3	Blocks harvested within the past few years (generally 6 years or less). Debris (slash) is comprised of western red cedar, western hemlock and/or Sitka spruce.	Factors associated with forest harvesting can profoundly influence the loading and characteristics of the subsequent surface fuel (for example, pre-harvest forest stand characteristics or harvest operation details).
D-1/2	Stands of deciduous species such as red alder and/or big leaf maple.	Other local vegetation communities include: Shrub-dominated communities that vary in composition (common species might include scotch broom, red alder, hardhack, conifer regen). May have a strong component of mineral soil exposure. Wet meadows with stunted shore pine and western red cedar. Conifer crowns extend to ground. Dense, conifer regen more than 6 years old, but less than 4 m height. Species might include western red cedar, western hemlock, red alder, big leaf maple.
O-1	Open grassland, standing or matted	Playing/sports fields

5.14 The Wildland Urban Interface

The wildland urban interface (WUI) is a term used to describe an area where various structures (most notably private homes) and other human developments meet wildland vegetation. There are three main classifications of WUI: interface, intermix and occluded. *Interface* is where there is a clear edge or boundary between developed lands and non-developed lands. Within the developed areas there are not enough vegetative fuels to sustain a wildfire. *Intermix* is where there are houses sprinkled within an undeveloped wildland area. Wildland fuels surround the individual



structures and there is enough to sustain a wildfire throughout the area. *Occluded* interface refers to situations where there is an area of undeveloped wildland imbedded within a generally developed urban area, such as a large park within a community. All three WUI types are represented within the Port Hardy AOI. Figures 6 and 7 show examples of *interface* and *intermix* WUI, and Figure 8 is a photo of a forested area north east of Eagle View Elementary School, which is an example of an *occluded* WUI.



Figure 6 Example, interface. Beaver Harbour Road.



Figure 7 Example, intermix. Bear Cove Cottages, Bear Cove Highway.



Figure 8 Example, occluded. Park Drive, north of Seaview Drive.

The main ignition source for structures in a WUI fire is from airborne firebrands²⁵ landing on combustible roofing materials, some distance away from the main fire front (this is termed spotting). During the 2015 wildfire west of Mayors Way, spot fires 500m ahead of the fire front were occurring. Spotting potential is greatly increased when aerial fuels are involved in a wildfire. Some fuel types are more susceptible to crown fire, and hence spotting, than others. The 2 km buffer off the District boundary is to reflect observed maximum spotting distances as used in the Beck and Simpson (2007) report.

6 Wildfire Threat Assessment

6.1 Methodology

The Union of BC Municipalities Strategic Wildfire Prevention Initiative program requires the use of a standard worksheet for wildland urban interface wildfire threat assessments in BC. Titled, "Wildland Urban Interface Wildfire Threat Assessments in BC," (Morrow, Johnston and Davies 2013) the guide and its associated worksheet are the recognized standard for conducting assessments for the CWPP Program.

A WUI Wildfire Threat Assessment involves documenting the ability of a unique area of forest land, usually located adjacent to, surrounding or abutting a community, group of buildings or individual structures, to support a wildfire. The assessment is designed to provide an estimate of the wildfire threat posed by the unique area of forestland based on the forest fuel within the area, local topography, general weather conditions, and position of the forestland relative to the development (Morrow, Johnston and Davies 2013). This method does not consider house characteristics, yard

²⁵ A piece of flaming or smouldering material carried aloft by convection or winds and capable of acting as an ignition source when it lands (CIFFC 2003).



maintenance, emergency response or water availability, but, as indicated above, does quantify fuels, topography, weather and position of structures. The specific method employed by SNRC for the AOI is explained below.

The first step in the process is to stratify vegetation cover into polygons based on a number of distinguishing characteristics. Polygons were defined using the following site attributes:

- A. Similar forest/vegetation cover. SNRC's geographic information system (GIS) department used three sources to create a 'layer' of relatively homogenous vegetation cover:
 1. Vegetation Resource Inventory (VRI) – obtained from the BC Governments' Land and Resource Data Warehouse (LRDW);
 2. Forest cover data – obtained from Western Forest Products;
 3. Visual stratification for areas where (1) and (2) were not available – field observations, LiDAR ortho imagery, and Google Earth and Bing imagery.
- B. Similar topography. Our GIS department used Digital Elevation Models obtained from the LRDW and from Western Forest Products to determine slope, aspect and terrain.

GIS analysis (ArcGIS v.10.3) using the above sources produced a map of polygons with relatively homogenous attributes. Polygon size was determined based on proximity to structures/developments (more variation was acceptable within polygons located a significant distance from structures/developments).

The next step involved field data collection. This included selected ground truthing of the GIS analysis and completing the WUI Wildfire Threat Assessment worksheets (plots) in various polygons, and included extrapolation to polygons that were inaccessible and/or further from the WUI. The worksheet determines the Wildfire Behaviour Threat Class which is an estimate of the potential wildfire behaviour on a unique area of forested land, or polygon, based on the forest fuels, topography and fire weather within the polygon (Morrow, Johnston and Davies 2013). A tally method is used that rates and assigns points under each category. After the first subcomponent (fuels), if the points do not add up to a specific amount, the polygon does not have adequate fuel volume or continuity to support a wildfire and thus the rest of the assessment is not relevant due to the lack of forest fuel available for combustion and wildfire spread. For definitions of Very Low, Low, Moderate, High and Extreme classes, please see Table 4.

Table 4 Wildfire Behaviour Threat Class definitions (Morrow, Johnstone and Davies 2013).

Very Low	These are lakes and water bodies that do not have any forest or grassland fuels. These areas cannot pose a wildfire threat and are not assessed.
Low	This is developed and undeveloped land that will not support significant wildfire spread.
Moderate	This is developed and undeveloped land that will support surface fires only. Homes and structures could be threatened.
High	Landscapes or stands that:
	are forested with continuous surface fuels that will support regular candling, intermittent crown and/or continuous crown fires
	often include steeper slopes, rough or broken terrain with generally southerly and/or westerly slopes
	can include a high incidence of dead and downed conifers
	are areas where fuel modification does not meet an established standard
Extreme	Consists of forested land with continuous surface fuels that will support intermittent or continuous crown fires. Polygons may also consist of continuous surface and coniferous crown fuels. The area is often one of steep slopes, difficult terrain and usually a southerly or westerly aspect.



The Wildland Urban Interface Threat Class quantifies the wildfire threat of a High or Extreme Wildfire Behaviour Threat Class polygon on a community or development, again using a tally method that uses the density of structures and their position on the landscape. These polygons can pose unacceptable wildfire threats when in close proximity to a community or development. For basic definitions of Low, Moderate, High and Extreme WUI Threat Classes, please see Table 5. Thirty-nine threat assessment plots were completed at several representative sites throughout the study area during May and June of 2016. Four photographs were taken at cardinal directions in each plot. See Appendix 1 and 3 for plot locations and results.

Table 5 Wildland Urban Interface Threat Class definitions (Morrow, Johnstone and Davies 2013).

Low	The high or extreme wildfire behaviour threat class polygon is sufficiently distant from any developments to not have a direct impact on the community. The polygon is likely over two kilometres from any developments.
Moderate	The high or extreme wildfire behaviour threat class polygon is sufficiently distant from any developments to not have a direct impact. The polygon is likely over five hundred metres from any developments.
High	The high or extreme wildfire behaviour threat class polygon has the potential to directly impact a community or development. The polygon is within five hundred metres of a community or development(s).
Extreme	The high or extreme wildfire behaviour threat class polygon has the potential to directly impact a community or development. The polygon is immediately adjacent to a community or development(s).

All land classification types that were a result of the WUI Wildfire Threat Assessment Polygons were plotted and then ground truthed in order to be able to extrapolate to polygons further from the WUI. Colour codes for Wildfire Behaviour Threat Classes and hatching for WUI Threat Classes used are in accordance with the assessment guide. Buffers of 200m, 500m and 2,000m were applied to every structure in the District so those Fire Behaviour polygons which achieved a high or above Threat Class could be modified for the WUI Threat Class based on distance from structure.

The assessment outcome can assist local government or landowners in identifying and managing the identified wildfire threats over both the short and long term, and may provide a basis for prioritizing and implementing fuel management strategies to reduce wildfire threats in and around the assessed community/structures (Morrow, Johnston and Davies 2013).



7 FireSmart

FireSmart is living with and managing for wildfire on our landscape. Preparing for the threat of wildfire is a shared responsibility. From home owners, to industry and government we all have responsibility to lessen the effects of wildfire (Partners in Protection 2003). The FireSmart manual titled *FireSmart – Protecting Your Community from Wildfire* was developed by Partners in Protection which is an Alberta-based non- profit organization that formed in 1990 to address common issues in the wildland urban interface. Their goal is to create a public education format that teaches communities and homeowners to reduce their exposure to wildfires.

The community FireSmart manual provides users with solutions or mitigative approaches to reduce the hazard posed by interface fire to communities or homes. The principal aspects and recommended guidelines for interface fire hazard mitigation are discussed in three sections: vegetation management, structural options, and infrastructure. Vegetation management includes strategies such as fuel removal, fuel reduction and/or fuel conversion within three Priority Zones radiating outwards from a structure. Some examples of structural options are roofing materials, chimneys, windows and balconies. Infrastructure considerations include access routes, open spaces, water supply and utilities. Other FireSmart disciplines discussed in the community manual are education, legislation and planning, development considerations, interagency cooperation, emergency planning and cross training.

8 Results and Discussion

Some polygons did not reach the minimum point requirement to continue past the fuels subcomponent and thus received a Low Wildfire Behaviour Threat Class assessment. These polygons included the Wetland, Grassland and Deciduous polygons.

