2022 DISTRICT OF UCLUELET
COMMUNITY WILDFIRE RESILIENCY PLAN

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SIGNATURE PAGE

Lauren Shinnimin
Registered Professional Forester
Frontera Forest Solutions, Inc.

Jan 31, 2023
Date

Rick Geddes
Fire Chief
District of Ucluelet

2023-01-15
Date

Duane Lawrence
Chief Administrative Officer
District of Ucluelet

2023-01-30
Date

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FREQUENTLY USED ACRONYMS

AOI	Area of Interest
BC	British Columbia
BCWS	British Columbia Wildfire Service
BEC	Biogeoclimatic Ecosystem Classification
CFFDRS	Canadian Forest Fire Danger Rating System
CFS	Community Funding and Support
CI	Critical infrastructure
CRI	Community Resiliency Investment
CWRP	Community Wildfire Resiliency Planning
DP	Development Permit
DPA	Development Permit Area
FBP	Fire Behavior Prediction System
FCFS	FireSmart Community Funding and Supports
FESBC	Forest Enhancement Society of British Columbia
FESIMS	Forest Enhancement Society Information Management System
FMP	Fire Management Plan
FSCCRP	FireSmart Canada Community Recognition Program
FNESS	First Nations Emergency Services Society
HIZ	Home Ignition Zone (also see Structure Ignition Zone)
HRVA	Hazard Risk and Vulnerability Analysis
LRMP	Land and Resource Management Plan
MFLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
MOTI	Ministry of Transportation and Infrastructure
PSOE	Provincial State of Emergency
PSTA	Provincial Strategic Threat Assessment
OCP	Official Community Plan
RSWAP	Resource Sharing Wildfire Allocation Protocol
SOLE	State of Local Emergency
SWPI	Strategic Wildfire Prevention Initiative
UBCM	Union of British Columbia Municipalities
VAR	Values at Risk
WRR	Wildfire Risk Reduction
WUI	Wildland Urban Interface

DEFINITIONS

Area of Interest (AOI): The AOI for a CWRP includes all the area that lies within the municipal boundary, regional district boundary, or First Nations land including First Nation reserve land, land owned by a Treaty First Nation (as defined by the Interpretation Act) within treaty settlement lands, or land under the authority of an Indigenous National Government boundary.

Critical Infrastructure (CI): Assets owned by the Provincial government, local government, public institution (such as health authority or school district), First Nation or Treaty First Nation that are essential to the health, safety, security or economic wellbeing of the community and the effective functioning of government, or assets identified in a Local Authority Emergency Plan Hazard, Risk & Vulnerability and Critical Infrastructure assessment.

Values at Risk (VAR): The human or natural resources that may be impacted by wildfire. This includes human life, property, critical infrastructure, high environmental and cultural values, and resource values.

Wildfire Risk: commonly defined as the likelihood of a fire occurring, the associated fire behaviour, and the impacts of the fire on human values (consequence). The exposure to the chance of loss from wildfire.

Wildfire Threat: The inherent ability of a wildfire to ignite, spread, and consume organic material (trees, shrubs, and other organic materials) in the forest. The major components used to define wildfire threat are fuel, weather, and topography, also known as the wildfire environment.

Wildland-Urban Interface (WUI): any area where combustible forest fuel is found adjacent to homes, farm structures or other outbuildings. This may occur at the interface, where development and forest fuel (vegetation) meet at a well-defined boundary, or in the intermix, where development and forest fuel intermingle with no clearly defined boundary.

EXECUTIVE SUMMARY

Wildfire is becoming increasingly prevalent across the BC landscape, with climate change impacting moisture regimes, temperatures, and weather patterns. Wildfire threat and the associated risk to communities within the Wildland Urban Interface (WUI) is therefore likely to increase due to climatic changes, making it more critical than ever to understand wildfire risk and identify the most effective strategies for its mitigation.

The purpose of this Community Wildfire Resiliency Plan (CWRP) is to identify wildfire threats within and surrounding the District of Ucluelet (the 'District'), and to quantify the risks and impacts to the community from wildfire. The CWRP outlines strategies to reduce threat and risk by providing recommendations to decrease the likelihood of wildfires entering the community, to increase the preparedness of the community to respond to wildfires, and reduce the potential loss of homes, businesses, and critical infrastructure from wildfire. This CWRP is intended to provide guidance to District staff and to educate and motivate Ucluelet community members to take part in FireSmart.

The CWRP focuses on wildfire risk assessment and the seven FireSmart disciplines including:

- Education,
- Legislation and planning,
- Development considerations,
- Interagency cooperation,
- Cross-training,
- Emergency planning, and
- Vegetation management.

Several factors are considered when determining a community's wildfire risk, including the landscape surrounding the community, the fuel types, fire history, and weather data. The wildfire threat identified in Ucluelet's wildland urban interface and surrounding area is **Low to Moderate**. However, with the unknown impacts of climate change, coastal communities should be prepared for unpredictable climatic events including more frequent wildfires.

Table 1 lists all the recommended actions for the District of Ucluelet, categorized by the seven FireSmart disciplines. Actions are prioritized as: **Moderate, High, and Very High**, based on anticipated effectiveness in reducing overall wildfire hazard and risk.

TABLE 1: LIST OF ALL COMMUNITY WILDFIRE RESILIENCE PLAN ACTIONS. PRIORITY LEVELS 'HIGH' AND 'VERY HIGH' ARE COLOURED RED.

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Risk Assessment						
The purpose of a risk assessment is to identify the specific risks to a community and its assets. An ongoing review of the risk assessment should occur and an update to this CWRP should occur in at least 10 years.						
1. Read and understand this CWRP's identified risks and recommended actions. The currently identified risks include:	Fire Chief, FireSmart Coordinator, Deputy Fire Chief, District staff	Very High	Immediate	Fire Chief, FireSmart Coordinator, Deputy Fire Chief, District staff and local	Fire Chief, FireSmart Coordinator, Deputy Fire Chief, District staff and leadership	N/A

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
I. Wildfire hazard and FireSmart principles are currently not well understood amongst the community due to a wet climate and lack of major historical wildfire occurrences. With unknown changes in climate, the threat of wildfire may increase if temperatures and drought days increase. II. Interface neighbourhoods, such as Reef Point and Rainforest Drive, are at high risk in the event of a wildfire as homes are surrounded by forest with long driveways and limited evacuation. Additionally, the risk of fire spreading into the forest from structure fires in these areas is high. III. Recreational tourism is high in the summer which substantially increases the population within and around the District. This increases the potential for fire ignitions.	and Leadership			elected officials to spend some time becoming familiar with this CWRP.	comprehend the risks and actions to take within this CWRP and consider next steps for implementing recommendations.	

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
IV. The Ucluelet Fire Department has agreements to respond to fires in the surrounding ACRD neighbourhoods and the Ucluelet First Nation. This could potentially put a strain on response services. V. The Fire Department currently does not have sufficient wildland firefighting suppression equipment (bladder tanks, hose, and pumps, etc.) to action wildfires. VI. There currently are no development permits requiring the implementation of FireSmart principles, or wildfire Development Permit Areas required for development. Many structures have hazardous materials on or near them, including conifer trees up against the homes. VII. Although the District currently has 19 volunteer firefighters plus the Fire Chief,						

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
most volunteers are insufficiently trained in wildfire fighting to safely and effectively action wildfires. Given the long response time from the BCWS Mid-Island Zone, District volunteer firefighters need to be continually trained to provide basic suppression on wildfires. VIII. High prevalence of private land within the District boundary limits fuel management activities on the landscape, putting more importance on private landowners to take action to reduce wildfire hazards on their property. IX. Some critical infrastructure and neighbourhoods have a high FireSmart hazard rating. These structures remain at risk from both ember showers and from direct radiant heat from flaming fronts.						

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Education						
Education is a critical piece of resiliency planning as it relates directly to the recruitment and retention of community members in the FireSmart program as well as reduces the probability of wildfire ignitions within the WUI.						
2. Hold a FireSmart event/open house to introduce FireSmart concepts to community members and educate them on things they can do around their homes to reduce fire hazard. This should be held annually between May and October.	Fire Chief, Volunteer Fire Department, FireSmart Coordinator, Deputy Fire Chief	Very High	Annually	Social media, posters, resources to run the event (ie. tent, food, etc.)	Participation by minimum of 50 residents.	Funding is available under UBCM's Community Resiliency Investment (CRI)[1] program.
3. Hire a fulltime or parttime FireSmart Coordinator (required by 2024). This position will run all aspects of the FireSmart program for the District and generally support many aspects of this CWRP. The District should apply for funding through CRI to help support this position.	Fire Chief	Very High	Spring 2023	An annual salary of $30,000 to $60,000 and some training and orientation at the beginning will be required.	Successfully hire or appoint an individual who is enthusiastic about promoting FireSmart, and ideally is a leader in the community or is well known.	Funding is available under UBCM's CRI[1] program to support a salary for a FireSmart Coordinator.
4. Distribute FireSmart promotional resources to members of the public at local businesses, FireSmart events, farmers markets or other community events.	FireSmart Coordinator, Deputy Fire Chief, Fire Chief	High	Ongoing	FireSmart promotional items.	Participation by minimum of 50 residents	FireSmart promotional items can be found on the FireSmart BC website[2]
5. Promote/encourage and complete FireSmart Home Assessments on private property for those community members who are interested. Provide recommendations on	FireSmart Coordinator, Deputy Fire Chief	Very High	Immediate/ Ongoing	A certified Local FireSmart Representative must complete the home assessments.	Participation by minimum of 25 residents	Funding is available under UBCM's CRI[1] program per structure.

[1] https://www.ubcm.ca/cri/firesmart-community-funding-supports
[2] https://firesmartbc.ca/resource-ordering-form/

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
actions they can take to make their homes more FireSmart and reduce the risk of loss and damages in the event of a wildfire						
6. Organize Community Chipper Day(s) and/or Community Cleanup Day(s) to assist homeowners with removal of hazardous vegetation and debris around their homes. Given the municipal restriction on all open burning larger than a campfire, more than Chipper Day a year may be necessary.	FireSmart Coordinator, Deputy Fire Chief, Public Works	Moderate	Annually	Chipper, disposal bins	Removal of hazardous vegetation, invasive plants and other flammable materials around homes.	Funding is available through the UBCM's CRI program[1]
7. Encourage private property/homeowners to have a FireSmart Home Assessment completed and implement FireSmart activities around their homes utilizing the FireSmart rebate program through use of social media, the internet, and FireSmart events.	FireSmart Coordinator, Deputy Fire Chief	High	Ongoing	Communication resources such as District website, someone to complete FireSmart Home Assessments	Participation by minimum of 25 residents who complete at least one eligible FireSmart activity on their home.	FireSmart activity rebate program up to $500[3]
8. Inform the community about upcoming FireSmart events via the internet, social media and public newsletter. Communications should be coordinated with the ACRD and Tofino if possible.	FireSmart Coordinator, Deputy Fire Chief	High	Ongoing	Communication resources	FireSmart events are well-attended with 50+ residents	N/A

[3] https://firesmartbc.ca/wp-content/uploads/2020/06/FireSmart-Assessment-Work-Hours-Estimate-Form-CRI.pdf

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
9. Put up educational signage along major tourist trails warning of the role people play in preventing wildfire ignitions.	District Parks and Recreation staff, Fire Chief	Very High	Within 2 years (2024)	Develop and construct signage	Signage is posted along major tourist trails by 2025	N/A
10. Apply for FireSmart Canada's Neighbourhood Recognition Program. Once recognized, annually renew for FireSmart Recognition.	FireSmart Coordinator, Deputy Fire Chief, Fire Chief	Moderate	Immediate, then Annually	A certified Local FireSmart Representative.	There currently are no neighbourhoods in the District recognized as a FireSmart Neighbourhood	Application to be filled out and required actions for recognition must be completed[4]
Legislation and Planning						
Legal or regulatory changes and community planning will improve community resiliency by encouraging and supporting the District's members to change their decisions to build a more resilient community.						
11. Incorporate strategies to educate the public and reduce fire ignitions from recreation and tourism into the District of Ucluelet Parks and Recreation Master Plan and the Tourism Master Plan.	District Parks and Recreation staff, Tourism Ucluelet, Deputy Fire Chief	Moderate	Within 5 years (2027)	Communication resources	Community members and tourists become more aware of the potential impact of recreation and tourism on fire ignitions.	N/A
Development Considerations						
Development considerations deal with how planned development (home, business and critical infrastructure) should be designed to optimize the District's resiliency to wildfire.						
12. Revise zoning and development permits to require fire resistant landscaping or other FireSmart considerations, such as fire-resistant building materials for roofs, decking, etc. or	District Planning Department, Fire Chief	High	Immediate	Public engagement and Communication resources, potential legal oversight	Development permits limit building materials and landscaping vegetation that are a high fire hazard.	Funding is available under UBCM's CRI[5] program to support development considerations.

[4] https://www.firesmartcanada.ca/programs-and-education/neighbourhood-recognition-program/
[5] https://www.ubcm.ca/cri/firesmart-community-funding-supports

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
restrictions around outdoor cedar saunas. This would be most important for neighbourhoods with high forest cover.						
13. Establish a Development Permit Area (DPA) for Wildfire Protection for new development/buildings within forested neighbourhoods. The Wildfire DPA should incorporate some FireSmart principles in development and landscaping while also aiming to retain the overall forest structure within neighbourhoods so as not to drastically change the unique character of neighbourhoods. The Wildfire DPA should also align with existing Environmental Development Permit Areas.	District Planning Department	Moderate	Within 5 years	Public engagement and Communication resources, qualified wildfire professional input, potential legal oversight	New developments or building renovations in forested neighbourhoods would be less at risk from wildfire.	Funding is available under UBCM's CRI[5] program to support development considerations.
14. Implement FireSmart recommendations resulting from the completed FireSmart Critical Infrastructure (CI) Assessment to critical buildings/infrastructure to reduce hazard score ratings to Moderate or Low. Critical	FireSmart Coordinator, Deputy Fire Chief, Fire Chief, Public Works	High	Within the next 5 years (2027)	Labour, machinery, and construction materials	FireSmart recommendations have been implemented for the highest priority CI to reduce the hazard score rating to Moderate where possible.	Funding is available through the UBCM's CRI program[6]

[6] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Infrastructure Assessments were completed for all CI within the District for the development of this CWRP. Vegetation surrounding CI was often identified as one of the highest hazards. The infrastructure with the highest hazard identified is: I. Water tower near the school II. Radio tower						
Interagency Cooperation						
To increase and share local knowledge, develop relationships and to collaborate on future projects.						
15. Establish a Community FireSmart and Resiliency Committee (required by 2024 for success to CRI funding) for the region with the following potential parties: I. The District of Ucluelet's FireSmart Coordinator and Fire Chief II. The Ucluelet First Nation, III. Ucluelet Emergency Network and Emergency Support Services,	FireSmart Coordinator, Deputy Fire Chief, Fire Chief, ACRD Emergency Management representative	Very High	Immediate	Communication Resources	Hold one meeting annually with all committee members involved. Participation in this committee is becoming a requirement for CRI applicants starting in 2024.	Funding is available through the UBCM's CRI program[7] to support participation in interagency meetings

[7] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
IV. Emergency management staff from the Alberni-Clayoquot Regional District V. District of Tofino Protective Services Department staff, VI. Pacific Rim National Park Reserve representative, VII. BC Wildfire Service representative from the Mid-Island Zone, VIII. Ministry of Forests Wildfire Risk Reduction staff, IX. Local timber licensees operating in the area.						
16. Work in collaboration with the Alberni-Clayoquot Regional District on improvements to hydrant access and suppression capacity within the regional district neighbourhoods that Ucluelet responds to, including Willowbrae,	FireSmart Coordinator, Deputy Fire Chief, Fire Chief, ACRD Emergency Management representative	Very High	Within 3 years (2025)	The ACRD should lead this and involve the Ucluelet Fire Department	Installation of fire hydrants in vulnerable neighbourhoods requiring them.	Funding is available through the UBCM's CRI program[8]

[8] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Millstream, and Port Albion.						
17. Communicate semi-regularly with the South Island Natural Resource District's Wildfire Risk Reduction representative regarding their annual/long-term plans to conduct wildfire risk reduction activities in areas outside of the District.	FireSmart Coordinator, Deputy Fire Chief	Moderate	Annually	Communication Resources	At least 1 annual meeting with FLNRO's WRR representative	N/A
Cross-Training						
Cross-training increases the District's wildland firefighting capacity while simultaneously supporting the structural volunteer fire department.						
18. Contact the BCWS Mid-Island Fire Zone in and discuss the possibility of annual cross-training opportunities for local firefighters.	FireSmart Coordinator, Deputy Fire Chief, Fire Chief	Moderate	Immediate	Communication Resources	Make initial contact to BCWS to discuss cross-training opportunities.	N/A
19. Provide cross training opportunities for firefighters such as the S100 or S185 course. The S100 course requires an annual refresher.	Fire Chief	High	Annual	Facility to hold the training, potentially some basic suppression equipment.	Complete funding application for submission in October.	Funding is available through the UBCM's CRI program[9]
20. Continue to build the District's volunteer fire department and encourage firefighters to participate in cross-	Fire Chief	Moderate	Ongoing	Volunteers interested in fire suppression and fire	Acquire an additional 5 volunteer fire fighters from the community.	N/A