Most polygons did not reach the minimum point requirement to continue onto the second component which calculates a Wildland Urban Interface Threat Class (see map titled Wildfire Threat in Appendix 1). A few polygons however did require assessment of the second component: pure conifer stands, greater than 20 years old, southwest aspect, and slopes between 0 and 55%, and one conifer stand (greater than 20 years old) that had a northeast aspect (see Appendix 3). Each polygon had a different proximity and location on the slope in relation to structures. The polygons that fell into the High Wildfire Behaviour Threat Class were therefore visually inspected on an individual basis to determine how they could potentially impact structural developments within the study area. The map titled Wildfire Threat (Appendix 1) shows the locations which have a High and Extreme Wildland Urban Interface Threat Class. The incidence of such Wildfire Behaviour Threat Classes was low elsewhere in the study area, and these polygons were far from the WUI. These areas resulted in Low to Moderate Wildland Urban Interface Threat Classes and are thus not shown on the map.

Key areas which scored a High and Extreme WUI Threat Class and their associated characteristics are noted below.



Scotia Bay

The Scotia Bay Resort has a High WUI Threat Class polygon within 200m of the structures, to the west. The mature, conifer forest is located on a steep (>30%) south facing slope on the north side of a large stream. Equally steep north facing slopes oppose the High threat polygon, with mature deciduous trees growing along the stream sides and along cleared edges of the property.

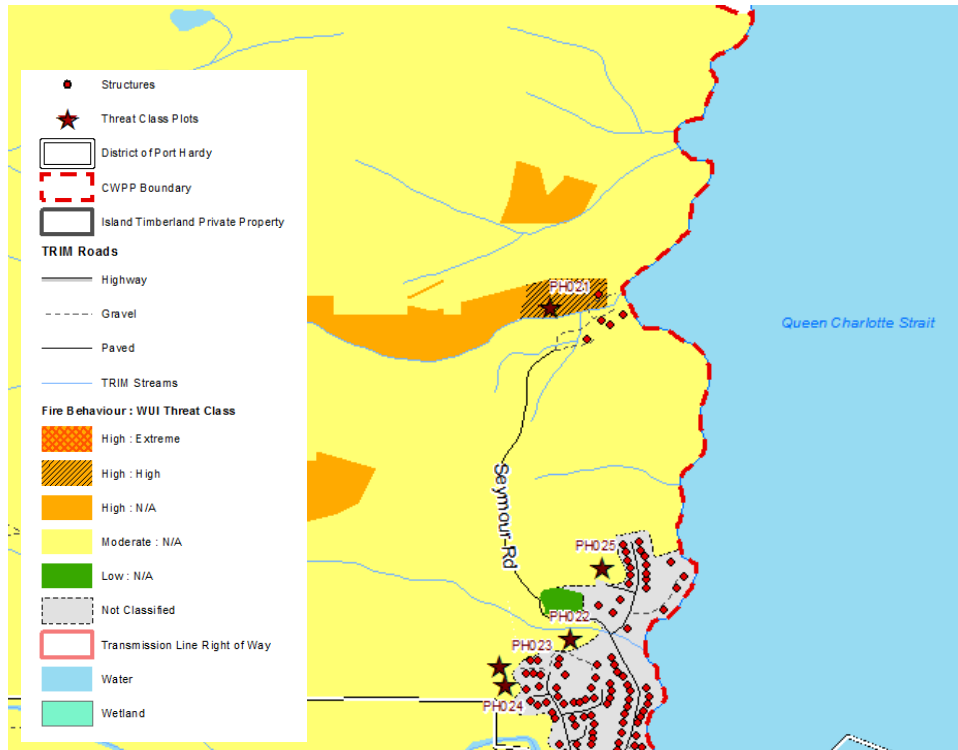


Figure 9 Scotia Bay WUI Threat Class.



BC Ferries Bear Cove Terminal

There is a small sliver of High WUI Threat Class located upslope (to the north) of the BC Ferries Bear Cove Terminal. The mature, conifer forest is located on a steep (>30%) south facing slope and has a lot of exposed rock. It is located on the north side of a relatively steep draw/valley.

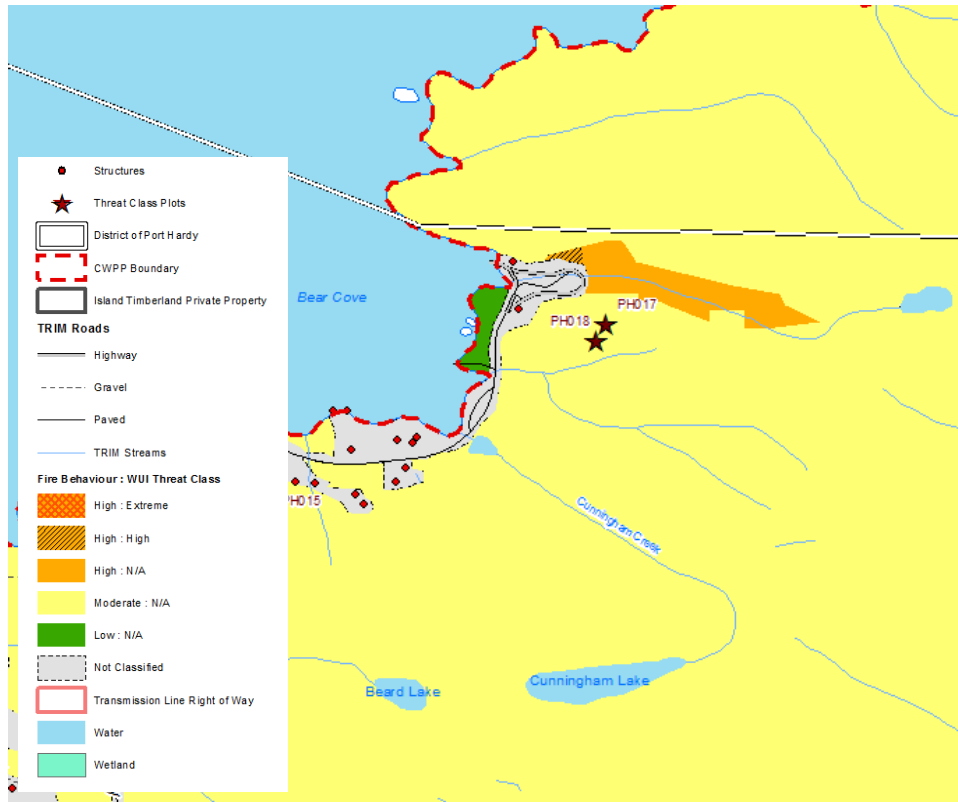


Figure 10 BC Ferries/Bear Cove WUI Threat Class.



Communication Tower (west of Chatham St)

An extreme WUI Threat Class exists downslope to the south of the tower and associated structures. An access road winds its way up the south facing slope. Distribution power lines climb from the lower access road directly up the slope. South of the hill is rolling terrain with some longer north facing slopes and a larger wetland. Slope position and the presence of infrastructure impacted the Threat Class value.

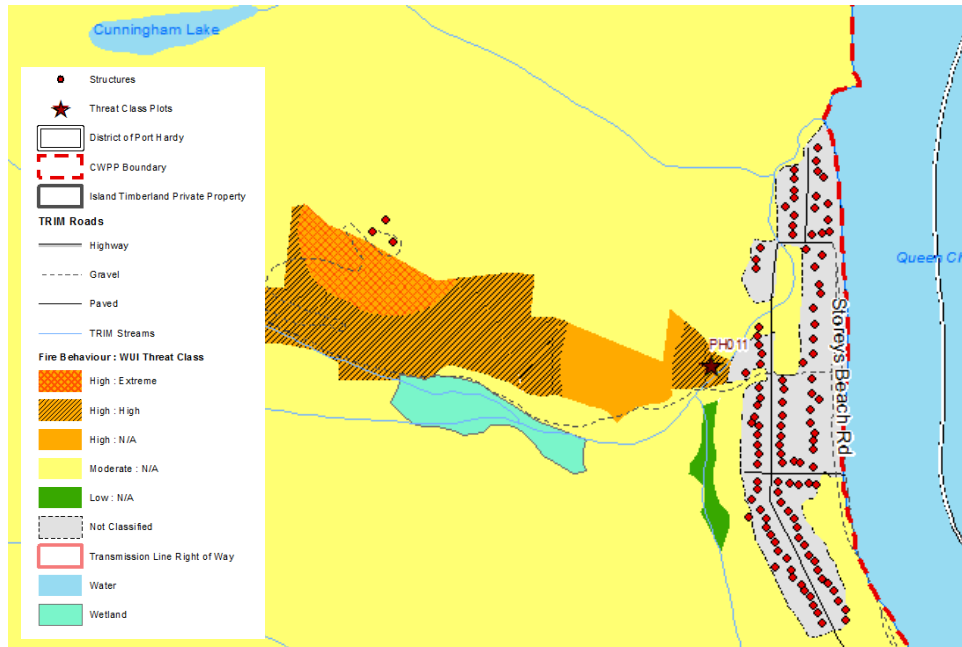


Figure 11 Communication Tower (west of Chatham St) WUI Threat Class.



West of Peel Road and South of Tsakis Way

A small High WUI Threat Class polygon is located behind the houses at the end of Peel Road. Although the conifer stand is on a north facing slope, the high density of live and dead suppressed and understory conifers increased the Fire Behaviour Threat Class to High, resulting in a structure assessment. There is a significant deciduous component at the back of the homes, along the old paved road running parallel with Byng Road, and along Byng Road itself. A High WUI Threat Class polygon with a south facing slope is located south of some homes along the middle and eastern end of Tsakis Way. The homes are in the *intermix* but the high threat stand type is mostly 'up and over' a slope – i.e. the homes are on the ocean front on a north facing slope. The property and structures adjacent the western end of the High WUI Threat Class polygon are located cross slope from one another. Terrain to the south of this high threat area is gently sloped, and has significant wetland features.