[9] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
training and annual refresher exercises, including: I. Hydrant flushing/testing, II. Refresher training of pumps and hose.				suppression equipment.		
21. Collaborate with the Ucluelet First Nation who may be interested in wildland firefighting/cross-training and exercises. This will assist them in building their volunteer fire department, which could help increase the safety of the Nation and take pressure off the Ucluelet Fire Department to respond.	Fire Chief, FireSmart Coordinator, Deputy Fire Chief	Moderate	Annually	Communications Resources, interested participants, and funds available to conduct training session(s)	At least one instance of an organized training session	N/A
Emergency Planning						
Emergency Planning informs community leaders and members on how to respond to different types of emergencies.						
22. Encourage community members to subscribe to the emergency notification system currently in use in Ucluelet. Emergency notices can be delivered via email, text, or voice messages.	Fire Chief, FireSmart Coordinator, Deputy Fire Chief	Very High	Ongoing	Posters, social media, other communication resources	Participation and passing of emergency response tests/exercises by at least 50 residents	N/A
23. Make the Evacuation/Emergency Response Plan available to the community via the internet or at the District's public offices. The District of Ucluelet Emergency Response	Fire Chief, FireSmart Coordinator, Deputy Fire Chief	High	Immediate	Website, social media	At least one established source by which community members can access the plan	N/A

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Plan is currently being updated and therefore not available online for viewing.						
24. Purchase or acquire ancillary suppression equipment including portable tanks, hoses, and portable pumps.	Fire Chief, FireSmart Coordinator/ Deputy Fire Chief	Very High	Immediate	Funding and/or source of capital to purchase fire equipment.	Resources secured and desired fire equipment purchased.	Funding is available through the UBCM's CRI program[10] for specified equipment, namely the structure protection unit.
25. Assess community backup electrical power and water delivery ability as required for emergency response and suppression activities. Currently, the municipal buildings that have emergency backup power are the fire hall, and the high school which has a large generator available during emergencies. A number of private homeowners have generators but the exact number is unknown.	Fire Chief, Public Works	Moderate	Within 5 years (2027)	Contractor to complete the assessment.	An assessment of backup emergency power has been completed and next steps to increase emergency backup power are understood.	Funding is available through the UBCM's CRI program[11] to complete an assessment.

[10] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community
[11] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
Vegetation Management						
The purpose of vegetation management is to reduce wildfire risk through the reduction of vegetative fuels available for consumption, while supporting forest values and healthy ecosystems.						
26. Apply for funding to complete fuel management demonstration projects to reduce forest fuels on municipal land and demonstrate what a more fire resilient stand looks like to the public. These fuel management areas cannot exceed 5.0 ha. Three areas have been identified as candidates for these projects: I. The forested area behind the schools, II. The forested area around the senior's center, and III. The forested area behind the community centre.	Fire Chief, FireSmart Coordinator, Deputy Fire Chief	High	Within the next 3 years (2025)	An RPF must write the fuel management prescription	At least one fuel management demonstration project is completed by 2025.	Funding is available through the UBCM's CRI program[12] for both prescription development and operational work.
27. Encourage homeowners to remove all vegetation from the Non-Combustible Zone and landscape using fire-resistant plants. Cedar trees within the first 10m (Zone 1) of the home should be	FireSmart Coordinator, Deputy Fire Chief	High	Immediate	A certified Local FireSmart Representative.	15 residents have implemented FireSmart landscaping and vegetation removal on their property by 2027	N/A

[12] https://www.ubcm.ca/funding-programs/local-government-program-services-funding/community-resilience/firesmart-community

Action	Lead(s)	Priority	Time frame	Resources Required	Metric for Success	Notes
encouraged for removal.						

INTRODUCTION

Wildfire is a natural disturbance agent on the landscape, but with warming temperatures and changing precipitation regimes due to climate change, the frequency, severity, and size of wildfires in British Columbia has been increasing in the last decade. This can be seen in 2017 and 2018, which were two of the worst wildfire seasons in BC history, with 1.2 and 1.3 million hectares burned, respectfully[13]. The most recent 2021 wildfire season has been notable as well, with approximately 868,000 hectares burned, 181 community evacuation orders, and 304 community evacuation alerts[14]. The increased presence of fire across BC, along with lessons learned, advances in knowledge, and loss prevention programs have encouraged the need for deliberate and effective wildfire risk prevention measures to occur within the wildland-urban interface (WUI), or the area where structures and other human development meet or intermingle with surrounding wildland/vegetative fuels[15].

Overview/CWRP Background

Community Wildfire Resiliency Plans (CWRPs) are the next generation of Community Wildfire Protection Plans (CWPPs) in British Columbia. CWPPs were introduced in 2004 as a comprehensive and science-based approach toward wildfire risk reduction planning that reflects local priorities and provincial goals for wildfire mitigation[16]. Key provincial goals of the newly revised Community Wildfire Resiliency Planning process are to:

- increase communities' capacity and understanding of wildfire threat and risk,
- foster greater interagency collaboration across administrative boundaries,
- be more responsive to the needs of different types of communities throughout British Columbia, and
- develop achievable and accountable action items for reducing wildfire threat and risk.

Specifically, the new CWRP process addresses the seven principles/disciplines of FireSmart Canada[17]:

1. Education
2. Vegetation Management
3. Legislation and Planning
4. Development Considerations
5. Interagency Cooperation
6. Cross-training
7. Emergency Planning

In 2022, Frontera Forest Solutions Inc. was retained by the District of Ucluelet to develop a Community Wildfire Resiliency Plan (CWRP) for municipal land within the District. Ucluelet has not had a CWPP completed previously. Threat from wildfire has become a greater concern in recent years from increasing summer recreation and tourism, an increase in population and development within the District, and the unknown potential impacts of climate change to coastal forests.

[13] *Wildfire Season Summary - Province of British Columbia (gov.bc.ca)*
[14] *https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary#provstat*
[15] *https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/what-is-the-wui/*
[16] *https://www.ubcm.ca/sites/default/files/2021-05/2021%20CWRP%20Supplemental%20Instruction%20Guide.pdf*
[17] *https://www.firesmartcanada.ca/what-is-firesmart/understanding-firesmart/seven-firesmart-disciplines/*

Purpose

The purpose of this Community Wildfire Resiliency Plan is to identify wildfire threat within and surrounding the District of Ucluelet, to quantify the potential risks and impacts to the community from wildfire and provide strategies for reducing identified threats and risks. Specifically, the landscape-level wildfire risk assessment methods of this CWRP will inform strategies that will aim to:

1. Reduce the likelihood of wildfire entering Ucluelet,
2. Increase the safety of community members in the event of a wildfire, including egress safety,
3. Reduce the impacts/losses to property and critical infrastructure by employing FireSmart principles, and
4. Ultimately provide recommendations to reduce the negative economic and social impacts of wildfire to the community of Ucluelet.

Plan Development Summary

The area of interest for this CWRP is the wildland-urban interface (WUI) of the District of Ucluelet. The WUI is characterized as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. For the purpose of this CWRP, the WUI is defined as a one-kilometer buffer around structures and development within the Ucluelet district boundary (see Wildland-Urban Interface).

In developing this CWRP, the consultants worked through these three key phases:

1. Consultation with local government representatives and wildfire specialists; information sharing with District representatives such as Fire Chief Rick Geddes throughout plan development, and ensuring linkages with existing plans (See LINKAGES TO OTHER PLANS below).
2. Identification of the values at risk and assessment of local wildfire threat; wildfire threat assessments take into consideration the natural fire regime and ecology, Provincial Strategic Threat Analysis (2021), field assessments and forest fuel type verification, and GIS wildfire threat analyses (see
3.
4.
5.
6.

7. WILDFIRE RISK ASSESSMENT).
8. Developing a risk mitigation strategy; a guide for the District of Ucluelet to implement wildfire mitigation and risk reduction activities. The risk mitigation strategy focuses on FireSmart activities around homes and structures, legislation and planning around emergency management, prioritization of fuel treatments, and wildfire response recommendations to reduce overall wildfire threat within the community (See **Error! Reference source not found.**).

LINKAGES TO OTHER PLANS

There are many plans that can relate and help inform the CWRP by providing background information and guide the development of the CWRP. The following plans in Table 2 were consulted in the development of the CWRP and to avoid unnecessary replication of information and align with existing objectives.

Table 2: Key plans and Relationship to CWRP

Plan Type	Description	Relationship to CWRP
District of Ucluelet Fire Department Establishment, and Fire and Safety Regulations Bylaw No.1251, 2019	Guidelines for the establishment of a fire department and to provide for the prevention of fire and protection of persons and property. It outlines the duties of the Ucluelet Volunteer Fire Brigade (UVFB) including: burning regulation, fire suppression, emergency planning, and fire prevention.	Section 6.1 gives the UVFB authority to provide wildland urban interface fire suppression, fire prevention, and emergency planning services. Section 6 Discusses the fire department's obligation to fight interface wildfires within the UVFB's service area. Section 8 gives the Fire chief or a bylaw officer the power to ban outdoor burning at any time.

Table 2: Key plans and Relationship to CWRP

Plan Type	Description	Relationship to CWRP
District of Ucluelet Outdoor Burning Bylaw No. 1288, 2021	This bylaw gives the fire chief the authority to regulate outdoor burning and prohibits fires greater than the size of a campfire (0.5m x 0.5m). Open burning can only occur if approved by the fire chief.	Regulating open burning helps limit human-caused ignitions and escaped fires. Section 3 defines under what conditions a campfire is permitted to burn. Section 4 defines prohibited burning and fires.
District of Ucluelet Parks and Recreation Master Plan (2013)	The Parks and Recreation Master Plan functions as a complimentary document to the OCP, expanding on the policies related to parks and trails in the District of Ucluelet. Goals of the Plan are to provide recommendations and design guidelines for improving both the existing recreation system and community events, as well as new parks and trails over the next 10 to 20 years.	This plan discusses planned changes to green spaces within the urban interface and focuses on the development of trails and parks. The development and enhancement of trails and parks around Ucluelet will likely increase recreation and should align with fuel management practices.
District of Ucluelet Resort Development Strategy (2019)	The Resort Development Strategy is a road map to developing and enhancing tourism within the town to create an environmentally sustainable and economically stable tourism industry within Ucluelet.	There is no direct reference to wildfire management within the Strategy. However, the plan to develop and increase tourism infrastructure within the community may result in land use changes and increase recreational tourism. The Development Strategy should consider impacts to community emergency response with increased tourism.
Tourism Ucluelet 2021 One Year Tactical Plan	District of Ucluelet one year budget and goals for Tourism Ucluelet in 2021.	There is no reference to wildfire management within the tactical plan. The tactical plan outlines the primary goals, target markets and implementation activities of Tourism Ucluelet.
District of Ucluelet Five-Year Strategic Business Plan (2018)	The strategic business plan discusses tourism objectives over a 5-year term to increase visitors to Ucluelet to bolster the economy. This includes	There is no direct reference to wildfire management within the plan. The strategic plan outlines plan for infrastructure growth and indicates changes in land use as well as

Table 2: Key plans and Relationship to CWRP

Plan Type	Description	Relationship to CWRP
	development of outdoor recreation, infrastructure, and visitor services.	number of visitors to the community. Plans to increase tourism within the community should consider impacts to community emergency response.
Ucluelet Emergency Plan	A comprehensive emergency plan that outlines notification, chain of command, roles and responsibilities, vulnerabilities, and emergency response and logistics in the event of a natural disaster or other emergency.	The emergency plan outlines a response procedure in the event of a wildfire (p. 93). It identifies BCWS as the key agency to lead response efforts and potential major issues that may arise. The wildfire procedure information does not provide specific details regarding step-by-step response guidelines, chain of command, or individual responsibilities. A more detailed response plan in the event of a wildfire would provide clarity for more effective emergency management.
Ucluelet Official Community Plan 2020	The OCP is a statement of objectives and policies adopted by a local government to guide decisions on land use planning, land use management and municipal operations. The OCP sets out a 30-year road map for the community of Ucluelet. The OCP is adopted by Bylaws and any other subsequent bylaw must be consistent with the plan. Ucluelet is a growing community and plans for additional infrastructure, housing, economic growth, and emergency services are the focus of this OCP. A large component of this report focuses on maintaining natural areas to protect ecological function and to support the wellbeing of community members.	The Community Health, Safety, and Wellbeing (pg. 39) part of the report discusses fire suppression capacity as well as plans to do a community risk assessment to evaluate necessary infrastructure and emergency resources as the community grows.
Vancouver Island Land Use Plan (2000)	The Vancouver Island land use plan designates land use over the next 10 years. Ucluelet is a part of the Maggie land use area. This area is designated as an enhanced forestry zone. Within	The Vancouver Island land use plan determined land use in and around Ucluelet from 2000 to 2010. Around Ucluelet the main objective was maintaining visual values. Understanding

Table 2: Key plans and Relationship to CWRP

Plan Type	Description	Relationship to CWRP
	this area there are plans for limited second growth timber harvest, but most of the focus is on maintaining visual objectives on the coast as well as near Maggie Lake.	previous land use gives an indication of long-term objectives for this area.
Ucluelet Climate Change Adaption Plan	The Ucluelet climate adaption program discusses how the community will become resilient to climate change.	The Climate adaption plan discusses wildfire resilience and planning.
Ucluelet First Nation Government Official Community Plan Act YFNS 32/2013	The community plan provides actionable tasks for improvement of community condition, economic growth and emergency services. A part of the community plan is collaboration with other municipalities, including Ucluelet, in both economic and emergency planning.	The community plan has a large section that is oriented towards emergency response and relevant to the CWRP. The plan discusses collaboration with municipalities in the area during emergencies. Further access is being developed by creating and established helipad. In addition, an emergency response plan is proposed.

COMMUNITY DESCRIPTION

Area of Interest

For the purpose of this CWRP, the Area of Interest (AOI) is the municipal lands located within the boundary of the District of Ucluelet (Figure 1). A majority of the land within the District is designated as private land. The District of Ucluelet is located on the southern tip of the Ucluelet Peninsula along the west coast of Vancouver Island. These lands are situated within the traditional territory of the Yuułuʔiłʔatḥ (Ucluelet) First Nation. The only access is via the Tofino Ucluelet Highway branching south off Highway 4. The neighbouring District of Tofino is approximately 40km northeast on Highway 4. Ucluelet falls within the Alberni-Clayoquot Regional District and is adjacent to the Pacific Rim National Park to the northwest and across the inlet from the Ittatsoo 1 Indian Reserve to the east. The District of Ucluelet encompasses a land area of approximately 7 km^2 or 700 hectares.

Wildland-Urban Interface

The Wildland-Urban Interface (WUI) occurs where homes, structures, and critical infrastructure are found adjacent to or intermixed with combustible vegetated lands. The WUI differs from the AOI in that historically in BC, the WUI was created by buffering an area where structure density is greater than 6 structures/km^2 by 2 km. The 2 km buffered area was originally designed to represent a reasonable distance that embers from a wildfire can travel to ignite a structure. However, for the purpose of the provincial FireSmart Community Funding and Support (FCFS) program eligibility, the eligible WUI within this CWRP is redefined as a maximum of one kilometer from where structure density is greater than 6 structures/km^2. Figure 1 also illustrates the resulting eligible WUI for this CWRP.

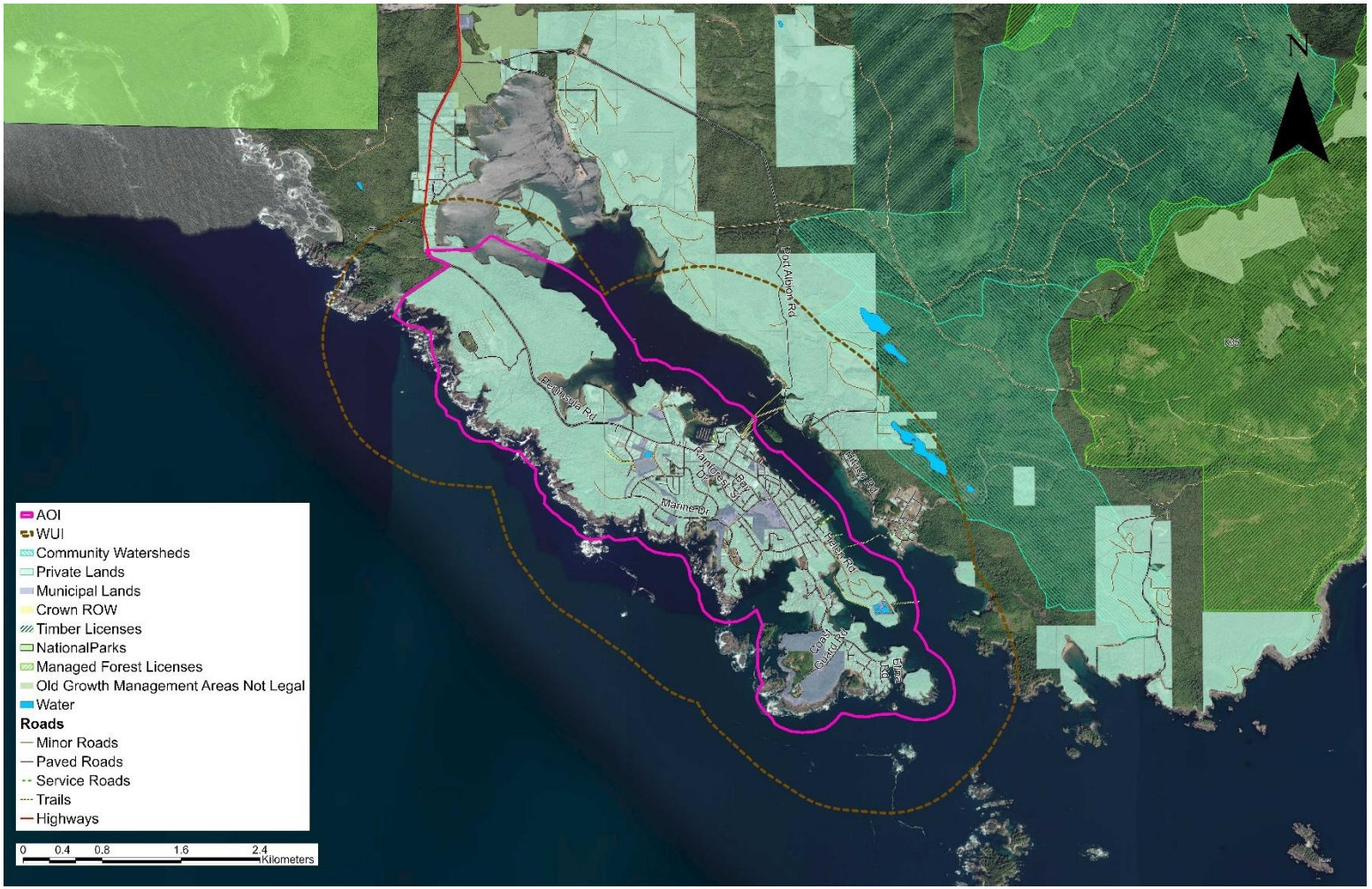


FIGURE 1: GENERAL OVERVIEW MAP OF LAND OWNERSHIP AND TENURE WITHIN THE AREA OF INTEREST (AOI) REPRESENTED BY THE DISTRICT BOUNDARY OF UCLUELET. THE WUI IS DENOTED BY THE BROWN DASHED LINE AROUND THE AOI, WHICH REPRESENTS THE AREA THAT IS ELIGIBLE FOR THE FIRESMART COMMUNITY FUNDING AND SUPPORTS PROGRAM (FCFS)

Community Information

The District of Ucluelet has a population of approximately 2,066 people. Population growth between the 2016 and 2021 census was significant at 20.3%. The population is generally centralized and due to topographic limitations, there is minimal room for outward expansion. The local economy of Ucluelet is primarily recreational and eco-tourism based, which results in a substantial increase in seasonal residents and tourists during the summer months. The tourism economy has continued to see strong growth each year and is anticipated to continue along this trend. The District has developed an economic/resort development strategy with the goal to continue to increase tourism and extend tourism season by providing infrastructure and amenities that support year-round enjoyment.

TABLE 3: COMMUNITY DEMOGRAPHICS (STATISTICS CANADA, 2021).

Total Population (year)	**2,066 (2021)**
Population Density (people per sq. km)	318.8
Median Age (years)	39.6
Housing Units	997
Median Household Income	$ 97,000 (2020)
Unemployment Rate	8.1%

WUI Values at Risk

The following section is a description of the extent to which wildfire has the potential to impact the values at risk (VAR) identified within the Area of Interest. VAR are the human or natural resource values that may be impacted by wildfire; this includes human life, property, critical infrastructure, high environmental and cultural values, and resource values. High VAR are often found within the WUI, but can also be geographically isolated, such as a communication tower.

Human Life and Safety

Human life and safety are the highest priority in the event of a wildfire. A key consideration is the evacuation of at-risk areas and safe egress when necessary. Evacuation can be complicated by the unpredictable and dynamic nature of wildfire. Orderly evacuation takes time and safe egress routes can be compromised by quickly moving/changing wildfire, or by traffic congestion and accidents.

Ucluelet is relatively remote and located at the end of a peninsula. The community has one primary access via the Tofino-Ucluelet Highway connecting to Highway 4 going east. The nearest community to the District of Ucluelet is the Ucluelet First Nation across the inlet; however, the Nation has minimal services. The next closest community is Tofino, located 40 kilometers to the north. Tofino is the only community on the peninsula that has an urgent care center (Tofino General Hospital). There is a secondary egress route via Port Albion Road which heads to the east around the inlet and eventually connects to Highway-4. All of these roads are single lane, which can easily become congested during evacuation, particularly during high tourism season.

There are inherent issues with a one-road in and one-road out community, which can complicate evacuation procedures. Within Ucluelet, evacuation would likely be local to specific neighbourhoods from a structure-to-structure fire. The Ucluelet Emergency Response Plan provides detailed evacuation procedures for the community, primarily in the event of a tsunami. Additionally, the District has established an Emergency Notification System that notifies members of emergency alerts via email, text or voice message.

To date, Ucluelet has never experienced an evacuation alert or order for a wildfire event. In the event of a full community wildfire evacuation, people would likely be redirected to Port Alberni; it is predicted that due to its size, Tofino would not be able to handle the influx of people. The most likely impact to the Ucluelet community from wildfire would be disruption to utilities such as loss of electrical power.

Critical Infrastructure

Critical infrastructure (CI) are structures or facilities that are essential to the health, safety, security, economic wellbeing, and/or effective functioning of a community or government. Protection of critical infrastructure during a wildfire event is an important consideration for emergency response preparedness and effectiveness, ensuring that coordinated evacuation can occur if necessary, and that essential services can be maintained and/or restored quickly after an emergency event. Critical infrastructure includes emergency and medical services, electrical and gas services, transportation and primary road networks, drinking and wastewater systems, social/support services, and communications infrastructure. Completing FireSmart activities around critical infrastructure will help to reduce losses and impacts related to wildfire.

The following CI were identified within the District of Ucluelet (Figure 2):

1. Community Center,
2. Fire Hall,
3. Senior Center,
4. Water Towers,
5. Radio tower,
6. Water Treatment facility,
7. Ambulance service,
8. Emergency Notification Towers
9. RCMP office, and
10. Municipal office.

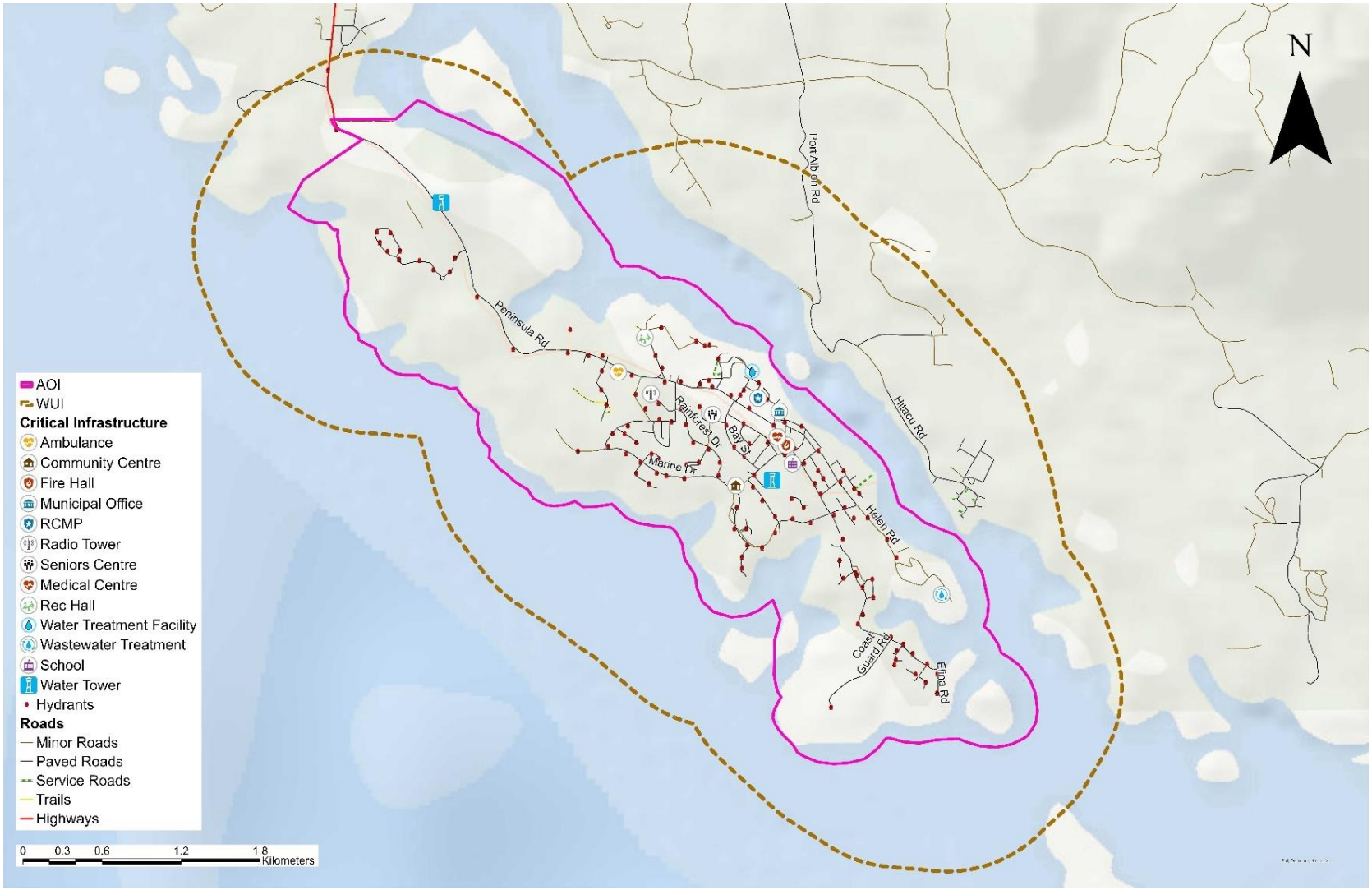


FIGURE 2: AN OVERVIEW OF CRITICAL INFRASTRUCTURE AND FIRE HYDRANTS IN THE DISTRICT OF UCLUELET

For this CWRP, FireSmart Critical Infrastructure Assessments were completed for most of the Critical Infrastructure listed above. A breakdown of scores and recommendations for each CI can be found in the DEVELOPMENT CONSIDERATIONS section later in this document.

Fire Suppression Capabilities

The District of Ucluelet has a fire hall with 19 volunteer fire fighters and a Fire Chief. Structural fire suppression within the district boundary is sufficient. The fire department owns two structural fire engines that can service the community and there is full hydrant coverage with no known deficits in water pressure. The District also has agreements to provide response coverage to the surrounding Alberni-Clayoquot Regional District and the Ucluelet First Nation. However, suppression response outside of the District of Ucluelet is more of a challenge due to limited hydrants. Wildland fire suppression capabilities are also limited as the fire department has insufficient wildland fire suppression gear including a water tender, bladder tanks, pumps, hoses, nozzles, etc. The District has recently received wildfire suppression equipment from Parks Canada. Wildland suppression would rely on structural gear as well as response from BC Wildfire Service.

Initial attack from BC Wildfire Service aims to keep new ignitions under one hectare and held within 72 hours. Suppression success is high on the west coast of the Island because fuel moisture and weather doesn't typically get dry enough to have the fire take off and become out of control. Initial response to the Ucluelet area could be by vehicle or helicopter; it is a 15 min helicopter flight from the Port Alberni base, or a 2.5 hour drive from the Errington base. It is likely that in the event of wildfire within the Ucluelet fire protection jurisdiction, the Ucluelet Fire Department would be responsible for initial suppression. BCWS would take a supporting role and take direction from the Ucluelet Fire Department. The Ucluelet Fire Department may also be requested to provide initial suppression to areas outside their fire protection jurisdiction if BCWS is unable to respond rapidly based on the provincial response capacity.

Community Water Supply

The community has two sources of water, the Lost Shoe Creek Aquifer and Mercantile creek. The community gets 9,450 m^3/day from the Lost Shoe Creek Aquifer and 3,239m^3/day from Mercantile Creek. 500 cubic meters of water per day are diverted to Ucluelet First Nations. The Lost Shoe Creek Aquifer runs low during summer months. The District of Ucluelet approved a $20.7 million plan to upgrade water treatment as well as storage to secure water supply to the area.

Electrical Infrastructure and Supply

Electrical power in Ucluelet is supplied by BC Hydro. The primary electrical transmission line servicing the District runs along Highway 4 from Port Alberni. The transmission line transports 69 KV of electricity diverging at a substation between Tofino and Ucluelet. Power is on the same transmission line for these two communities so if lines are damaged between Port Alberni and the Tofino Ucluelet Highway, both communities would be impacted. There is no District-wide backup electricity in the event of a power outage, leaving the community vulnerable should the transmission or distribution lines sustain damage in a wildfire. Currently, the Fire Hall is the only municipal structure with backup emergency power. Additionally, the High School owns a large generator that can be accessed during an emergency power outage. A number of private homeowner's own power generators, however the number owned by community members is unknown.

High Environmental Values

The natural environment is a critical pillar in the economic and social lifestyle and culture of the Ucluelet community. Its position on the edge of the west coast of Vancouver Island provides for a rich diversity of terrestrial and marine habitat to support an abundance of vegetation, wildlife, and ocean life. The forested areas around Ucluelet are comprised of Sitka spruce, western hemlock, western redcedar, Douglas-fir and Amabilis fir. These stands are adapted to high wind events and salt spray, which provide for a unique stand structure and habitat for birds. There is also the presence of sensitive and at-risk species including the northern red-legged frog (*Rana aurora*) and tall woolly-heads (*Psilocarphus elatior*)[18] (a small herb). This unique coastal environment is an integral component to everyday life in Ucluelet, and draws tens of thousands of tourists during the summer season. Recreational parks and trails in Ucluelet are abundant and well-used. Because the use of these parks and trails are significantly higher in summer season due to tourism, there is an increased potential for damages to these ecosystems through littering, trampling, the introduction of invasive species, and human-caused fire ignitions. As tourism and development continues to increase, the impacts to the environmental values within and around Ucluelet must be considered and mitigation activities implemented.

[18] *http://maps.gov.bc.ca/ess/hm/cdc/*

WILDFIRE RISK ASSESSMENT

A wildfire risk assessment provides a decision support tool for determining the most appropriate wildfire risk reduction activities and opportunities to increase community resiliency. Wildfire risk is different from wildfire threat in *that risk takes into consideration the impact and consequences of a wildfire event on human values*. Wildfire risk and wildfire threat are defined below.

Wildfire Risk: commonly defined as the likelihood of a fire occurring, the associated fire behaviour, and the impacts of the fire on human values (consequence). The exposure to the chance of loss from wildfire.

Wildfire Threat: The inherent ability of a wildfire to ignite, spread, and consume organic material (trees, shrubs, and other organic materials) in the forest. The major components used to define wildfire threat are fuel, weather, and topography, also known as the wildfire environment.

Wildfire Environment

The environment in which wildfire occurs is influenced by three main components: topography, vegetation (fuel), and weather. Together, these components interact to characterize the overall wildfire environment and influence wildfire behaviour (Figure 3).

FIGURE 3: THE WILDFIRE ENVIRONMENT TRIANGLE (HTTPS://CATALOG.EXTENSION.OREGONSTATE.EDU/EM9230/HTML)

Topography

Topography is a landscape component that can influence fire behaviour, particularly slope, slope position, and aspect. Slope position and aspect can affect the temperature, solar intensity, fuel moisture, and relative humidity as a consequence of varying degrees of solar radiation. Slope affects local wind patterns, with steeper slopes facilitating greater up-slope wind speeds during the day, and fuels upslope being closer to flames during a fire. Warmer aspects ie. south facing in Canada, and steeper slopes increase the rate of spread of a fire. Fire that spreads faster is more difficult to control, making potential values situated on upper slopes more vulnerable.

Ucluelet is located on a relatively flat peninsula, surrounded by ocean on three sides (Figure 4). The land base within Ucluelet is rocky with some outcrops along the edges and small hills inland. There are no steep slopes (slopes >40% rise) on the peninsula, outside of rock outcrops. The presence of ocean on three sides is a significant barrier to the spread of wildfire. Overall, the topography around Ucluelet would help to reduce wildfire intensity and spread.