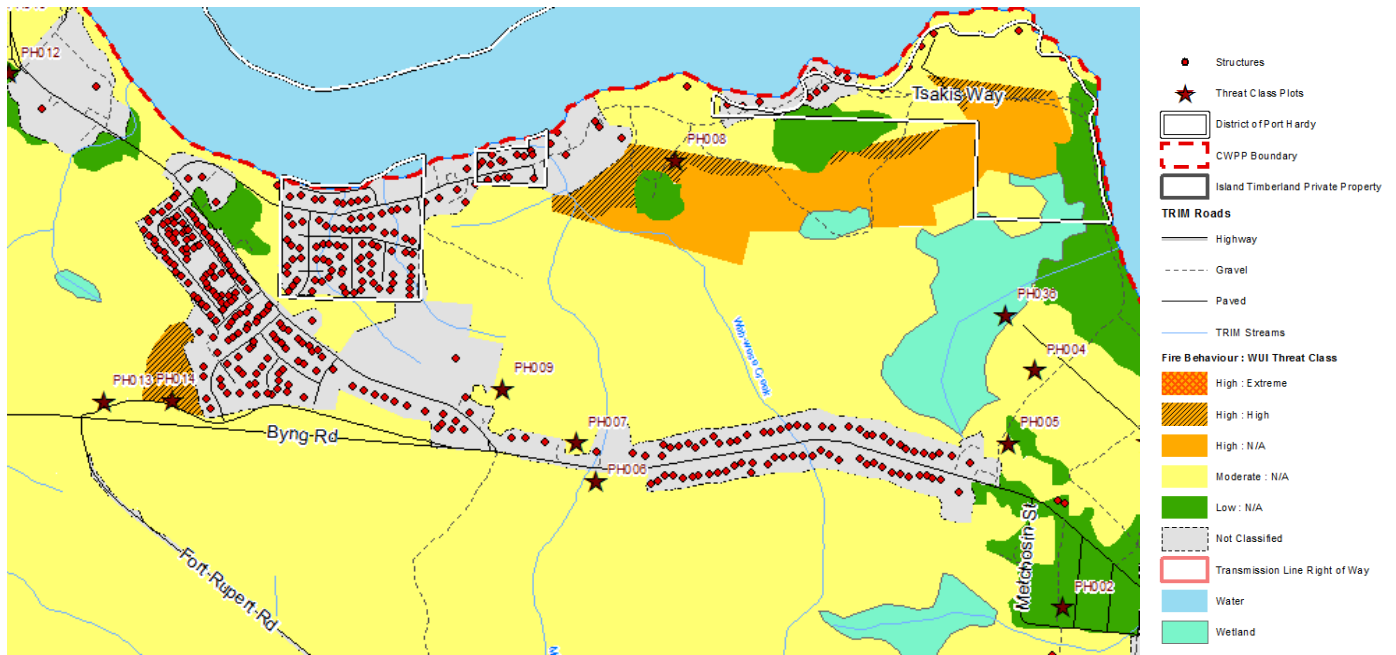


Figure 12 Peel Road/Tsakis Way WUI Threat Class.



9 Recommendations

Wildfire prevention initiatives fall under three broad categories; Education, Engineering and Enforcement, also known as the 3 E's approach.

Education involves raising the awareness level of the public and stakeholders about various fire and fire prevention related principles. One of the first steps in the education process is for residents within the WUI to gain an understanding that fire is a constant and recurrent process in most forest and grassland ecosystems and that we cannot fully eliminate it. This fact does not change when houses and other developments are built within forest areas. Once we accept this fact we can plan for the inevitable presence of fire. Education can range from raising the awareness of the role fire has historically played in forest ecosystems, the effects of fire – both good and bad – on the landscape, safe use of fire, and methods of making our residences, business areas and living areas safer from fire. Education can also mean training of structural fire suppression personnel and residents in the specialized tactics and acquisition of specialized equipment used for wildfire suppression.

Education involving the public, local government and all stakeholders needs to emphasize collaboration, community protection and personal responsibility. This builds essential trust and effective communication amongst all players. The concept of community engagement is one in which locals are truly involved; often the local population *wants* to be involved and contribute their knowledge of their area (The State of Victoria 2005). Aiming for collective decision-making could result in a more successful and well-rounded public education outcome. Three fundamental (or minimum) standards for community engagement are: knowing and respecting the communities involved, embedding a community engagement plan that is appropriate for the project size and complexity, and undertaking works (including engagement activities) together with other fire, public and emergency management agencies, where appropriate (The State of Victoria 2005).

Appropriate education and engagement can help members of the community understand and accept their wildfire risk, and to take proactive steps to improve the safety and resilience of their homes, landscapes, infrastructure and community assets to withstand a fire (Fire Adapted Communities 2013). Multiple approaches are often more effective than one single program, so agencies and local government involved should look at various models and toolkits available and create a plan which works best for them.

Engineering involves processes that modify our surroundings with an eye towards managing for wildfire or to reduce the potential damage caused by fire. This can be the design of residential areas near the forest that take into account factors that recognize and manage for the presence of fire. This could include the design of infrastructure such as water delivery systems, ingress and egress routes, use of building materials that provide greater resistance to fire and the modification of forest fuels in and around interface areas. Fuel



modification usually includes the creation of defensible space adjacent to structures in the interface (FireSmart Priority Zone 1 FireSmart manual). At a larger scale, sequencing of timber harvesting and undertaking post-harvest hazard abatement when proximal to human development is another option.

Enforcement is the final category in a well-rounded fire prevention strategy. There must be rules and guidelines for the safe and responsible use of fire as there can be serious consequences for its misuse, and there must be a way to monitor that rules are being followed. To be effective and credible there also must be a consequence for failure to use fire safely and responsibly. Enforcement initiatives can take the form of having simple and comprehensive legislation governing the safe and effective use of fire and the management of issues that create a fire hazard and/or risk. This can take the form of legislation that enables the imposition of fire bans, orders to reduce a fire hazard, orders to extinguish a fire that is potentially dangerous, rules on adequate equipment to manage fire, ability to close areas off if the hazard becomes too unsafe and legislation that enables forced cost recovery for an agency burdened with suppressing a wildfire started by someone else. Agency personnel must be trained and empowered to act on the legislative non-compliance at the lowest operational level possible. There must also be dissemination of the rules so the public knows exactly what is expected and what the consequences are. A review of existing bylaws and the creation of new bylaws are critical to the enforcement of community standards that govern the use of fire. There must also be appropriate and effective sanctions on people who do not use fire safely.

The following recommendations are divided into each of the above categories and further subdivided into more detailed sections.

9.1 Education

9.1.1 Enhance Public and Stakeholder Knowledge

Recommendation #1: Consider the strategic use of signage within the District of Port Hardy to bring awareness.

Two options include:

1. High recreational use areas and access points, to deter behaviours that contribute to accidental fire starts and provide information on how to report wildfires.
2. District boundary and/or entrance points to industrial areas, to provide fire danger information in an effort to remind those conducting open burning operations and/or high risk activities of their responsibilities for fire watch, etc.



Recommendation #2: Educate appropriate District of Port Hardy staff on FireSmart. This should involve distribution of the FireSmart community manual ("FireSmart: Protecting Your Community from Wildfire," Partners in Protection, 2003) and brochures to relevant parties such as planners, key fire department personnel and those responsible for permit approvals.

Recommendation #3: Continue collaboration with the Invasive Plant Council of BC, as per Official Community Plan Objective 4.4.2, to review available guidelines for identification, reporting and control of Scotch Broom within the District of Port Hardy. Scotch broom is highly susceptible to complete surface consumption by fire due to high levels of volatiles (Morrow, Johnston and Davies 2013).

Recommendation #4: Provide public education opportunities regarding wildfires and FireSmart via online resources.

1. Enhance the District of Port Hardy's website by presenting wildfire information in one, clear and easily accessible place (i.e. via direct link from the main page):
 - Continue providing information on current, local wildfires
 - Continue providing FireSmart information and links
 - Continue providing preparedness information
 - Add current fire danger ratings
 - Add wildfire reporting information
 - Add a short description of FireSmart so as to entice residents to follow the link provided
 - Add fire-related bylaws and permit information
 - Add link to the *Wildfire Act and Regulations*
2. Enhance the Port Hardy Fire Rescue website by including FireSmart information and links.
3. Use social media to distribute information (i.e. reminders for backyard burning safety and spring time FireSmart activities).

Recommendation #5: Provide public education opportunities regarding wildfires and FireSmart principles. Ideas for disseminating such information could include the following:

- Information booth at local events (i.e. Filomi Days)
- Seminars or webinars
- FireSmart brochure placement in municipal hall

Recommendation #6: Educate private industry on the *Wildfire Act and Regulations* and relevant bylaws via permit application process. At the time of application the District should provide information on requirements and restrictions under both.

Recommendation #7: Port Hardy Fire Rescue and BC Wildfire Service should consider providing wildfire education in schools.



Recommendation #8: Provide prospective builders with FireSmart information during permit process.

9.1.2 Training

Recommendation #9: Port Hardy Fire Rescue should encourage all staff to undertake the S-100 Basic Fire Suppression and Safety course, and ensure that the S-100A refresher course is taken annually thereafter. The PHFR should consider committing key individuals to receive more advanced wildfire specific suppression and knowledge training, such as:

- S-115 Wildfire in the Urban Interface
- S-185 Fire Entrapment Avoidance
- S-241 Fire Assessment
- S-275 Air Tanker Use and Safety
- Incident Command System

Recommendation #10: Establish wildfire simulation exercises. A simulated wildfire scenario should be developed and carried out at least once per year with wildfire suppression crews. This exercise could involve emergency management agencies, local stakeholders (for example, Western Forest Products, BC Hydro, Cape Scott Wind LP) and residents in both the planning and the execution to test knowledge and ability to respond. The District of Port Hardy could pursue funding sources to be made available for such exercises (i.e. UBCM in the past had a funding source for such activities called the Emergency Planning Fund but this program is no longer running. The District could lobby for its reinstatement).