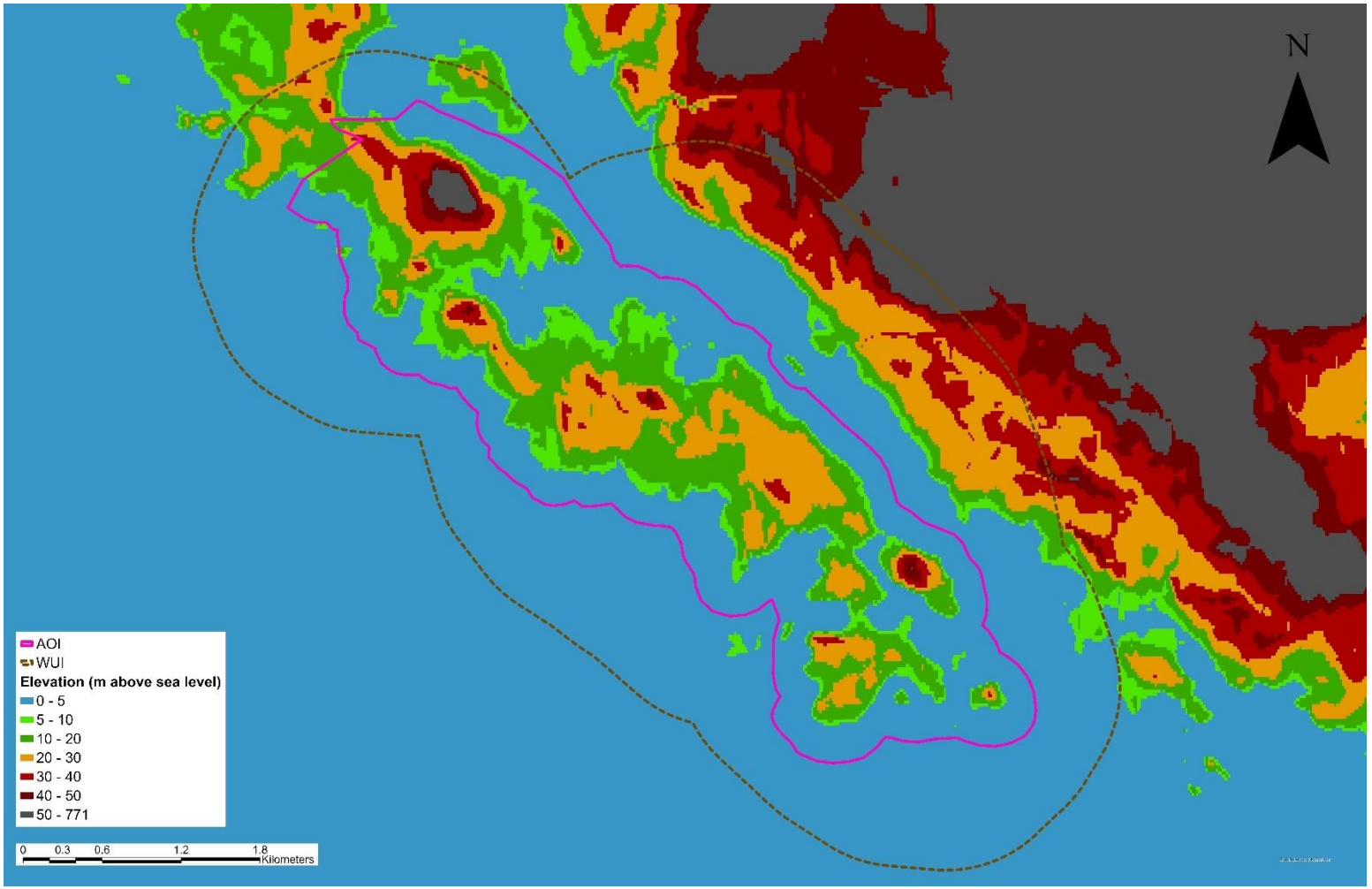


FIGURE 4: TOPOGRAPHIC MAP OF THE DISTRICT OF UCLUELET AND SURROUNDING AREA USING A PROVINCIAL DIGITAL ELEVATION MODEL.

Vegetation (Fuels)

Fuels refers to the loading, size and shape, arrangement (horizontal and vertical), compactness, chemical properties, and moisture content within organic materials. In a forest environment, the focus is primarily on woody fuels.

Biogeoclimatic Ecosystem Classification (BEC) Zones

The vegetation (fuels) within any given area of British Columbia can be summarized using the provincial Biogeoclimatic Ecosystem Classification (BEC) system. The BEC system in BC describes and categorizes ecological zones by vegetation, soils, and climate. Regional subzones are derived from relative precipitation and temperature. Subzones may be further divided into variants based upon climatic variation and the resulting changes in the vegetative communities[19]. By understanding the vegetative communities of an area, we can better predict the natural disturbance regime of those ecosystems and the potential effects of wildfire. The District of Ucluelet and surrounding area is comprised of one primary BEC subzone: the Very Wet Hypermaritime Coastal Western Hemlock (**CWHvh1**) (Figure 5).

Very Wet Hypermaritime Coastal Western Hemlock (CWHvh)

The CWHvh occurs at low elevations in hyper-maritime areas of the BC south coast[20]. On Vancouver Island it is primarily restricted to a narrow coastal fringe on the outer coast of the Island between Port Renfrew up to Quatsino Sound. The CWHvh is the wettest BEC zone in BC with annual precipitation averaging over 3,000 mm. The proximity of the CWHvh to the Pacific Ocean moderates temperatures throughout the year, keeping them relatively cool. Fog, cloud, and drizzle are common throughout the year. Forest ecosystems in this subzone are dominated by western hemlock (Hw), amabalis fir (Ba), western red cedar (Cw), and Sitka spruce (SS). Common understory species include salal, Alaskan blueberry, red huckleberry, and deer fern. The disturbance regime is defined by windthrow, forest pathogens, and rare stand-replacing fires. Disturbance events are typically small or patchy in size resulting in uneven-aged, multi-storied stands across the landscape.

[19] *BEC WEB (gov.bc.ca)*
[20] *https://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh28.pdf*

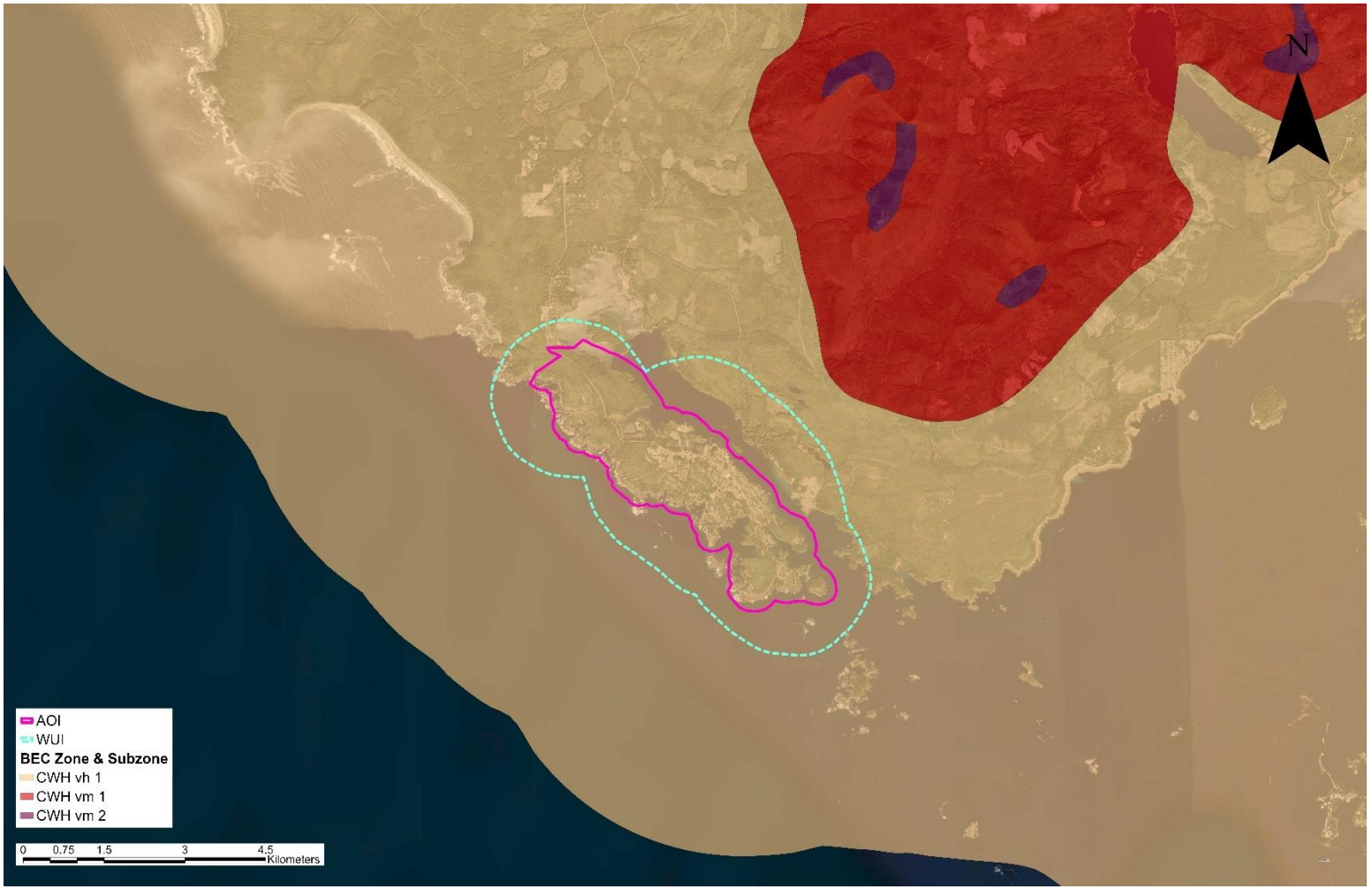


FIGURE 5: BIOGEOCLIMATIC (BEC) ZONES AROUND THE DISTRICT OF UCLUELET AND SURROUNDING AREAS

Forest Health

The District of Ucluelet is located in the Arrowsmith Timber Supply Area (TSA). Several health agents exist in the Arrowsmith TSA; however, few are significant. Root diseases, especially *Phellinus* and *Armilaria,* summer drought, risk of fire, and losses to windthrow in partial harvest areas are of highest concern[21]. Frequent storms and strong wind events occur around the Ucluelet-Tofino area; however, forest harvesting in the area is low, so a majority of forest stands are well established and continuous, and trees have developed resistance to windthrow through frequent exposure to high winds. Forest health concerns such as drought or may become more prevalent within the Ucluelet-Tofino area as climate change is anticipated to bring higher annual average temperatures and reduced rainfall in the summer months.

Weather and Climate

Weather attributes including temperature, relative humidity, precipitation, wind speed and wind direction are critical factors in the ignition, spread, and duration of wildfires. Climate is the most important factor influencing the development of forest ecosystems, providing for vegetative fuel that interacts with daily weather to create the conditions for potential wildfire behavior. The climate in Ucluelet is characterized by short cool summers, and long cool winters with high precipitation. The climate is regulated by the ocean, limiting extreme changes in temperature. On average, the warmest month is August which sees an average high temperature of 19°C. The coolest months on average is between December and February which gets an average low of 4°C and a high of 9°C[22].

Ucluelet has high seasonal precipitation variability with summer months getting significantly less rain. The months of July and August sees around 75mm of monthly precipitation on average, while November through January sees nearly 500mm of monthly precipitation on average. By contrast, on the east side of Vancouver Island, Nanaimo experiences the rain shadow effect from the Vancouver Island Ranges. The result is an average monthly precipitation of 30mm in the summer months and an average monthly precipitation of 150mm November through January. This means Ucluelet receives two and a half times more rain in the summer months, and over three times more rain in the winter months. The result is a moist and lush temperate rainforest in Ucluelet that is typically not prone to fire ignitions. However, preliminary analyses of the future impacts of climate change suggest growing season moisture deficits will increase, particularly in southern and coastal BC (Spittlehouse 2008). Deficits occur where monthly precipitation is less than monthly evaporative demand (reflecting solar radiation, air temperature, relative humidity, and wind).[23] Predicted impacts of climate change on Ucluelet is discussed further in the Climate Change section below.

Wind significantly influences fire behaviour and direction of fire spread and is summarized in the wind roses from the local representative Tofino Airport weather station (Figure 6) operated by Environment Canada. Variables including wind speed, wind direction, relative humidity, and air temperature is compiled daily at 12:00 p.m. local time to provide estimates of prevailing wind directions and wind speed. The data is restricted to the core fire

[21] *https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/silviculture/silviculture-strategies/arrowsmith_tsa_irmp_situational_analysis_v1_4.pdf*
[22] *https://weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,ucluelet,Canada*
[23] *https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/applied-science/2a_va_bc-climate-change-final-aug30.pdf*

season as identified by the Rationale for the development of "Core Wildfire Season" for use in the 90th Percentile Calculator[24], as required by forestry consultants in the Tools for Fuel Management[25]. The core wildfire season for the Humid Maritime and Highlands eco-division where Ucluelet is located is from May 15th to August 31st. Throughout the duration of the core wildfire season, prevailing winds tend to blow primarily from the northwest and southeast.

[24] *https://wps-prod.apps.silver.devops.gov.bc.ca/static/media/90th_percentile_calculator_rationale.d02b2d447dc0912b8405.pdf*
[25] *https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/vegetation-and-fuel-management/fire-fuel-management/fuel-management*

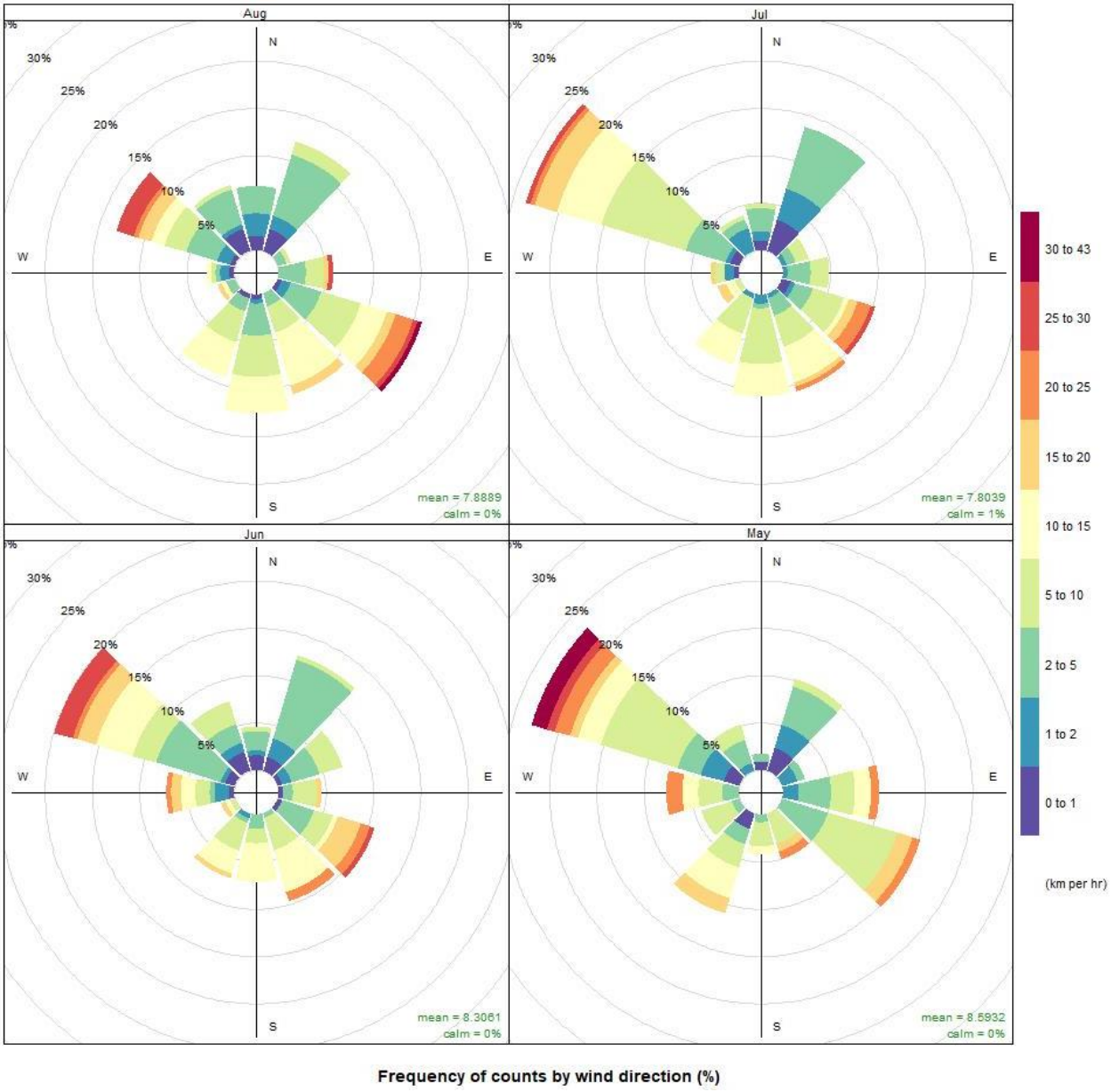


FIGURE 6: WIND ROSES DERIVED FROM THE TOFINO WEATHER STATION THROUGHOUT MAY TO AUGUST FOR YEARS 2015 TO 2022.