Use of training exercises can provide a valuable check on current logistics and emergency infrastructure, identify if there is a need to improve inter-agency coordination procedures or clarify regulatory requirements during an event.



9.1.3 Local Operational Knowledge Improvement

Recommendation #11: Improve knowledge about access (including constraints to) and water sources through effective collaboration between agencies and stakeholders. Access issues, which should be mapped and shared on a regular basis and be up-to-date, can comprise the following: ownership, barriers to access (i.e. gates, bollards), bridge load limitations/removals/installations, and road deactivation and condition. Water source mapping should include distance/barriers/condition of access to natural (lakes, wetlands, streams, rivers – with regard to land ownership and ecologically sensitive water bodies) and private water sources. This information could be used in the Application that the Port Hardy Fire Rescue recently purchased, *Who's Responding*. This type of knowledge attainment is a good opportunity to involve local stakeholders and their knowledge as it builds trust and effective communication and results in more robust relationships between emergency services, local government and the local community as a whole.

Recommendation #12: Share knowledge and coordinate awareness of property, critical infrastructure and values at risk, in conjunction with North Island Central Coast Natural Resource District staff for inclusion in the Regional Fire Management Plan. Items may include (list not complete):

- Businesses
- Industry
- Hazardous areas (i.e. explosive storage areas)
- Energy infrastructure (i.e. BC Hydro and Cape Scott Wind LP)
- Archaeological sites (including First Nations)
- Sensitive ecosystems
- Red- and blue-listed species and plant communities

Recommendation #13: Ensure that Port Hardy Fire Rescue maintains an up-to-date list of qualified local service providers, including contact information and support capabilities, which would be available to assist the District of Port Hardy with wildfire fighting in the event that a wildfire puts strain on Port Hardy Fire Rescue and BC Wildfire Service's resources. Service providers should be trained in S-100 fire suppression capability (basic fire suppression and safety) with annual S-100A refresher training at minimum, and be able to supply their own basic fire suppression tools. The list should also include suppression crews, wildlife dangerous tree assessors (with wildfire module), certified fallers and others capable of providing chainsaw services in the event that falling or basic chainsaw support is required for various emergency situations. The list could be maintained annually in collaboration with the Districts' Emergency Coordinator, BC Wildfire Service and the Districts' operational department.



9.2 Engineering

Recommendation #14: Encourage FireSmart principles on private properties, in particular, those properties adjacent High Wildland Urban Interface Threat Class areas (Scotia Bay Resort, the middle and eastern end of Tsakis Road, and the communication tower west of Chatham St). Landowners should consider the risk on their own property and take appropriate actions guided by FireSmart principles. This should include assessment of the structures (i.e. building materials), creating defensible space around the structure (i.e. removal of flammable materials/vegetation) and being prepared in the event of a wildfire (i.e. sprinkler systems).

Getting buy-in from private landowners will take a strong effort to educate the public on the risks of living in the wildland urban interface. Financial and/or tax incentives should be considered as a way of assisting landowners to undertake potentially expensive fuel management and purchasing building materials that are FireSmart.

Recommendation #15: Consider a Fuel Management Demonstration Project on Crown land within the District of Port Hardy municipal boundary to promote awareness of FireSmart principles within the community while utilizing Union of BC Municipalities (UBCM) funding under the Strategic Wildfire Prevention Initiative (SWPI). Such a project should be implemented in an area highly visible to District residents and should incorporate educational tools such as signs and interpretive trails. A creative approach to the project could involve local high school students, and/or community volunteers.

Recommendation #16: Conduct FireSmart assessments on all critical infrastructure and implement FireSmart principles (if required) in order to reduce the potential damage in the event of a wildfire.

9.3 Enforcement

Recommendation #17: Consider having interface Development Permit applications go through applicable external agencies/groups for comment prior to approval. These agencies/groups should include Port Hardy Fire Rescue and the BC Wildfire Service. This can generate more information and reveal potential concerns regarding new developments prior to commencement of construction. This type of consultation can also help establish and maintain ongoing communication, all of which assists the District in dealing with interface wildfire risk.



Recommendation #18: Consider incorporating FireSmart principles into building and property standards and subdivision layout requirements. FireSmart vegetation management (all three Priority Zones, but Zone 1 in particular), structural options and infrastructure can be incorporated into local bylaws and form and character guidelines.

It should be noted that there are multiple references within the OCP that may conflict with FireSmart recommendations. References in the OCP include Objectives 4.4.1 (native plant landscaping), 4.4.3 (protect and preserve parks, open spaces and natural areas), 4.6.4 (connection of open spaces), and Form and Character guidelines under Development Permit Areas (DPA) #2, 3 and 4 (use of wood), 5 (tree retention) and 7 (natural vegetation to buffer).



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10 Appendices

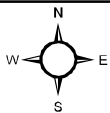
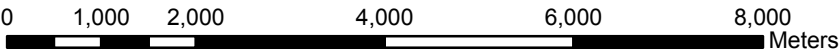
10.1 Appendix 1 – Maps

The following maps were also submitted digitally to the District: Project Area Overview, Wildfire Threat (two maps), Fire History and Structures, PSTA Fuel Types and CWPP Fuel Types.

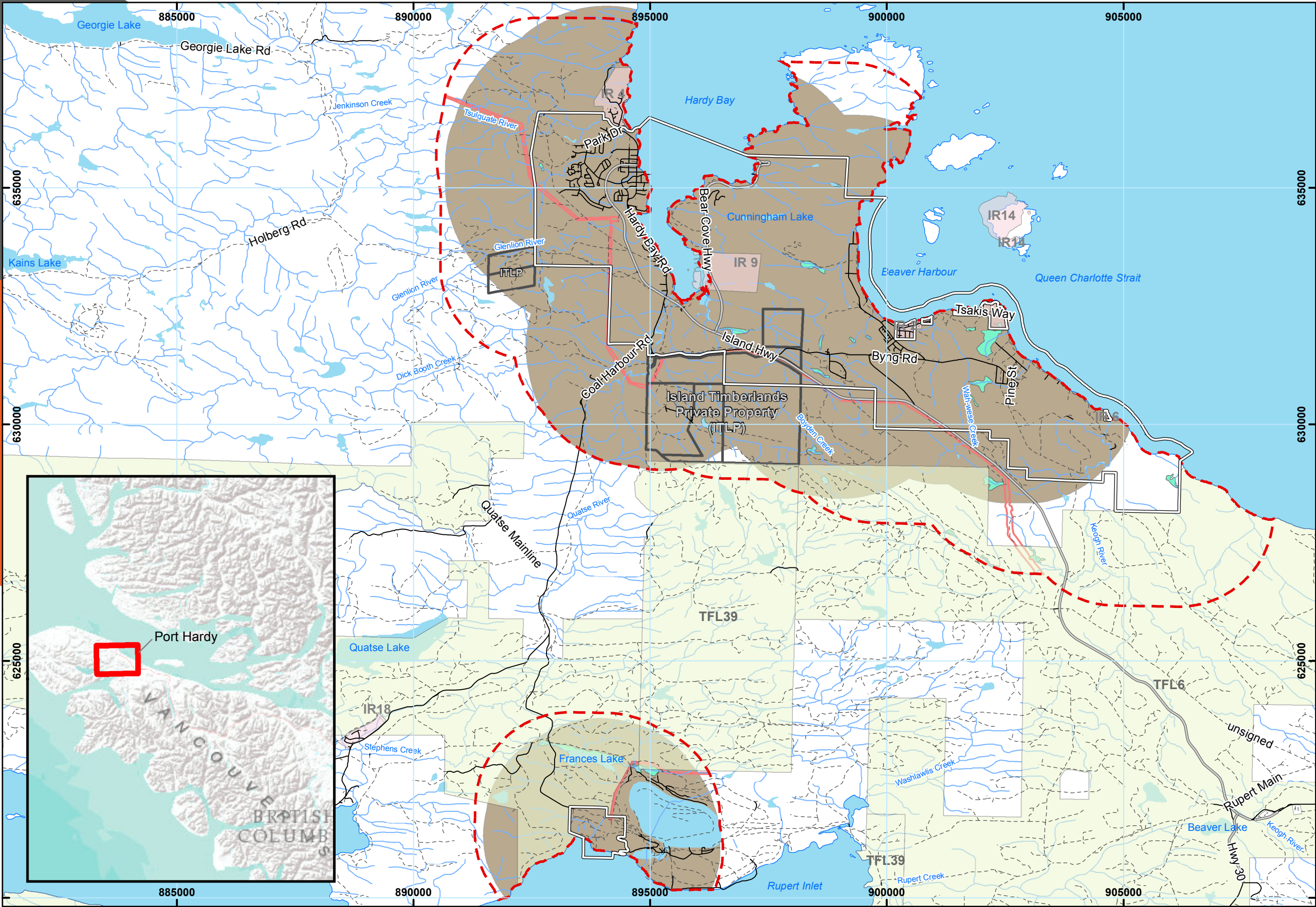




District of Port Hardy - Community Wildfire Protection Plan
Project Area Overview



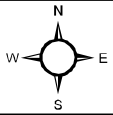
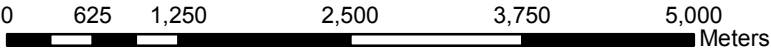
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Produced By: samantha.griffore