Climate Change

An important component of building community resiliency is recognizing the potential impacts of climate change and being proactive in preparing the community for those changes. Although wildfire historically has not been a significant natural ecosystem disturbance on the west coast of Vancouver Island, ecosystem structures and the disturbances acting on them may shift under a changing climate. For Ucluelet, projections and predictions made utilizing the ClimateBC climate model program (Wang et al), were used to determine some basic potential future climate variables including precipitation and temperature in both the winter and summer seasonal windows. Different ranges of 30-year increments were selected to represent three different future timeframes, 2011-2040, 2041-2070, 2071-2100. Recorded temperature and precipitation from a current year range of 1991-2020 was modeled using the same program and guidelines to ensure an even comparison. Each of these ranges were modeled to get a representation of the change over time the area could potentially experience in both temperature and precipitation, given predetermined climate change algorithms. A detailed summary of the model and algorithms used can be found in Appendix B: Climate Modeling Using Climate BC.

The following tables show the modeled values for seasonal temperature and seasonal precipitation for both the current period and each 30-year future period up to the year 2100.

TABLE 4: CLIMATE MODEL PROJECTIONS TABLE FOR WINTER PRECIPITATION (MM). BLUE PERCENT CHANGES DEPICT AN INCREASE IN OVERALL PRECIPITATION

Time Period	Season	Precipitation Range (mm)	Difference (mm)	% Change
Current (1990 - 2020)	Winter	1115 - 2298	0	0
2040 (2011 - 2040)	Winter	1169 - 2425	+73	+ 6%
2070 (2041 - 2070)	Winter	1227 - 2542	+132	+ 11%
2100 (2071 - 2100)	Winter	1246 - 2589	+160	+ 13.5%

TABLE 5: CLIMATE MODEL PROJECTIONS TABLE FOR SUMMER PRECIPITATION (MM). BLUE PERCENT CHANGES DEPICT AN INCREASE IN OVERALL PRECIPITATION. YELLOW PERCENT CHANGES DEPICT A DECREASE IN OVERALL PRECIPITATION

Time Period	Season	Precipitation Range (mm)	Difference (mm)	% Change
Current (1990 - 2020)	Summer	247 - 614	0	0
2040 (2011 - 2040)	Summer	242 - 608	-1	- 0.27%
2070 (2041 - 2070)	Summer	241 - 613	+5	+ 1.36%
2100 (2071 - 2100)	Summer	231 - 589	-9	-2.45%

Table 4 above demonstrates a fairly steady increase in predicted precipitation during the winter season. Table 5 shows that changes in precipitation during the summer season over the next 80 years is uncertain and will likely be similar to current levels of summer precipitation, or slightly less. It is important to note that precipitation projections, particularly regional and seasonal patterns, contain much more uncertainty than temperature projections.

TABLE 6: CLIMATE MODEL PROJECTIONS TABLE FOR WINTER TEMPERATURE (°C). ORANGE PERCENT CHANGES DEPICT AN INCREASE IN RELATIVE TEMPERATURE

Time Period	Season	Temperature Range (°C)	Difference (°C)	% Change
Current (1990 - 2020)	Winter	(-1.4) - 5.8	0	0
2040 (2011 - 2040)	Winter	(-1.1) - 6.1	0.3	4.2%
2070 (2041 - 2070)	Winter	(-0.2) - 7	1.2	16.7%
2100 (2071 - 2100)	Winter	0.5 - 7.7	1.9	26.4%

TABLE 7: CLIMATE MODEL PROJECTIONS TABLE FOR SUMMER TEMPERATURE (°C). ORANGE PERCENT CHANGES DEPICT AN INCREASE IN RELATIVE TEMPERATURE

Time Period	Season	Temperature Range (°C)	Difference (°C)	% Change
Current (1990 - 2020)	Summer	11.4 - 15.6	0	0
2040 (2011 - 2040)	Summer	12.3 - 16.5	0.9	21.4%
2070 (2041 - 2070)	Summer	13.2 - 17.4	1.8	42.9%
2100 (2071 - 2100)	Summer	14 - 18.2	2.6	61.9%

Table 6 and Table 7 above demonstrate that temperatures in both the winter and summer seasons are predicted to increase significantly in the next 80 years, relative to current temperature ranges. Therefore, winters in Ucluelet are predicted to be warmer and wetter, with a predicted increase in extreme storm and wind events. Of particular concern is a greater than 60% predicted increase in summer temperatures by 2100, with little predicted changes in summer precipitation. Despite predicted wetter winters, if summers on the west coast become warmer with similar precipitation patterns or slightly less precipitation, this can have substantial impacts on terrestrial communities and tree survival. Preliminary analyses suggest growing season moisture deficits will increase in coastal BC[26]. Moisture deficits occur where monthly precipitation is less than the monthly evaporative demand (reflecting solar radiation, air temperature and humidity, and wind). This can lead to drier conditions and therefore increased fire danger. Moisture deficits and potential for resulting tree mortality can cause both increased ignition potential and fuel build up on coastal areas, thereby enhancing conditions for wildfire events.

[26] https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nrs-climate-change/applied-science/2a_va_bc-climate-change-final-aug30.pdf

Wildfire History

The natural disturbance regime along the west coast of Vancouver Island is characterized by rare stand-initiating disturbance events and are categorized as a Natural Disturbance Type (NDT) 1. Disturbance events are dominated by wind, landslide, pathogen, or fire events that are small and patchy in size[27]. The Ucluelet area is surrounded by temperate rainforest and water. The fuel arrangement is primarily old growth west coastal forest. As a result, historical documented wildfires in the Ucluelet-Tofino area greater than a few hectares in size are very rare (Figure 7). Provincial historical data shows there was one documented wildfire near the Tofino airport that occurred in 1958 and was 26 ha in size. Wildfires become more frequent moving inland on Vancouver Island as climatic and geographic factors allow for drier conditions.

An interview with Joshua Macy, Wildfire Officer for the Mid Island Fire Zone - Errington/Port Alberni, provided insight into the wildfire behaviour and history on the west coast of Vancouver Island. There are little to no natural occurrence of fires and no known history of cultural burning by local First Nations. Fires in the area are human caused and typically occur in artificially created fuel types ie. open grass, slash, and under very specific weather conditions. Recreation fire starts are more common inland towards the Kennedy Lake area. Fire ignitions rarely grow to be over a few hectares and remain on the ground as surface fires. Currently, the greatest fire concern for Ucluelet is the spread of structure-to-structure fires via grasses, cedar shrubs, cedar trees, etc. as a majority of homes are situated in close proximity to forests and vegetation.

Larger fires in the area are most likely to occur as a result of industrial burning, such as licensees burning cured slash after harvest. Fire abatement after harvest is a legal responsibility of forest licensees, however waste and residue removal after harvest on the coast is often unsuccessful. A harvest block full of cedar slash on a south facing slope could cause a very intense fire under the right conditions. Wildland firefighting on coastal terrain is very tough and slow in steep areas; there are many danger trees to navigate, minimal opportunity to use machinery, a very long mop up process, and an intensive use of resources. This makes suppression much more difficult than in interior BC terrain.

Under current climate conditions, the Kennedy Lake area and Ucluelet peninsula have a very high buildup of fuels due to a lack of stand-replacing disturbance events in the highly productive temperate rainforest ecosystem. There is the possibility that this becomes a concern in the future under climate change if drought conditions and the right weather conditions for burning increase in frequency.

[27] *https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/natural-resource-use/land-water-use/crown-land/land-use-plans-and-objectives/cariboo-region/cariboochilcotin-rlup/biodiversity_guidebook.pdf*

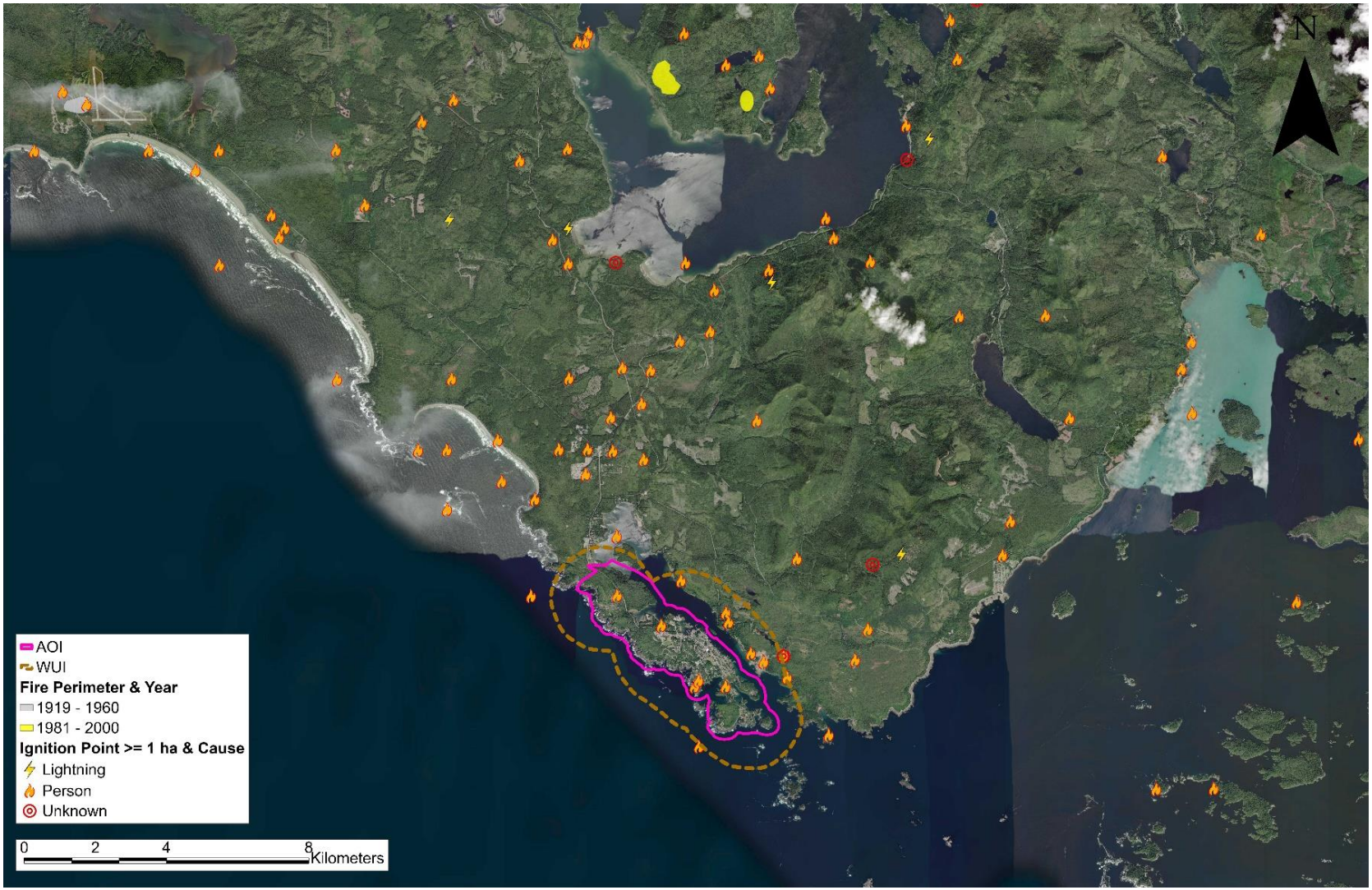


FIGURE 7: FIRE HISTORY OVERVIEW MAP INDICATING EXTENT OF HISTORICAL FIRE PERIMETERS, AND LOCATIONS OF WILDFIRE IGNITIONS RESULTING IN FIRES ONE OR MORE HECTARES IN SIZE.

Fuel Types

The Canadian Forest Fire Behaviour Prediction (FBP) System outlines five major fuel groups and sixteen fuel types modeled based on characteristic fire behaviour within common boreal vegetation under defined weather conditions[28]. In general, fuel types are defined in the FBP System by overall vegetation structure, dominant overstory species, and understory, ladder fuel, and forest floor characteristics[29]. Fuel typing is a subjective process, as many of the vegetation communities of BC are not suitably represented by the boreal-based FBP fuel types. Therefore, the most appropriate fuel types were assigned based on best-available scientific research and information, professional experience, and practical knowledge. There are notable limitations with the fuel typing system for the purpose of this CWRP including: a fuel typing system designed to describe fuels which do not occur within the AOI, fuel types which cannot accurately capture the natural variability within a spatial polygon, and limitation in the data used to create the initial fuel types.

The most prevalent forested fuel types on the landscape around the District of Ucluelet are C-5 and D-1/2, with minor components of M-1/2 and C-3 (Figure 9). Table 8 below provides further description of each of the prevalent fuel types. The C-5 fuel type is characterized by mature, lower density conifer stands with well-developed deciduous shrub understories[30]. They generally have low potential for active crown fire and therefore a lower expected fire intensity or rate of spread when compared to other conifer-dominated fuel types. Fires in this fuel type would primarily burn as a surface fire. However, this potential can increase significantly when wind-driven and/or under drought conditions due to heavy buildup of surface fuels generally present in mature coastal stands. The D-1/2 fuel type is considered to have a very low hazard for crown fire or spotting potential due to high moisture retention in foliage, with fires primarily burning as a surface fire.

TABLE 8. FUEL TYPES IDENTIFIED WITHIN THE WILDLAND URBAN INTERFACE OF UCLUELET

Fuel Type	FBP/ CFDDRS Description	BC/AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type- Crown Fire/ Spotting Potential
C-3	Mature jack or lodgepole pine. Stands that have matured at least to the stage of complete crown closure.	Dense immature stands containing Douglas fir, western redcedar and/or western hemlock. Understory conifer layers may be present.	Surface and crown fire, potential for very high fire intensity and rate of spread	High

[28] https://cfs.nrcan.gc.ca/publications?id=10068
[29] *Perrakis, D. and G. Eade. 2015. BC Wildfire Service. Ministry of Forests, Lands, and Natural Resource Operations. British Columbia Wildfire Fuel Typing and Fuel Type Layer Description 2018 Version.* https://cfs.nrcan.gc.ca/publications?id=39432
[30] https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/wildfire-management/fire-fuel-management/bcws_bc_provincial_fuel_type_layer_overview_2015_report.pdf

Fuel Type	FBP/ CFDDRS Description	BC/AOI Description	Wildfire Behaviour Under High Wildfire Danger Level	Fuel Type- Crown Fire/ Spotting Potential
C-5	Mature stands of red pine and eastern white pine. The understory is of moderate density of conifers and/or deciduous shrubs.	Mature, low density coastal vegetation communities of mature Douglas-fir, western hemlock and/or western redcedar. High crown base height and high deciduous shrub component. Often accompanied by dead woody fuel accumulations.	Low potential for active crown fire. Under drought conditions, fuel consumption and fire intensity can be higher due to dead woody fuels	Low-Moderate
D-1/2	Pure aspen stand (leafless and green). A conifer understory is noticeably absent.	Deciduous stands with greater than 80% deciduous overstory composition.	Always a surface fire, low to moderate rate of spread and fire intensity	Very Low
M-1/2	Boreal mixedwood (leafless and green) comprised of various coniferous and deciduous species.	Moderately well-stocked mixed stand of conifers (20-80%) and deciduous species, low to moderate dead, down woody fuels.	Surface fire spread, torching of individual trees and intermittent crowning, (depending on slope and percent conifer)	<26% conifer (Very Low); 26-49% Conifer (Low-Moderate); >50% Conifer (Moderate-High)

FIGURE 8: EXAMPLES OF LOCAL FUEL TYPES: THE FIRST PHOTO REPRESENTS A C-3 FUEL TYPE WITH A HIGHER DENSITY OVERSTORY AND LOTS OF LADDER FUELS. THE SECOND PHOTO REPRESENTS A C-5 FUEL TYPE WITH A MORE MATURE, LOWER DENSITY OVERSTORY AND WELL ESTABLISHED DECIDUOUS SHRUB UNDERSTORY.

The original provincial fuel type dataset was relatively accurate, with the exception of non-fuel development within the Ucluelet town core mapped as D-1/2 deciduous forest. This error did not have an impact on the existing wildfire threat ratings as both deciduous stands and non-fuel areas have very low wildfire intensity potential. For these particular fuel type change polygons, wildfire threat was determined to be Low. There were also a couple instances where a C-3 stand was mapped as a C-5 stand in the provincial dataset, however these C-3 stands were typically more open than a typical C-3 stand.

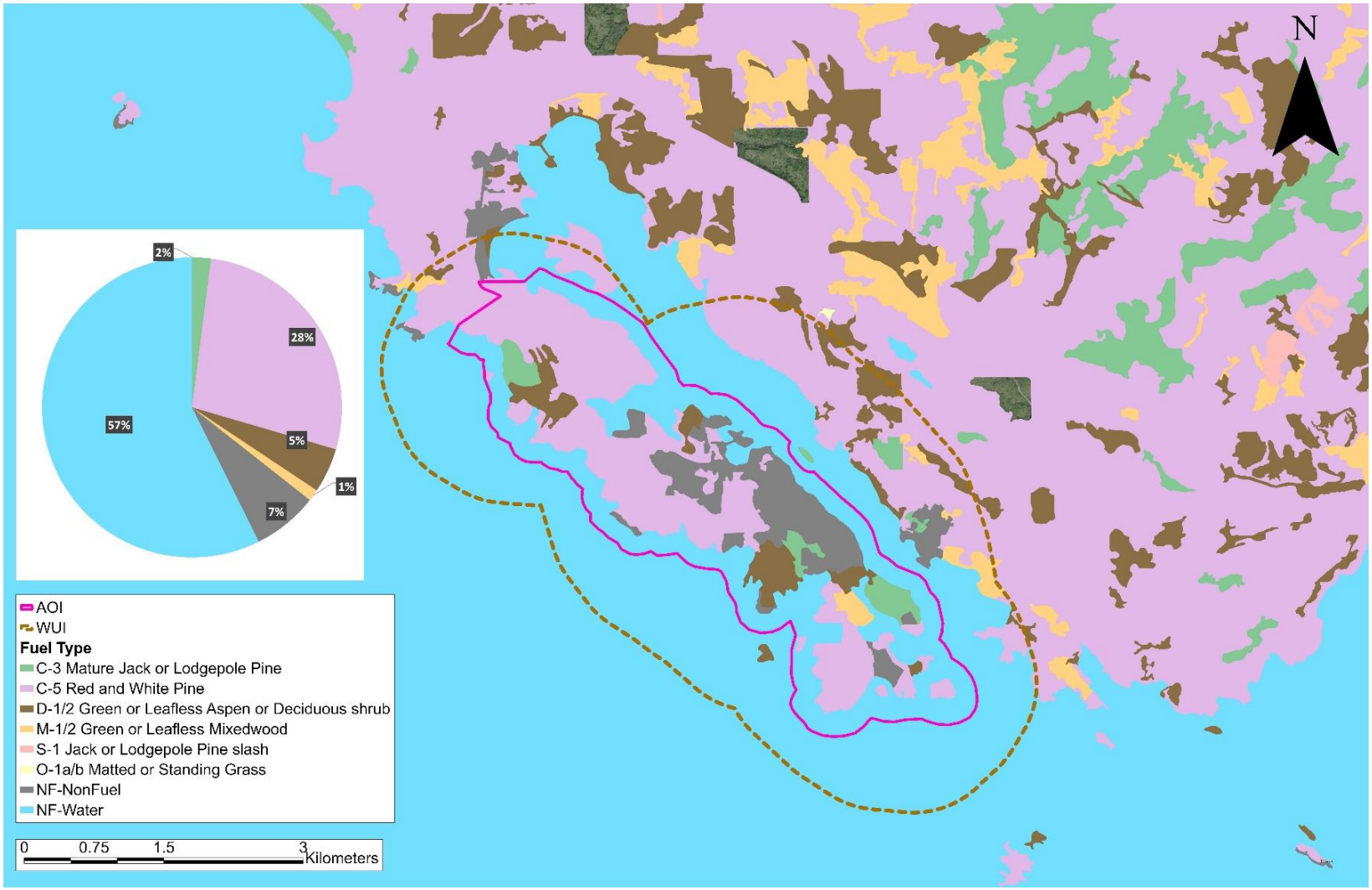


FIGURE 9: FUEL TYPES WITHIN THE UCLUELET WUI AND SURROUNDING AREAS.

Canadian Forest Fire Danger Rating System (CFFDRS)

The national Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. Fire Danger Classes provide a relative index of how easy it is to ignite a fire and how difficult control is likely to be. A network of fire weather stations is maintained throughout the province during the fire season by the MFLNRORD, and the recorded data are used to determine fire danger represented by Fire Danger Classes on forest lands within/around a community. The fire danger information can be obtained from the BCWS and is most commonly utilized by municipalities and regional districts to monitor fire weather, restrict high risk activities when appropriate, and to determine hazard ratings associated with bans and closures.

The BC *Wildfire Act* [BC 2004][31] and *Wildfire Regulation* [BC Part 3/2021][32] specify responsibilities and obligations with respect to fire use, prevention, control, and rehabilitation, and restrict high risk activities based on Fire Danger Classes. The five Fire Danger Classes are defined as follows:

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

An analysis of fire danger information for the area showed that Ucluelet has historically never reached **High** or **Extreme** fire danger ratings. However, the area has experienced days of Moderate fire danger rating during drier months such as July and August. As mean summer temperatures are predicted to rise and summer precipitation is predicted to remain constant or decrease slightly under a changing climate, this can significantly impact moisture levels in both the atmosphere and vegetative fuels. As a result, there is strong potential for Ucluelet to start experiencing increased number of days of **Moderate** fire danger and even **High** fire danger days.

[31] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/04031_01
[32] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/11_38_2005

Fire Threat: PSTA

The Provincial Strategic Threat Analysis (PSTA) Fire Threat Rating is a spatial dataset developed by the BC Wildfire Service to assess and predict potential wildfire threat and risk to values, utilizing three primary inputs including: fire occurrence density, spotting impact, and head fire intensity[33]. Values ranging from 1 to 10 are generated based on an average weighting process of the aforementioned three inputs. The values were then grouped into the following general threat class descriptions: **low (1-3); moderate (4-6); high (7-8); and, extreme (9-10).** Water bodies were automatically given a value of 'no threat' (-1). The PSTA analysis has historically not been completed for private land, so private land is automatically given a value of 'no data' (-2).

Within the Ucluelet area, wildfire hazard is generally low throughout. The Port Albion region across the Ucluelet inlet has the highest identified wildfire threat in the Ucluelet fire protection area based on knowledge from local wildfire officer Joshua Macy. Figure 10 shows the breakdown of PSTA fire threat rating values within and around the District of Ucluelet. A large proportion (>50%) of the WUI is classified as 'no threat' due to the surrounding water. The high proportion of private land within the District has resulted in 30% of the WUI classified as having 'no data' available. As a result, there is minimal data depicting the potential threat of the vegetative areas within the District. The threat data outside the Ucluelet WUI shows that the surrounding forested C-5 and C-3 fuel types have an overall threating rating of **Moderate**. From this, we can assume that the forested C-5 and C-3 areas within parks and private land in the District also have a fire threat rating of Moderate. Deciduous forests will have a fire threat rating of Low.

[33] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020-wildfire-threat-assesment-guide-final.pdf*

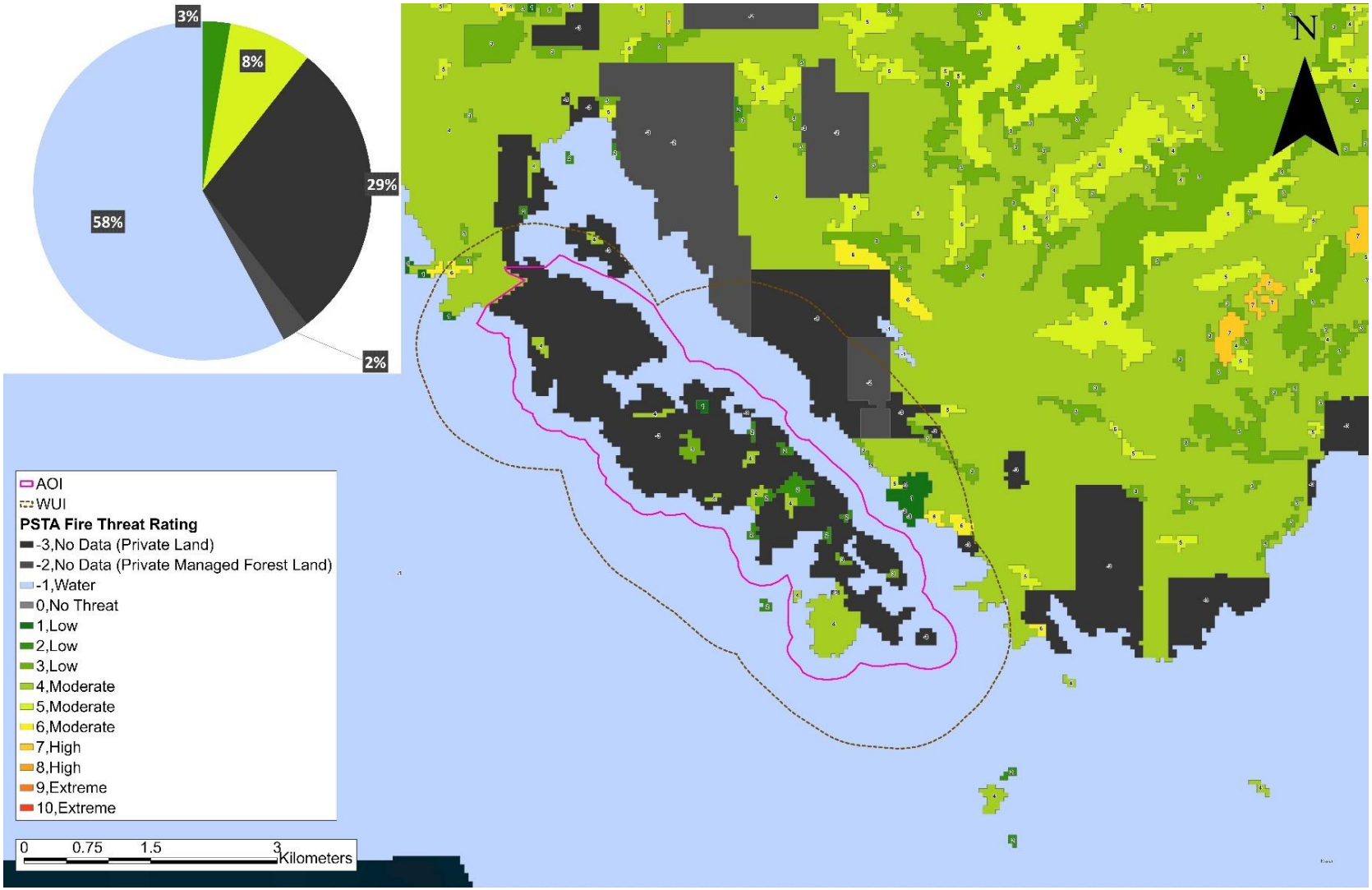


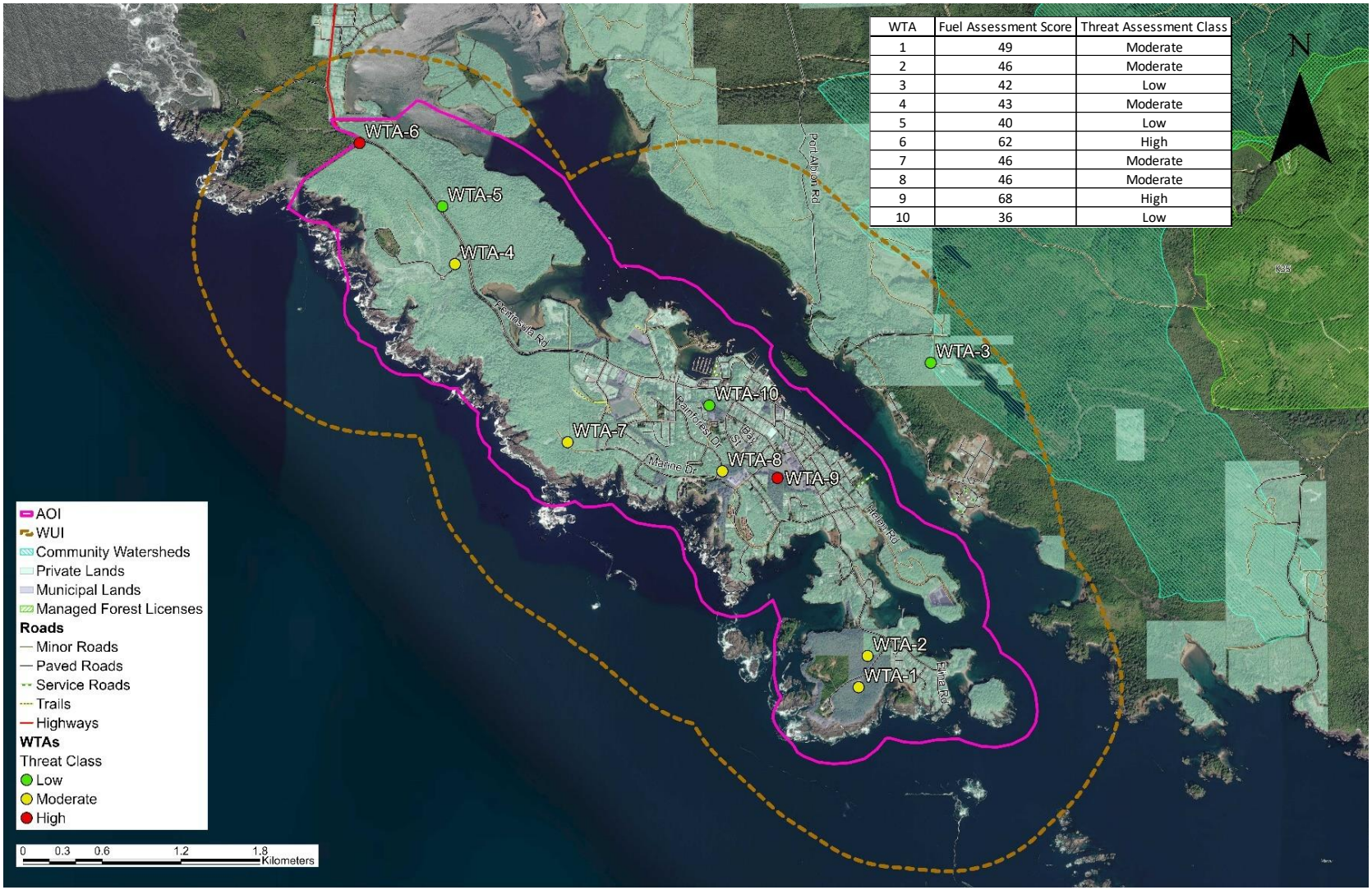
FIGURE 10: PROPORTION OF EACH PSTA THREAT RATING CLASS WITHIN THE UCLUELET WUI.

Local Wildfire Threat Assessment

Part of the process of developing this CWRP involves on-the-ground verification and assessment of local vegetation types and the inherent wildfire threat of forested areas within and around a community. Wildfire threat is assessed using the Wildfire Threat Assessment (WTA) tool developed by BC Wildfire Service[34], which focuses on forest stand attributes and fuel structure, independent of fire weather and other fire behaviour components which are contained in the PSTA data.

The authoring forester completed field verification and wildfire threat analysis for the Ucluelet WUI. Ten Wildfire Threat Assessments were completed in various forested areas (Figure 11); 50% of assessed areas achieved a wildfire threat rating of **Moderate**, 30% a **Low** threat rating, and 20% a **High threat rating**. Fire threat differs from fire risk in that fire threat does not take into account proximity to values or the consequence of damage to those values in a wildfire event. Low and Moderate wildfire threat ratings were associated with C-5 forest fuel types, while the High wildfire threat ratings were associated with denser C-3 forest fuel types. Figure 11 below contains a table outlining the wildfire threat rating for each completed WTA.

[34] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020-wildfire-threat-assesment-guide-final.pdf*



WTA	Fuel Assessment Score	Threat Assessment Class
1	49	Moderate
2	46	Moderate
3	42	Low
4	43	Moderate
5	40	Low
6	62	High
7	46	Moderate
8	46	Moderate
9	68	High
10	36	Low

FIGURE 11: WILDFIRE THREAT ASSESSMENTS (WTA) COMPLETED THROUGHOUT THE UCLUELET WUI AREA.

Local Wildfire Risk Assessment

Stand attributes, fuel structure and landscape information collected in the WTA is used in conjunction with the provincial PSTA Wildfire Density and Spotting Impact spatial datasets to develop a new PSTA Fire Threat Rating that more accurately reflects local characteristics. The new PSTA Fire Threat Rating is then used along with proximity to values, and landscape and topographic data to develop an overall wildfire risk score and relative risk classification (Table 9). Wildfire risk differs from wildfire threat in that it takes into consideration the proximity of human values to the vegetated area being assessed. Table 9 outlines the updated Wildfire Risk scores based on the revised local wildfire threat score from collected field data. Determining wildfire risk helps foresters identify vegetative areas within or around a community that would benefit from vegetative and fuel management treatments to help reduce the overall threat to surrounding values. Forested areas identified for fuel management within the Ucluelet WUI are presented in the VEGETATION MANAGEMENT section of this CWRP.