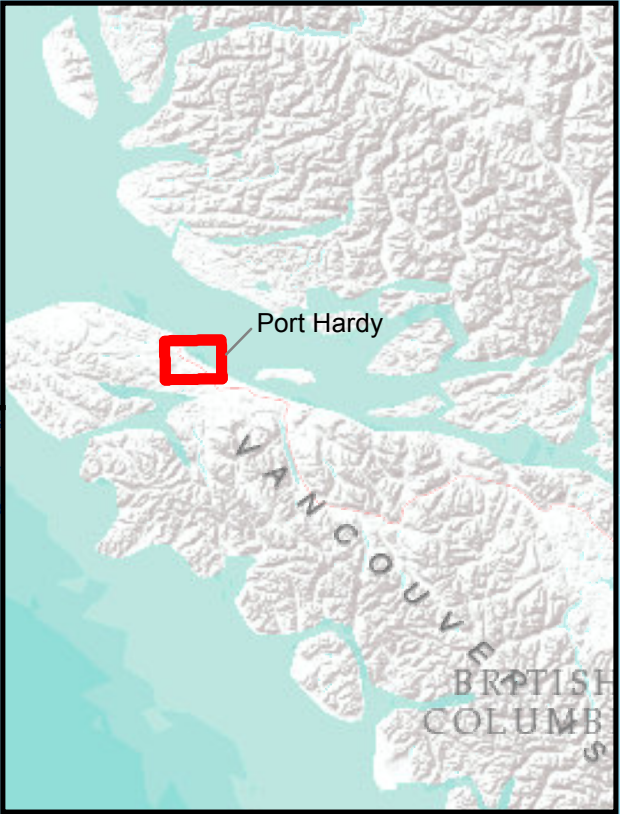
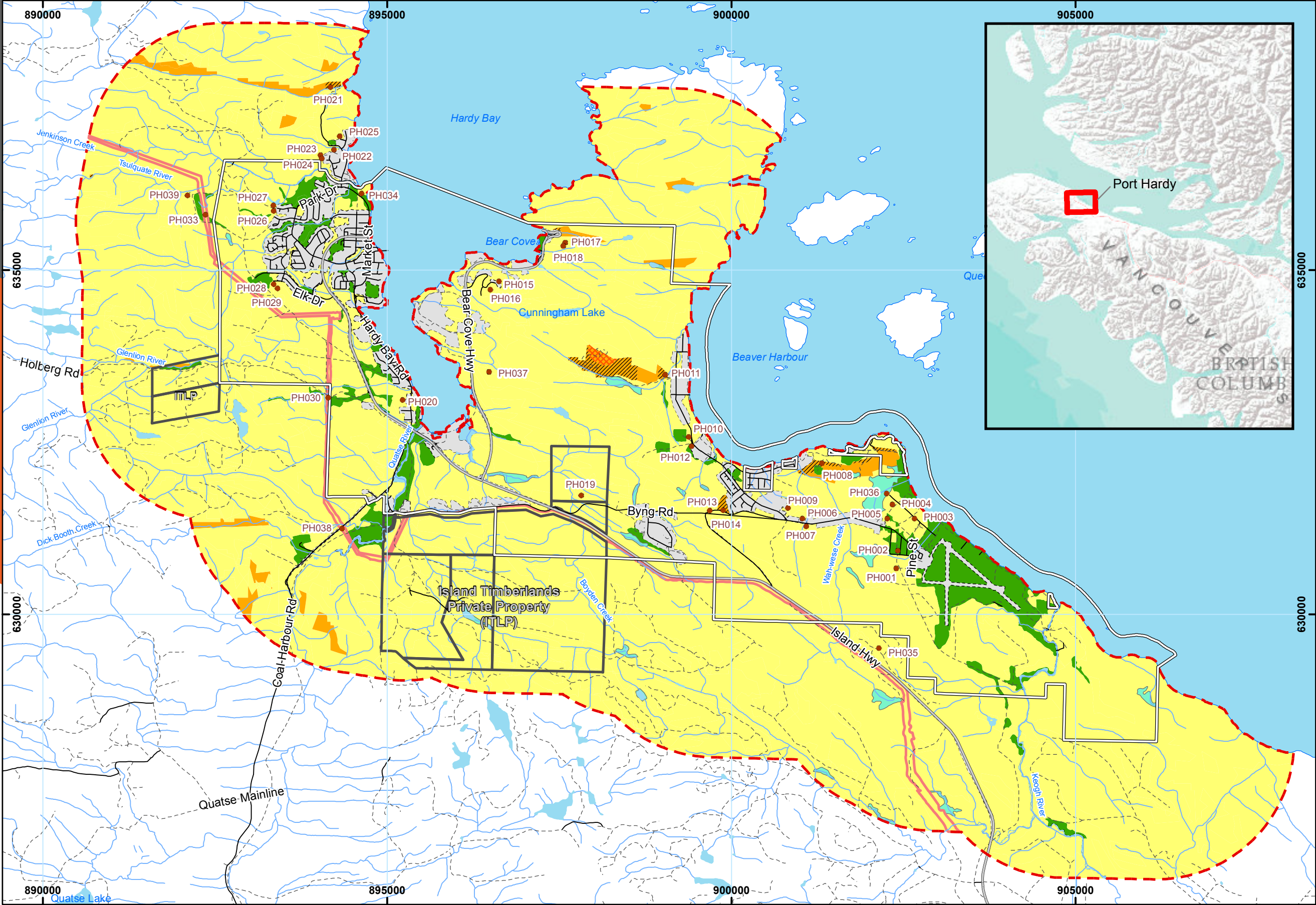
- District of Port Hardy
- CWPP Boundary
- Island Timberland Private Property
- Indian Reserve
- Tree Farm Licence
- Wildland Urban Interface
- TRIM Roads
 - Highway
 - Gravel
 - Paved
- TRIM Streams
- Transmission Line Right of Way
- Water
- Wetland



District of Port Hardy - Community Wildfire Protection Plan
Wildfire Threat Map 1 of 2



Projection: NAD 1983 BC Environment Albers
Scale: 1:55,000
Date: 7/7/2016
Produced By: samantha.griffore



- Threat Class Plots
- District of Port Hardy
- CWPP Boundary
- Island Timberlands Private Property
- TRIM Roads
 - Highway
 - Gravel
 - Paved
 - TRIM Streams
- Fire Behaviour : WUI Threat Class
 - High : Extreme
 - High : High
 - High : N/A
 - Moderate : N/A
 - Low : N/A
 - Not Classified
 - Transmission Line Right of Way
 - Water
 - Wetland

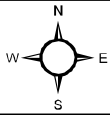
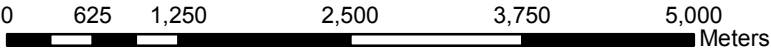
Areas Summary	
FB : WUI Threat Classes	Area (ha)
Low : N/A	505.72
Moderate : N/A	10,010.69
High : Low	15.43
High : Moderate	110.98
High : High	34.32
High : Extreme	6.06
High FB Total	166.79
CWPP Total	10,683.20