TABLE 9: REVISED LOCAL WILDFIRE THREAT SCORE BASED ON WTA DATA AND TOPOGRAPHICAL FEATURES USED TO CALCULATE OVERALL WILDFIRE RISK SCORES AND CLASSIFICATION. WEIGHTING FOR EACH INPUT IS SHOWN IN BRACKETS.

WTA ID	Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope % (5%)	Total Wildfire Risk Score	Relative Risk Classification
1	3.5	8	7	1	1	5.7	Moderate
2	3.5	8	7	1	1	5.7	Moderate
3	1.5	10	7	2	1	5.7	Moderate
4	3.3	8	10	1	1	6.5	Moderate
5	1.5	10	10	1	1	6.6	Moderate
6	5.3	2	10	1	1	5.3	Moderate
7	3.3	8	7	2	1	5.6	Moderate
8	3.5	10	10	2	2	7.3	High
9	5.2	10	10	2	2	7.8	High
10	1.7	10	10	1	1	6.6	Moderate

The Relative Risk Classification scoring system is outlined in the BCWS document *Determining Wildfire Threat and Risk at a Local Level*[35] and is summarized in Table 10 below. A detailed breakdown of the risk assessment inputs and methodology can be found in Appendix A: Determining Wildfire Threat and Risk at a Local Level Based on Updated Fuel Types.

[35] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_determining_wildfire_threat_and_risk_at_a_local_level.pdf*

TABLE 10: THE WEIGHTED WILDFIRE RISK SCORE (OUT OF 10) AND THE CORRESPONDING RELATIVE WILDFIRE RISK CLASSIFICATION FROM THE BCWS *DETERMINING WILDFIRE THREAT AND RISK AT A LOCAL LEVEL* DOCUMENT.

Relative Wildfire Risk Classification	Weighted Wildfire Risk Score
Low	0 - 3.9
Moderate	4 – 6.9
High	7 – 8.9
Extreme	9 - 10

Hazard, Risk and Vulnerability Assessment

The Hazard, Risk, and Vulnerability Analysis (HRVA) is an organized process to identify hazards that may trigger an emergency response, and the potential consequences of those hazards. Understanding local hazards and risks helps a community establish priorities, plans and strategies to prevent or reduce the risks. Evaluating hazards and risks is a legislative requirement under Section 2(1) of the *Local Authority Emergency Management Regulation*[36]. This applies to those defined as a local authority (such as a local fire department, government, or Regional District). The HRVA that local governments undertake to develop a local Emergency Management Plan may provide additional locally-derived information that can augment the wildfire PSTA, particularly regarding critical infrastructure.

The District of Ucluelet has completed a HRVA which outlines the likelihood of a variety of emergency events/hazards, and subsequently rates the risk/impact of the identified hazards. The following hazards and risks relating to fire and evacuation were identified within the Ucluelet HRVA:

TABLE 11: DISTRICT OF UCLUELET HRVA ELEMENTS RELATING TO FIRE AND EVACUATION

Event/Hazard	Likelihood of Occurrence	Risk/Impact
Structural fire	Very Likely	Moderate
Lightening	Very Likely	Moderate
Failure of Highway 4	Moderate/Likely	Moderate
Interface fire	Occasional/Slight Chance	Moderate
Drought	Occasional/Slight Chance	Low
Heat wave	Unlikely/Improbable	Low
Climate Change	Unlikely/Improbable	Low

All the hazard events outlined in Table 11 above are addressed throughout this CWRP, with recommendations for reducing risk to the community.

[36] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/380_95

FIRESMART DISCIPLINES

EDUCATION

Public education and outreach efforts help community members learn about wildfire and its potential impacts to their communities. In addition, these efforts should be designed to help individuals understand their role in taking action to reduce risk. Education and outreach activities are designed for all groups to benefit, including elected officials, community planners, residents, visitors, businesses, land managers, first responders, and more.

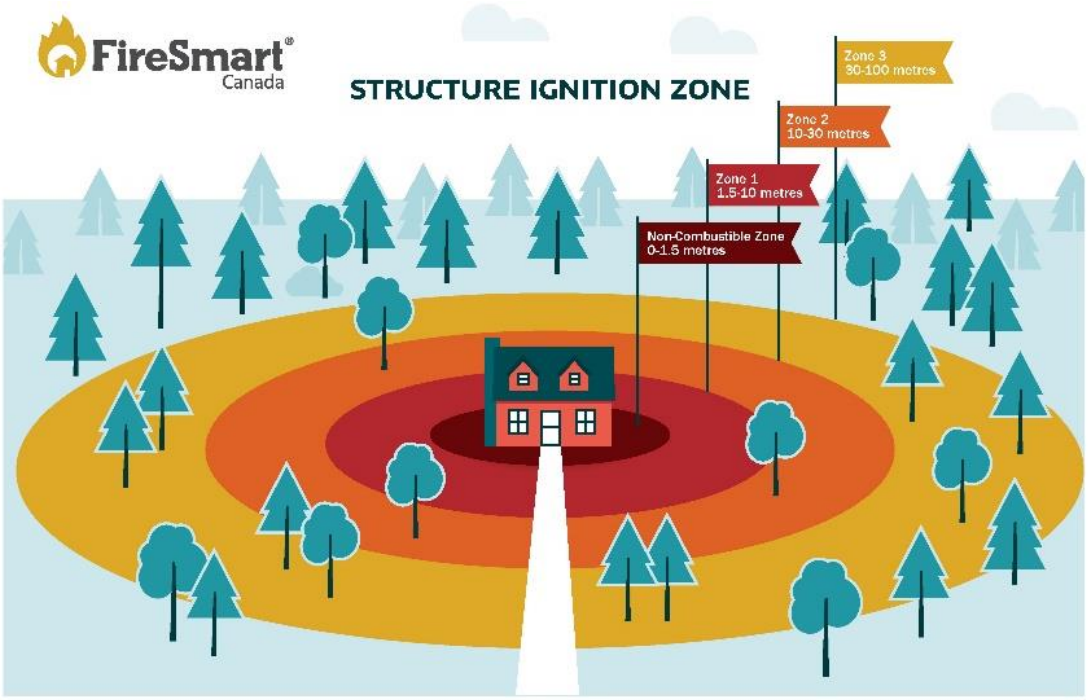
Effective education is important to inform community members about the risk of wildfire and ways to minimize that risk. It is important that information is shared accurately and clearly to be effective at informing the target audience. The following sections will identify areas of focus, delivery methods, and actions to provide education.

FireSmart BC[37] and FireSmart Canada[38] provide several resources that are available to communities to learn about reducing their risk of wildfire. These websites provide a number of resources such as brochures, video, posters, and guidebooks that can be distributed within the community. Community websites and social media accounts can also be valuable resources to connect with the community and a broader audience, and to distribute information from FireSmart Resources. It is important to put regular updates on website and social media accounts about FireSmart information, events, meetings, and informing on the publication of the CWRP.

There are a number of training programs through FireSmart BC that can help educate the community, such as the FireSmart 101 or Wildfire Risk Reduction courses[39], and Local FireSmart Representative (LFR) training workshop. Local FireSmart Representatives are individuals trained to understand the wildland fire hazard assessment process and appropriate wildfire mitigation measures available to individuals or neighbourhoods. The LFR workshop is designed to assist participants in becoming familiar with and implement all components of the FireSmart Canada Neighborhood Recognition Program.

FireSmart Canada's Neighbourhood Recognition Program[40] educates community members on how to increase their home's chance of survival in the event of a wildfire through proactive actions, while encouraging neighbours to work together to reduce losses and damage. The more neighbourhoods that become recognized, the safer the community is as a whole. The mitigation actions that are developed for the FireSmart Neighbourhood Recognition Program align with the recommendations of this CWRP. Homeowners are encouraged to implement FireSmart recommendations around their homes to further increase their home's chance of survival; the most important zone is the first 1.5m around the home (non-combustible zone) (Figure 12).

[37] https://firesmartbc.ca/
[38] https://www.firesmartcanada.ca/
[39] Courses | FireSmart BC
[40] How to apply for the FireSmart Canada Neighbourhood Recognition Program (FCNRP) | FireSmart BC



Work with your neighbours in any overlapping priority zones!

Non-combustible Zone (0-1.5 metres)	Reduce the chance of wind-blown embers igniting materials near your home. A non-combustible surface should extend around the entire home and any attachments, such as decks. Creating a non-combustible surface can be as easy clearing vegetation and combustible material down to mineral soil. To add to your landscape design, use non-combustible materials such as gravel, brick, or concrete in this critical area adjacent to your home. Woody shrubs, trees or tree branches should be avoided in this zone, any that are present should be properly mitigated.
Zone 1 (1.5-10 metres)	Create a landscape that will not easily transmit fire to the home. A FireSmart yard includes making smart choices for your plants, shrubs, grass and mulch. Selecting fire-resistant plants and materials can increase the likelihood of your home surviving a wildfire. Plant a low density of fire-resistant plants and shrubs. Avoid having any woody debris, including mulch, as it provides potential places for fires to start. Storing items such as firewood piles, construction materials, patio furniture, tools and decorative pieces against or near a house is a major fire hazard. Move firewood piles, trailers/ recreational vehicles, storage sheds and other combustible structures out of this zone and into Zone 2. If unable to move, store firewood inside your mitigated garage, shed or other ember resistant structures, create a non combustible zone underneath and for 1.5 metres around trailers/ vehicles and mitigate sheds and other structures to the same standards as those of your home.
Zone 2 (10-30 metres)	If your property extends out to this zone, thin and prune evergreen trees to reduce hazard in this area. Within 30 metres of your home, selectively remove evergreen trees to create at least 3 metres of horizontal space between the single or grouped tree crowns and remove all branches to a height of 2 metres from the ground on the remaining evergreen trees. If possible, pruning trees up to 100 metres from your home (Zone 3) is recommended. Regularly clean up accumulations of fallen branches, dry grass and needles from on the ground to eliminate potential surface fuels. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.
Zone 3 (30-100 metres)	Taking FireSmart actions in Zone 3 on your property will influence how a wildfire approaches your home. You can change the dynamics of wildfire behaviour by managing vegetation within this zone. Look for opportunities to create a fire break by creating space between trees and other potentially flammable vegetation. Thinning and pruning is effective here as well. These actions will help reduce the intensity of a wildfire. Consider seeking the guidance of a forest professional with wildland fire knowledge on appropriate management options for this zone.

FIGURE 12: FIRESMART HOME IGNITION ZONES
(HTTPS://FIRESMARTCANADA.CA/WP-CONTENT/UPLOADS/2022/01/FS_HOME-IGNITION-ZONE-POSTER.PDF)

Current Status and Action Planning

Historically, FireSmart has not been a focus within the Ucluelet community due to a wet climate and lack of historical wildfire occurrences. As a result, there is minimal FireSmart resources put out by the District of Ucluelet. For example, FireSmart education and promotion is not currently offered to the public on the District website. However, the Alberni-Clayoquot Regional District provides FireSmart information on their website,[41] including information on the home assessments and rebate program, as well as resources such as the FireSmart homeowner's manual, landscaping guide, evacuation checklist, and fact sheets. The following are recommended action items for the District of Ucluelet to increase FireSmart awareness, education and action within the community:

Action #1: Read and understand this CWRP's identified risks and recommended actions.

Action #2: Hold a FireSmart event/open house to introduce FireSmart concepts to community members and educate them on things they can do around their homes to reduce fire hazard. This should be held annually between May and October.

Action #3: Hire a fulltime or parttime FireSmart Coordinator (required by 2024). This position will run all aspects of the FireSmart program for the District and generally support many aspects of this CWRP. The District should apply for funding through CRI to help support this position.

Action #4: Distribute FireSmart promotional resources to members of the public at local businesses, FireSmart events, farmers markets or other community events.

Action #5: Promote/encourage and complete FireSmart Home Assessments on private property for those community members who are interested. Provide recommendations on actions they can take to make their homes more FireSmart and reduce the risk of loss and damages in the event of a wildfire

Action #6: Organize Community Chipper Day(s) and/or Community Cleanup Day(s) to assist homeowners with removal of hazardous vegetation and debris around their homes. Given the municipal restriction on all open burning larger than a campfire, more than Chipper Day a year may be necessary.

Action #7: Encourage private property/homeowners to have a FireSmart Home Assessment completed and implement FireSmart activities around their homes utilizing the FireSmart rebate program through use of social media, the internet, and FireSmart events.

Action #8: Inform the community about upcoming FireSmart events via the internet, social media and public newsletter. Communications should be coordinated with the ACRD and Tofino if possible.

Action #9: Put up educational signage along major tourist trails warning of the role people play in preventing wildfire ignitions.

Action #10: Apply for FireSmart Canada's Neighbourhood Recognition Program. Once recognized, annually renew for FireSmart Recognition.

[41] *https://www.acrd.bc.ca/firesmart*

LEGISLATION AND PLANNING

Legislation and Regulation can be a very effective tool for reducing wildfire risk on provincial crown lands and within the administrative boundaries of a local government or First Nation community. Provincial acts and regulations provide the means for local governments and First Nation communities to implement wildfire risk reduction actions through by-laws.

Municipal Bylaws

The following municipal bylaws relating to wildfire protection currently exist for the District Ucluelet:

District of Ucluelet Fire Department Establishment, and Fire and Safety Regulations, Bylaw No. 1251, 2019

A bylaw for the establishment and regulation of a fire department, and to provide for the prevention of fire and the protection of persons and property in the District of Ucluelet and fire service agreement areas.

5.2. The Ucluelet Volunteer Fire Brigade (UVFB) may respond to an incident outside of the District Service Area..

(d) when in accordance with an agreement with or standard operating procedures established by BCWS or any other provincial emergency agency.

6.1. UVFB is authorized to provide the following services within the District Service Area..

(g) Wildland urban interface fire suppression;

(j) Fire prevention and public education;

(o) Trail rescue (utilizing the Fire Department's UTV or quad when necessary);

(t) Emergency planning;

(u) Supporting Ucluelet's Emergency Preparedness Plan under the direction of the District Emergency Operations Centre.

6.3. The UVFB may provide fire suppression outside of the District Service Area where a wildfire or an interface fire imminently threatens any part of the UVFB's District Service Area.

7.9. The Fire Chief […] may exercise one or more of the following powers within the District Service Area:

(i) Make orders or take measures to ensure that flammable material is: (a) removed from land or premises.

8.1. The Fire Chief may:

(a) order a partial or total ban on open air burning at any time and for any duration;
(b) Suspend, cancel or restrict for such time as deemed necessary or desirable any or all burning permits issued under the District's "Bylaw to Regulate Outdoor Burning".

District of Ucluelet Outdoor Burning Bylaw No. 1288, 2021

This bylaw gives the fire chief the authority to regulate and restrict outdoor burning and prohibits fires greater than the size of a campfire (0.5m x 0.5m). Open burning can only occur if approved by the fire chief.

Section 3: defines under what conditions a campfire is permitted to burn.

Section 4: defines prohibited burning.

Provincial Acts and Regulations

BC Building Act and Building Code

The building act provides consistency in technical building requirements across BC and sets training and qualification requirements for building officials.

BC Open Burning and Smoke Control Regulations

BC Open Burning Smoke Control Regulation (OBSCR) covers open burning of wood debris (vegetative material) to manage smoke and fine particulate matter from contributing to poor air quality[42]. OBSCR has requirements that pertain to burning for community wildfire risk reduction. The OBSCR requires anyone conducting an open burn for wildfire risk reduction to submit the plan to a director, to give notification to the community about the burn plan, that a ventilation forecast is "good" or "fair", and that the burn is completed within a day[43].

BC Wildfire Act and Wildfire Regulations

BC *Wildfire Act* and Regulation sets out legal responsibilities and obligations for everyone in BC that are enforceable during bans and restrictions[44]. This Act and regulations could impact this CWRP recommendations and treatments when a provincial fire ban is in effect.

Federal Acts and Regulations

Canada Federal Fisheries Act

The Federal *Fisheries Act*[45] is in place to provide a framework for the management and control of fisheries in Canada, as well as conservation and protection of fish and fish habitat. Any wildfire prevention and mitigation treatments that could impact fish or fish habitat, including riparian areas will need to adhere to the legal requirements of this Act.

Canada Federal Species at Risk Act (SARA)

SARA[46] is federal legislation to prevent species from extinction and/or extirpation in Canada and provide recovery strategies for extirpated, endangered, and threatened species, as well as prevent species of concern from becoming threatened or endangered. The CWRP treatments and recommendations will need to consider species at risk and follow the requirements and prohibitions set out in SARA.