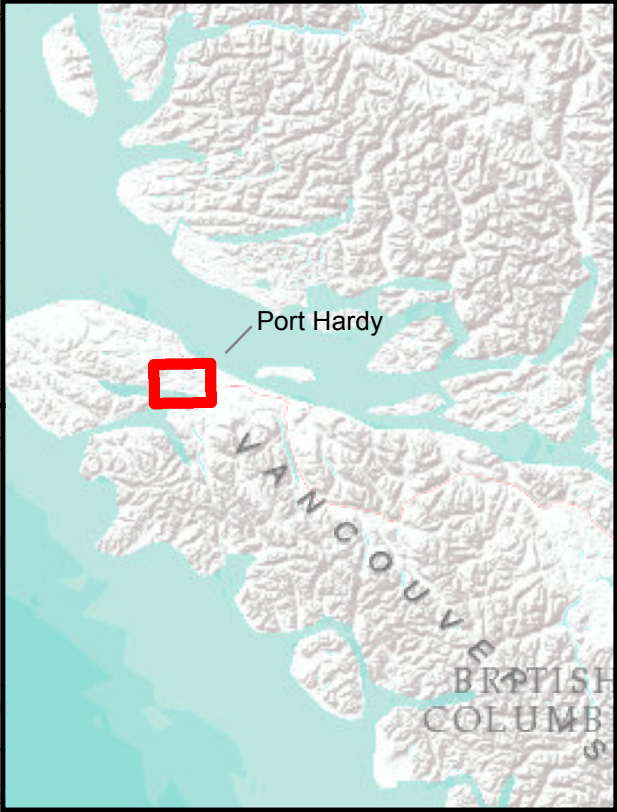
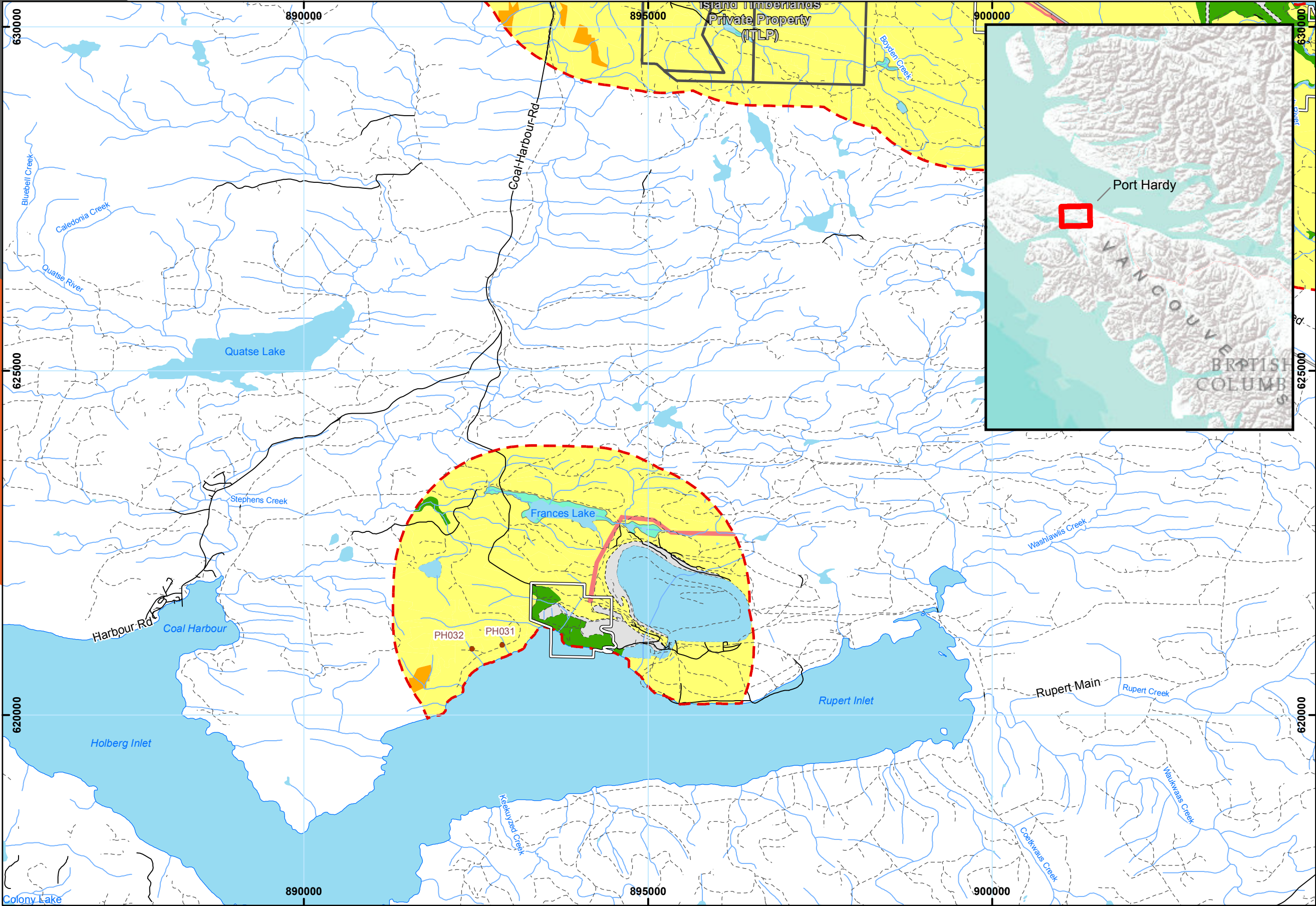
Campbell River 321-1180 Ironwood St. p: 250.287.2246
Port McNeill 2-1488 Beach Dr. p: 250.956.2260



District of Port Hardy - Community Wildfire Protection Plan
Wildfire Threat Map 2 of 2



Projection: NAD 1983 BC Environment Albers
Scale: 1:55,000
Date: 7/7/2016
Produced By: samantha.griffore



- Threat Class Plots
- District of Port Hardy
- CWPP Boundary
- Island Timberland Private Property
- TRIM Roads**
 - Highway
 - Gravel
 - Paved
 - TRIM Streams
- Fire Behaviour : WUI Threat Class**
 - High : Extreme
 - High : High
 - High : N/A
 - Moderate : N/A
 - Low : N/A
 - Not Classified
 - Transmission Line Right of Way
 - Water
 - Wetland

Areas Summary	
FB : WUI Threat Classes	Area (ha)
Low : N/A	505.72
Moderate : N/A	10,010.69
High : Low	15.43
High : Moderate	110.98
High : High	34.32
High : Extreme	6.06
High FB Total	166.79
CWPP Total	10,683.20

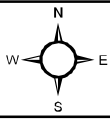
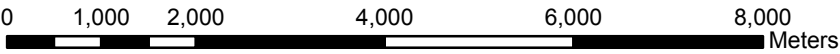


Campbell River
321-1180 Ironwood St.
p: 250.287.2246

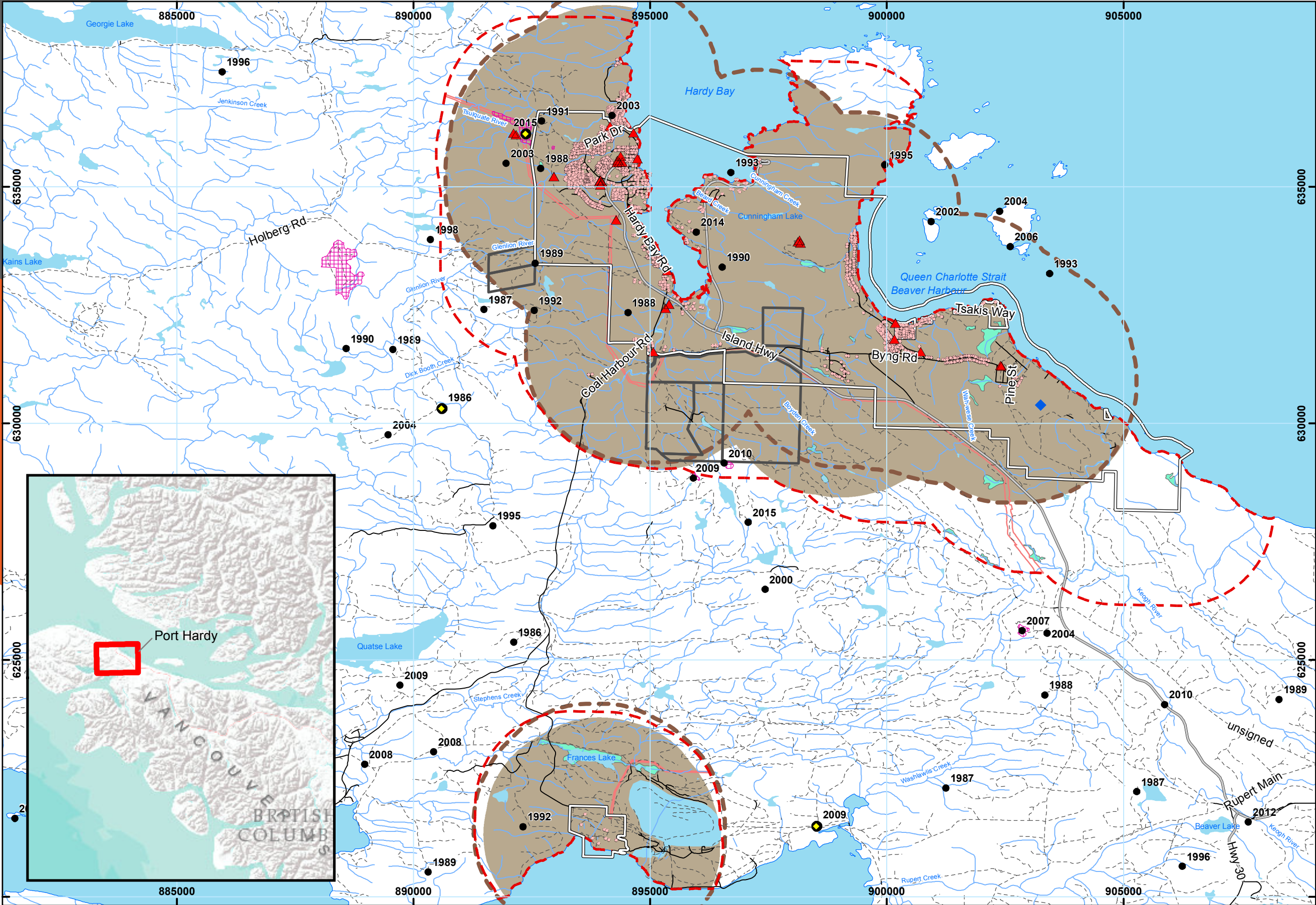
Port McNeill
2-1488 Beach Dr.
p: 250.956.2260



District of Port Hardy - Community Wildfire Protection Plan
Fire History and Structures



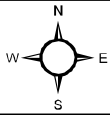
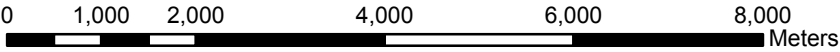
Projection: NAD 1983 BC Environment Albers
Scale: 1:80,000
Date: 7/7/2016
Produced By: samantha.griffore



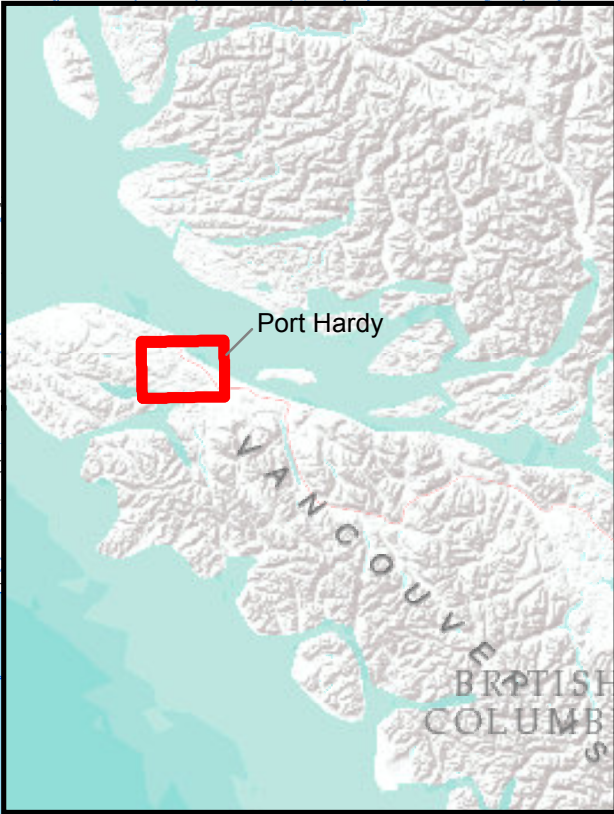
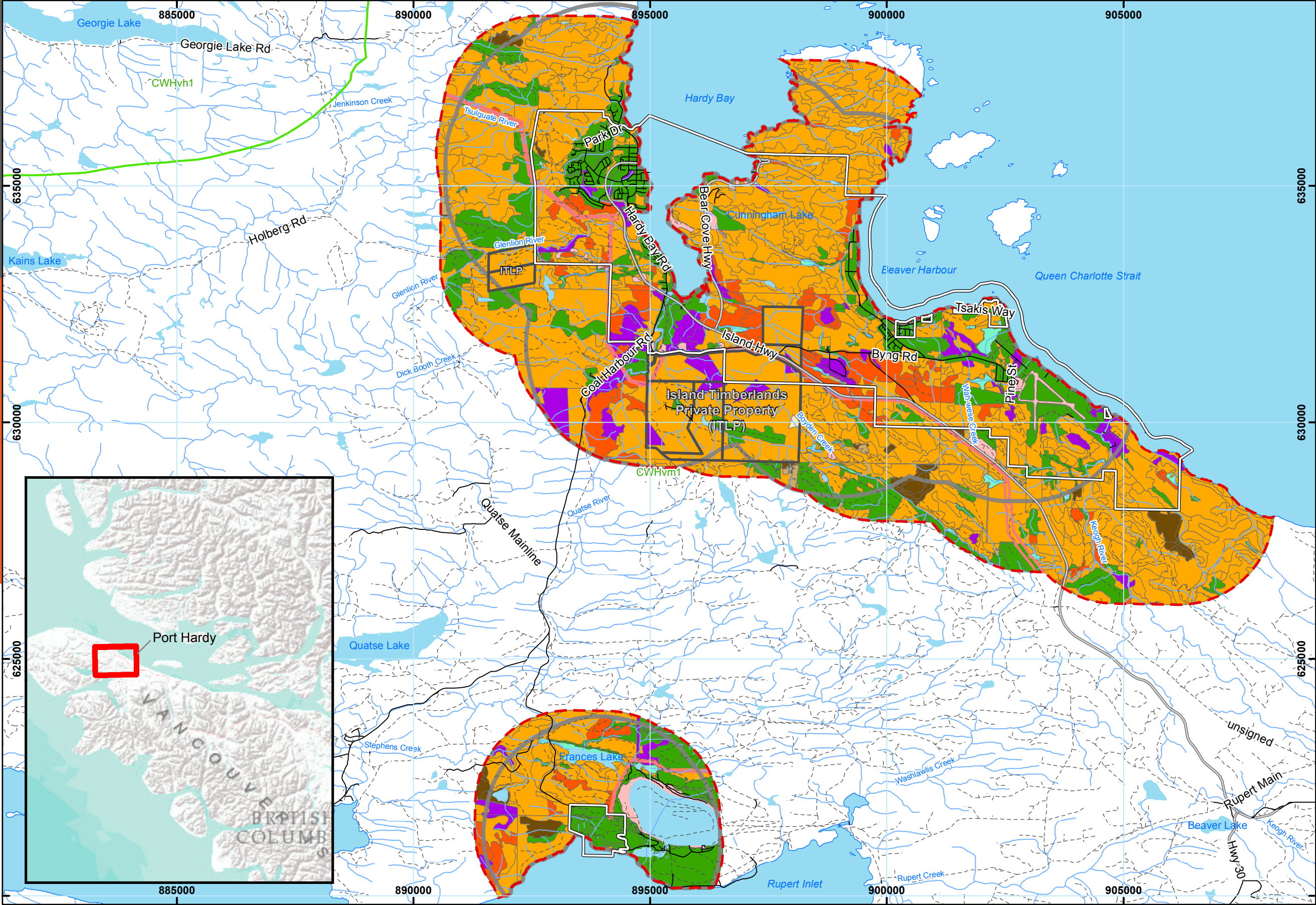
- 30yr Historical Fire Point - Person
- 30yr Historical Fire Point - Lightning
- △ Structure
- △ Critical Infrastructure
- ◆ Weather Station
- District of Port Hardy
- CWPP Boundary
- Island Timberland Private Property
- TRIM Roads**
 - Highway
 - - - Gravel
 - Paved
 - TRIM Streams
- Transmission Line Right of Way
- Water
- Wetland
- 30yr Historical Fire Polygon
- PSTA Wildland Urban Interface
- CWPP Wildland Urban Interface



District of Port Hardy - Community Wildfire Protection Plan
PSTA Fuel Types



Projection: NAD 1983 BC Environment Albers
Scale: 1:80,000
Date: 7/7/2016
Produced By: samantha.griffore



- District of Port Hardy
- CWPP Boundary
- Island Timberland Private Property

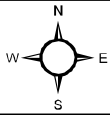
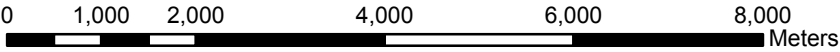
- TRIM Roads**
- Highway
 - Gravel
 - Paved
 - TRIM Streams
 - Transmission Line Right of Way
 - Water
 - Wetland
 - Wildland Urban Interface
 - Biogeoclimatic Zone

- PSTA Fuel Type**
- C-3
 - C-5
 - D-1/2
 - M-1/2
 - O-1a/b
 - S-1
 - S-3
 - N
 - W

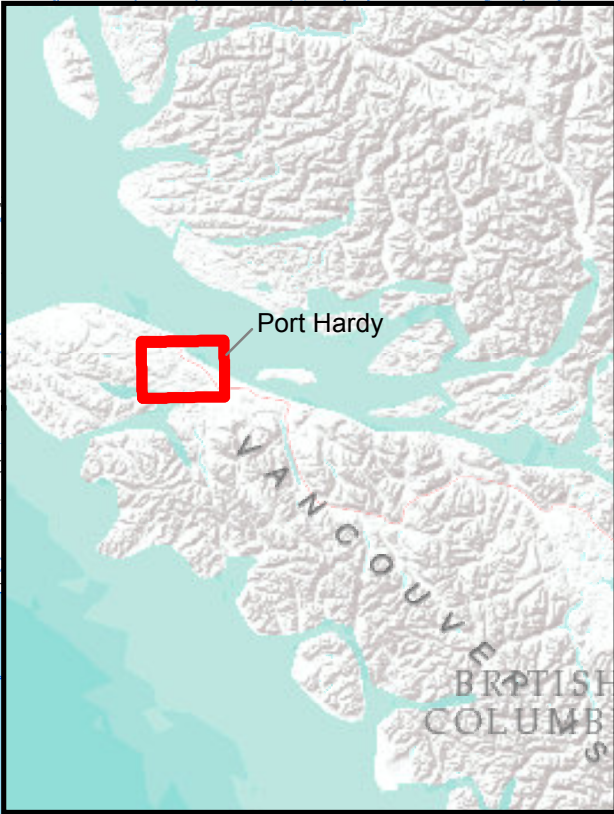
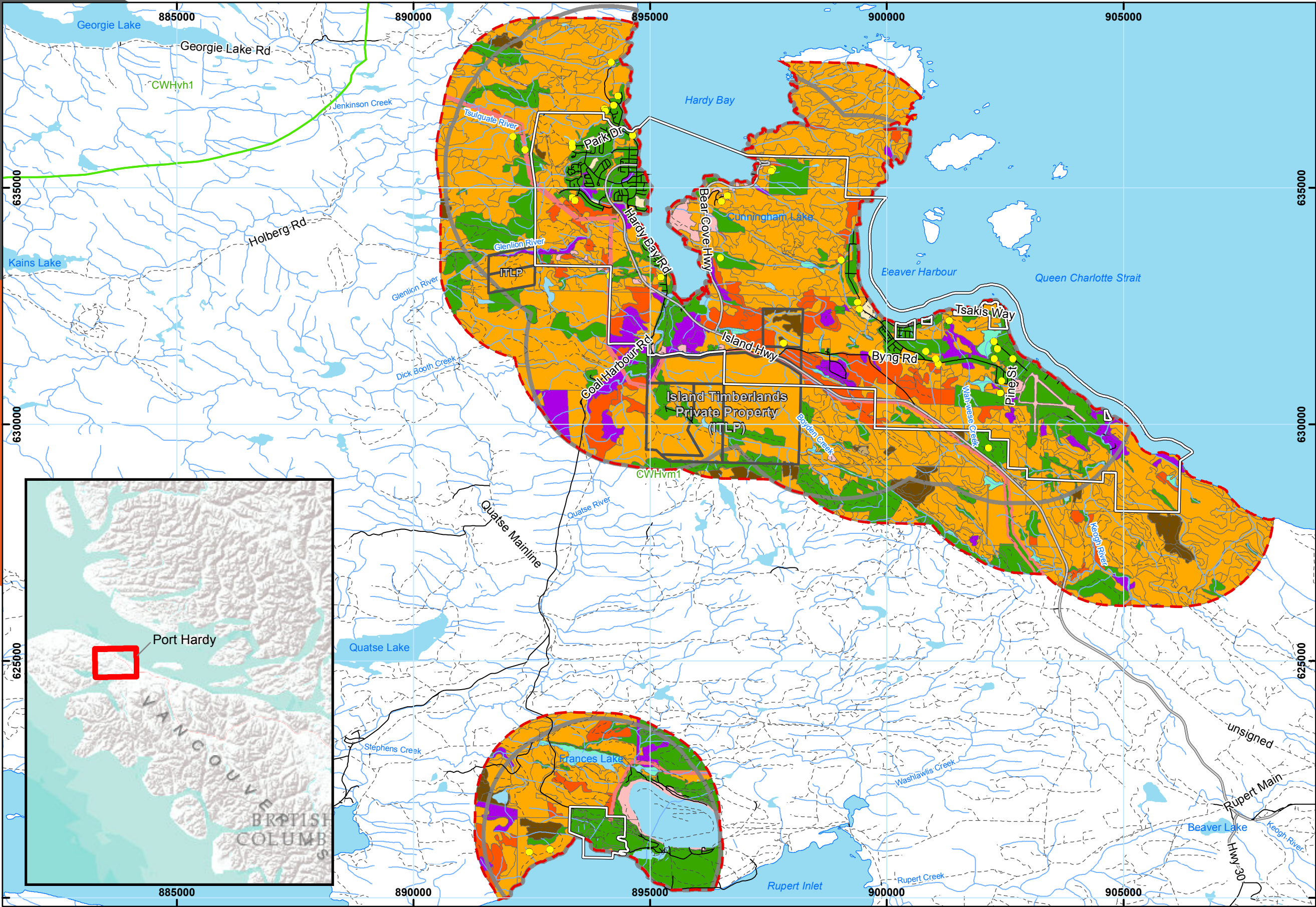
Area Summary	
PSTA Fuel Types	Area (ha)
C-3	695.60
C-5	7589.00
D-1/2	2145.46
M-1/2	531.33
N	207.80
O-1a/b	4.85
S-1	21.53
S-3	171.70
W	218.37
Total	11585.66



District of Port Hardy - Community Wildfire Protection Plan
CWPP Fuel Types



Projection: NAD 1983 BC Environment Albers
Scale: 1:80,000
Date: 7/7/2016
Produced By: samantha.griffore



Fuel Type Photo Locations

District of Port Hardy

CWPP Boundary

Island Timberland Private Property

TRIM Roads

Highway

Gravel

Paved

TRIM Streams

Transmission Line Right of Way

Water

Wetland

Wildland Urban Interface

Biogeoclimatic Zone

CWPP Fuel Type

C-3

C-5

D-1/2

M-1/2

Non-Fuel

O-1a/b

S-1

S-3

W

Area Summary	
CWPP Fuel Types	Area (ha)
C-3	705.64
C-5	7285.51
D-1/2	2468.30
M-1/2	451.84
N	219.35
O-1a/b	18.74
S-1	5.48
S-3	225.89
W	204.90
Total	11585.66

10.2 Appendix 2 – Fuel Types

The following are photos of example FBP fuel types found in the District of Port Hardy.



Example, FBP Fuel Type C-3



Example, FBP Fuel Type C-5



Example, FBP Fuel Type M-1/2



Example, FBP Fuel Type D-1





Example, FBP Fuel Type S-3



Example, FBP Fuel Type 0-1a/b



10.3 Appendix 3 – Wildland Urban Interface Wildfire Threat Assessment Plots



Plot #	Location		Geographic	Site Description	Date	Component			Wildfire Behaviour Threat Score	Wildfire Behaviour Threat Class	Structural	WUI Threat Class	Total Wildfire Threat Score
	Northing (m)	Easting (m)				Fuel	Weather	Topography			WUI Wildfire Threat Score		
PH001	630668	902399	West of junction of Metchosin and Yew Roads	Conifer / >20 yrs / NE	02/05/2016	57	2	14	73	Moderate	0	N/A	73
PH002	630922	902421	West of Hemlock Road	Grassland	02/05/2016	25	0	0	25	Low	0	N/A	25
PH003	631391	902661	Northwest of runway 11	Shrubland	02/05/2016	34	2	14	50	Moderate	0	N/A	50
PH004	631597	902339	West of Fort Rupert Road	Shrubland	02/05/2016	33	2	14	49	Moderate	0	N/A	49
PH005	631389	902267	North of Airport Inn	Conifer / >20 yrs / NE	02/05/2016	57	2	14	73	Moderate	0	N/A	73
PH006	631280	901090	South of Avalon Adventist Junior Academy	Conifer / >20 yrs / NE	02/05/2016	65	2	14	81	Moderate	0	N/A	81
PH007	631390	901034	West of Avalon Adventist Junior Academy	Conifer / >20 yrs / NE	02/05/2016	55	2	14	71	Moderate	0	N/A	71
PH008	632194	901317	South of Tsakis Road	Conifer / >20 yrs / SW / 0-16%	02/05/2016	77	2	21	100	High	33	High	133
PH009	631544	900825	Northeast of Fire Hall #2	Conifer / 10-19 yrs / NE	03/05/2016	64	2	6	72	Moderate	0	N/A	72
PH010	632579	899380	East of communication tower on Beaver Harbour Road	Conifer / >20 yrs / NE	03/05/2016	60	2	14	76	Moderate	0	N/A	76
PH011	633479	899040	West of homes along Beaver Harbour Road (north of Carlton Street)	Conifer / >20 yrs / SW / 16-30%	03/05/2016	68	2	27	97	High	30	High	127
PH012	632442	899421	North of Fort Rupert Elementary School	Deciduous	03/05/2016	29	0	0	29	Low	0	N/A	29
PH013	631508	899688	Northeast of junction of Byng and Fort Rupert Roads	Mixed Deciduous	03/05/2016	52	2	22	76	Moderate	0	N/A	76
PH014	631512	899884	West of the end of Peel Road	Conifer / >20 yrs / NE	03/05/2016	74	2	22	98	High	33	High	131
PH015	634838	896629	North of end of Goletas Way	Conifer / >20 yrs / NE	03/05/2016	56	2	27	85	Moderate	0	N/A	85
PH016	634715	896503	South of end of Goletas Way	Conifer Regen with Residuals	03/05/2016	60	2	32	94	Moderate	0	N/A	94
PH017	635398	897587	Regen east of BC Ferries terminal	Conifer / 2-9 yrs / NE	03/05/2016	57	2	12	71	Moderate	0	N/A	71
PH018	635351	897558	Regen east of BC Ferries terminal	Conifer / 2-9 yrs / SW / 0-16%	03/05/2016	59	2	18	79	Moderate	0	N/A	79
PH019	631725	897821	Recent cutblock north of Byng Road (Island Timberlands)	Slash	03/05/2016	60	2	14	76	Moderate	0	N/A	76
PH020	633113	895225	West of Camelot Road	Conifer / >20 yrs / NE	03/05/2016	55	2	14	71	Moderate	0	N/A	71
PH021	637658	894175	Scotia Bay	Conifer / >20 yrs / SW / 30-55%	04/05/2016	51	2	47	100	High	35	High	135
PH022	636751	894228	South of Gwa'sala-'Nakwaxda'xw School	Conifer / >20 yrs / SW / 0-16%	04/05/2016	59	2	22	83	Moderate	0	N/A	83
PH023	636672	894034	West of Tsulquate Road	Mixed Conifer	04/05/2016	55	2	22	79	Moderate	0	N/A	79
PH024	636624	894051	West of Tsulquate Road	Conifer / >20 yrs / SW / 16-30%	04/05/2016	55	2	35	92	Moderate	0	N/A	92
PH025	636944	894314	North of Gwa'sala-'Nakwaxda'xw School	Conifer / >20 yrs / SW / 0-16%	04/05/2016	53	2	24	79	Moderate	0	N/A	79
PH026	635939	893349	End of Mayors Way	Conifer / >20 yrs / NE	04/05/2016	68	2	14	84	Moderate	0	N/A	84
PH027	635863	893352	End of Mayors Way	Mixed Conifer	04/05/2016	42	2	14	58	Moderate	0	N/A	58
PH028	634794	893354	South end of Highland Road	Conifer / >20 yrs / NE	04/05/2016	58	2	14	74	Moderate	0	N/A	74
PH029	634733	893411	South end of Highland Road	Conifer / 10-19 yrs / SW / 0-16%	04/05/2016	67	2	14	83	Moderate	0	N/A	83
PH030	633147	894144	Right-of-way at Holberg Road	Right-of-way	04/05/2016	41	2	10	53	Moderate	0	N/A	53
PH031	621022	892884	Regen (WFP) Rupert Arm	Conifer / 10-19 yrs / SW / 16-30%	04/05/2016	51	2	35	88	Moderate	0	N/A	88
PH032	620963	892445	Regen (WFP) Rupert Arm	Conifer / 10-19 yrs / SW / 0-16%	04/05/2016	53	2	22	77	Moderate	0	N/A	77
PH033	635805	892361	Right-of-way southeast of Water Treatment Plant	Right-of-way	04/05/2016	69	2	16	87	Moderate	0	N/A	87
PH034	636111	894627	Tsulquate Waste Water Treatment Plant	Mixed Conifer	04/05/2016	47	2	13	62	Moderate	0	N/A	62
PH035	629509	902147	Regen block off Hwy 19, south of Airport	Conifer Regen with Residuals	15/06/2016	30	2	14	46	Moderate	0	N/A	46
PH036	631753	902258	Pine bog near airport	Wetland	15/06/2016	11	N/A	N/A	11	Low	0	N/A	11
PH037	633524	896482	Regen off Bear Cove Hwy	Conifer Regen with Residuals	15/06/2016	47	2	35	84	Moderate	0	N/A	84
PH038	631245	894343	Right-of-way at Coal Harbour Road	Right-of-way	15/06/2016	31	2	22	55	Moderate	0	N/A	55
PH039	636086	892101	Water treatment plant	Conifer / >20 yrs / NE	15/06/2016	56	2	4	62	Moderate	0	N/A	62