[42] https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/openburningregulation
[43] https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/152_2019/
[44] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/governance/legislation-regulations
[45] https://laws-lois.justice.gc.ca/eng/acts/f-14/
[46] https://laws-lois.justice.gc.ca/eng/acts/S-15.3/

Legislation and Planning: Current Status and Action Planning

Existing municipal bylaws sufficiently address wildfire response and protection within the District, as well as burning regulations to limit the probability of human-caused fire ignitions. To further enhance wildfire protection and preparedness, The District of Ucluelet could consider incorporating wildfire mitigation and education strategies into the Ucluelet Parks and Recreation Master Plan and the Tourism Master Plan, and FireSmart bylaws or regulations into their building codes or building development plans. The following are recommended action items regarding FireSmart Legislation and Planning:

Action #11: As increased recreation and tourism activities occur within and around the District, Incorporate strategies to educate the public and reduce fire ignitions from recreation and tourism into the District of Ucluelet Parks and Recreation Master Plan and the Tourism Master Plan.

DEVELOPMENT CONSIDERATIONS

Development decisions, such as land use types, structure density, road patterns, and other considerations, shape the built and natural environments. These decisions can bring lasting impacts to the WUI and wildfire risk by affecting public and first responder safety and survivability of homes, critical infrastructure, and other community features. Considering these factors early in the development process can reduce wildfire risk to life, safety, and property.

The District of Ucluelet continues to see a steady increase of both permanent and seasonal residents, as well as tourists. An increase in population and tourism increases the demand for housing, hospitality services and public utility services. With the new development of a variety of residential and commercial units, it will be important to consider wildfire threat.

New builds/development should consider some of the following strategies to reduce the chances of structural losses from wildfire:

- Use of fire-resistant exterior construction materials following FireSmart recommendations and standards.
- Inclusion of minimum setbacks from forested edge and top of slope based on FireSmart principles.
- Use of FireSmart landscaping (low flammability plants, appropriate spacing and low flammability aggregates/ ground cover based on FireSmart principles).
- Prompt removal of combustible construction materials, thinning/ fuel management debris, or clearing debris during the fire season.
- Review and approval process for submitted applications.
- Post-development inspections and sign-offs.
- Outline of responsibilities for staff and applicants.
- Enforcement and regulation (consequences of non-compliance).

Development Considerations: Current Status and Action Planning

No FireSmart recommendations have been incorporated into District development requirements, permits, or policies. It would be beneficial for the District of Ucluelet to develop and implement building codes and permitting requirements that govern all new developments and provides standards that follow current FireSmart principles. The FireSmart hazard rating and recommendations from the completed FireSmart Critical Infrastructure Assessments can be found in

Table 12 below. It is recommended that CI that did not have a FireSmart Assessment completed be completed by a Local FireSmart Representative.

TABLE 12: FIRESMART CRITICAL INFRASTRUCTURE ASSESSMENTS COMPLETED FOR THIS CWRP, INCLUDING SCORES AND RECOMMENDATIONS.

CI	Critical Building	Critical Structure	Non-Combustible Zone	Zone 1 (1.5-10m)	Zone 2 (10-30m)	Total Score	Recommendations
Community Centre	90	N/A	0	30	45	165	Remove coniferous vegetation within Zone 1

Fire Hall	17	N/A	30	30	25	102	Remove combustible materials stored within the first 10m of the building
Water Tower (near Schools)	66	0	30	60	50	206	Remove coniferous trees and surface fuels within first 10m of structure. Outbuilding contains wooden materials.
Senior Center	52	N/A	30	30	50	162	Complete a Fuel Management Demonstration Project in Zone 2 forested area.
Radio Tower (Athlone Rd)	90	30	0	90	45	255	Radio tower contains wooden materials. Remove conifer trees and surface fuels in Zone 1, Zone 2 if possible.
Water Tower (Peninsula Rd)	N/A	36	0	60	25	121	Replace wooden operational box with metal. Clear some conifer trees within Zone 2.
Ambulance building	36	N/A	0	30	45	111	Remove cedar trees against building.
RCMP Building	30	N/A	30	60	25	145	If possible, remove flammable plastic tent from Zone 1.
Municipal Office	160	N/A	30	0	0	190	Wood siding has some gaps, moss on roof. Replace siding with non-combustible material.

The following are recommended action items regarding FireSmart development considerations:

Action #12: Revise zoning and development permits to require fire resistant landscaping or other FireSmart considerations, such as fire-resistant building materials for roofs, decking, etc. or restrictions around outdoor cedar saunas. This would be most important for neighbourhoods with high forest cover.

Action #13: Establish a Development Permit Area (DPA) for Wildfire Protection for new development/buildings within forested neighbourhoods. The Wildfire DPA should incorporate some FireSmart principles in development and landscaping while also aiming to retain the overall forest structure within neighbourhoods so as not to drastically change the unique character of neighbourhoods. The Wildfire DPA should also align with existing Environmental Development Permit Areas.

Action #14: Implement FireSmart recommendations resulting from the completed FireSmart Critical Infrastructure (CI) Assessment to critical buildings/infrastructure to reduce hazard score ratings to Moderate or Low. Critical Infrastructure Assessments were completed for all CI within the District for the development of this CWRP. Vegetation surrounding CI was often identified as one of the highest hazards. The infrastructure with the highest hazard identified is:

I. Water tower near the school,
II. Radio tower.

FIGURE 13: PHOTOS OF THE WATER TOWER NEAR THE SCHOOLS, AND THE RADIO TOWER STRUCTURE AND BUILDING

INTERAGENCY COOPERATION

It takes the collaborative efforts of multiple stakeholders working together to achieve a fire resilient community. These people include the local fire departments, local government staff, elected officials, First Nations representatives, industry representatives and provincial government residents in your area. Individually they are responsible to their own organizations, but all of the stakeholder organizations are dependent upon each other to develop an effective Community Wildfire Resiliency Plan and undertake a successful wildfire response.

Development of a Community FireSmart and Resiliency Committee (CFRC)

The Community FireSmart and Resiliency Committee (CFRC) is a board of community members and agencies that can influence and implement wildfire risk reduction in and around a neighborhood or community[47]. The goal of the CFRC is to coordinate and collaborate between local and provincial agencies to implement FireSmart principles within the community, ultimately increasing the community's resiliency to wildfire. Members of this committee could include local representatives such as local fire departments, First Nations, local government staff or elected officials, along with regional/provincial agencies such as BC Wildfire Service, Emergency Management BC, BC Parks, First Nations Emergency Services Society (FNESS), Forest industry partners and non-government organizations.

The goals of the CFRC are to:

- Develop or maintain a Community Wildfire Resiliency Plan.
- Provide collaboration and coordination on Community Funding and Supports Projects, and Crown Land Wildfire Risk Reduction project initiatives that reduce risk to municipalities, First Nation communities and supporting critical infrastructure.
- Collaborate on a communication and public education strategy with multiple local governments.
- Develop a fuel management plan in collaboration with FLNRORD and other agency staff.
- Streamline FireSmart Home Assessment and FireSmart grant programs by sharing capacity between multiple local authorities.
- Develop a network of Local FireSmart Representatives in the area and coordinate their activities within the region.
- Create an advocacy program for participation in the FireSmart Canada Neighbourhood Recognition Program and work towards increasing the number of recognized neighbourhoods in the region each year.
- Coordinate applications to the Community Resiliency Investment program and other funding opportunities.
- Identify FireSmart activities that should be undertaken to best build wildfire resiliency in higher risk areas; connect and share information to the public via social media.
- Identifying funding sources to access and support priority projects from Provincial, Federal and Regional Programs, ensuring the coordination of project initiatives that span multiple jurisdictions and scales over space and time.
- Develop/update, implement, and monitor the success of a completed Community Wildfire Resiliency Plan.

[47] https://firesmartbc.ca/wp-content/uploads/2020/06/Community-FireSmart-and-Resiliency-Commitee-Guidance-1.pdf

Interagency Cooperation: Current Status and Action Planning

The District of Ucluelet is currently not a part of a CFRC and would benefit from increased interagency cooperation to increase FireSmart awareness and community support and implement FireSmart and wildfire risk reduction activities over a broader area outside the District. The formation of a CFRC will be required to receive funding by 2024. The following are recommended action items moving forward in regard to FireSmart Interagency Cooperation:

Action #15: Establish a Community FireSmart and Resiliency Committee (required by 2024 for success to CRI funding) for the region with the following potential parties:

I. The District of Ucluelet's FireSmart Coordinator and Fire Chief,
II. The Ucluelet First Nation,
III. Ucluelet Emergency Network and Emergency Support Services,
IV. Emergency management staff from the Alberni-Clayoquot Regional District,
V. District of Tofino Protective Services Department staff,
VI. Pacific Rim National Park Reserve representative,
VII. BC Wildfire Service representative from the Mid-Island Zone,
VIII. Ministry of Forests Wildfire Risk Reduction staff,
IX. Local timber licensees operating in the area.

Action #16: Work in collaboration with the Alberni-Clayoquot Regional District on improvements to hydrant access and suppression capacity within the regional district neighbourhoods that Ucluelet responds to, including Willowbrae, Millstream, and Port Albion.

Action #17: Communicate semi-regularly with the South Island Natural Resource District's Wildfire Risk Reduction representative regarding their annual/long-term plans to conduct wildfire risk reduction activities in areas outside of the District.

CROSS-TRAINING

Wildland-Urban Interface resiliency planning and incident response draw on many different professions who do not typically work in a wildfire environment. Cross-training of fire fighters, public works staff, utility workers, local government and First Nations administration, planning and logistics staff, and other key positions will help support the development of comprehensive and effective wildfire risk reduction planning and activities, as well as a safe and effective response.

Cross-training ensures that fire fighters within the community are trained in both structural and basic wildfire suppression[48]. For communities within the WUI it is important that professionals are well trained to ensure proper response to fire. Some training programs available are:

- Basics wildland fire training
- Structure protection training
- Incident Command System training
- Local FireSmart Representative training
- FireSmart Home Partners Mitigation Specialist training
- FireSmart Neighbourhood Champion workshop

Cross-Training: Current Status and Action Planning

The District of Ucluelet currently has good structural firefighting capacity, with approximately 19 firefighters. In the spring of 2022, the fire department received basic wildland fire suppression training. This cross-training is important given the closest BCWS base is located Port Alberni or Errington, and the Ucluelet fire department is responsible for providing wildfire suppression until BCWS arrives. Investing in regular wildfire suppression training for fire fighters and ensuring that they possess the necessary basic skills to respond to a wildfire would be beneficial. The following are recommended action items relating to FireSmart Cross-training:

Action #18: Contact the BCWS Mid-Island Fire Zone in and discuss the possibility of annual cross-training opportunities for local firefighters.

Action #19: Provide cross training opportunities for firefighters such as the S100 or S185 course. The S100 course requires an annual refresher.

Action #20: Continue to build the District's volunteer fire department and encourage firefighters to participate in cross-training and annual refresher exercises, including:

I. Hydrant flushing/testing,
II. Refresher training of pumps and hose.

Action #21: Collaborate with the Ucluelet First Nation who may be interested in wildland firefighting/cross-training and exercises. This will assist them in building their volunteer fire department, which could help increase the safety of the Nation and take pressure off the Ucluelet Fire Department to respond.

[48] *Cross-training | FireSmart BC*

EMERGENCY PLANNING

Community preparations for a wildfire emergency requires a multi-pronged approach. Individuals and agencies need to be ready to react by developing plans, mutual-aid agreements, resource inventories, training and emergency communication systems. All of these make it possible for a community to respond effectively to the threat of wildfires as a whole.

An Emergency Management Plan is beneficial in coordinating response efforts and increasing efficiency and effectiveness of communications and evacuations in the event of an emergency. An emergency management plan should focus on emergency preparedness, response activities, and recovery.

Emergency Planning: Current Status and Action Planning

The District of Ucluelet faces inherent difficulty and complexity in the event of an emergency evacuation with only one road in and out of the community. Road access is via Peninsula Road/Tofino Ucluelet Highway to Highway 4. Highway 4 is a difficult road to travel under normal conditions as it is narrow and winding with swift weather changes. Due to these constraints, the District has developed an Emergency Plan that focuses on alternate responses to emergency situations that does not rely on Highway # 4 or Peninsula Road to evacuate the community elsewhere. The District also has an emergency notification system in place with two tsunami warning system speakers. The following are recommended action items to further enhance Emergency Planning:

Action #22: Encourage community members to subscribe to the emergency notification system currently in use in Ucluelet. Emergency notices can be delivered via email, text, or voice messages.

Action #23: Make the Evacuation/Emergency Response Plan available to the community via the internet or at the District's public offices. The District of Ucluelet Emergency Response Plan is currently being updated and therefore not available online for viewing.

Action #24: Purchase or acquire ancillary suppression equipment including portable tanks, hoses, and portable pumps.

Action #25: Assess community backup electrical power and water delivery ability as required for emergency response and suppression activities. Currently, the municipal buildings that have emergency backup power are the fire hall, and the high school which has a large generator available during emergencies. A number of private homeowners have generators but the exact number is unknown.

VEGETATION MANAGEMENT

The general goal of vegetation management is to reduce the potential wildfire intensity and ember exposure to people, infrastructure, structures, and other values through manipulation of both the natural and cultivated vegetation that is within or adjacent to a community. A well-planned vegetation management strategy that is coordinated with development, planning, legislation, and emergency response wildfire risk reduction objectives can greatly increase fire suppression effectiveness and reduce damage and losses to structure and infrastructure.

Fuel management, also referred to as vegetation management or fuel treatment, is an important element of wildfire risk reduction within the WUI. The objective of fuel management treatments are to alter aspects of wildfire behaviour, such as decreasing potential intensity, to limit damage to infrastructure and allow for safer and more effective suppression strategies. Vegetation management within and around the community can be accomplished through two different activities:

1. Residential scale FireSmart landscaping: The removal, reduction, or conversion of flammable plants (such as landscaping for residential properties, parks and open spaces) in order to create more fire-resistant areas in FireSmart Noncombustible Zone and Priority Zones 1, 2 and 3.
2. Fuel management treatments: The manipulation or reduction of living or dead forest and grassland fuels to reduce the rate of spread and head fire intensity and enhance the likelihood of successful suppression, generally outside of the FireSmart Noncombustible Zone and Priority Zones 1, 2 and 3 on crown land.

Vegetation Management: Current Status and Action Planning

Due to the high proportion of private land within the District boundary and the cool and moist forest environment along the coast, there have been no landscaping or vegetation management treatments completed for the purposes of fuel reduction and wildfire mitigation. FireSmart home assessments are voluntary to private land/homeowners, however no homes have yet had a FireSmart Home Assessment completed.

Proposed Fuel Treatments

The potential vegetation management treatment areas were chosen primarily based on limited municipal forested land and proximity to critical infrastructure (Figure 14). The areas identified for potential treatment are detailed in Table 13 and have been prioritized based on wildfire hazard (Wildfire Threat Assessment ratings). Due to their small size (<5.0 ha), the proposed areas fall under the 'fuel management demonstration project' funding. The following are recommended action items regarding FireSmart Vegetation Management and fuel treatments:

Action #26: Apply for funding to complete fuel management demonstration projects to reduce forest fuels on municipal land and demonstrate what a more fire resilient stand looks like to the public. These fuel management areas cannot exceed 5.0 ha. Three areas have been identified as candidates for these projects:

I. The forested area behind the schools,
II. The forested area around the senior's center, and
III. The forested area behind the community centre.

Action #27: Encourage homeowners to remove all vegetation from the Non-Combustible Zone and landscape using fire-resistant plants. Cedar trees within the first 10m (Zone 1) of the home should be encouraged for removal.

FIGURE 14: PROPOSED FUEL MANAGEMENT TREATMENT AREAS LOCATED ON MUNICIPAL LAND.

TABLE 13: PROPOSED FUEL TREATMENT SUMMARY TABLE

Fuel Treatment ID	Total Area (ha)	Treatment Unit Type / Objective	Local Fuel Threat (Hectares)			Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme / High	Mod	Low		
TU-1 School	3.5	Interface	3.5	0.0	0.0	Surrounds the municipal water tower. Adjacent to Ucluelet Elementary, Ucluelet Secondary School.	The proposed treatment unit is a small, forested area bound by the Ucluelet Elementary and Ucluelet Secondary School to the northeast, and private residences to the south and west. A municipal water tower is located within the treatment unit. The area consists of an immature C-3 fuel type characterized by a relatively high density of Cw in both the overstory and understory. Surface fuels are also relatively high. There are numerous unofficial trails running through the unit. Both the wildfire threat and wildfire risk to infrastructure were rated as **High (WTA-9)**. A thin from below to reduce continuity of ladder fuels and surface fuel reduction would reduce rate of spread of a potential surface fire and reduce probability of a crown fire.
TU 2 – Seniors Centre	0.9	Interface	0.0	0.3	0.6	Adjacent to the Seaview Seniors Housing Society.	The proposed treatment unit is a small, forested area adjacent to the Seniors Centre and private residences on Peninsula Rd and St Jacques Blvd. The area consists of a C-5 fuel type

Fuel Treatment ID	Total Area (ha)	Treatment Unit Type / Objective	Local Fuel Threat (Hectares)			Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme / High	Mod	Low		
							characterized by a multi-layered stand and high deciduous shrub component. There is small stream running through the middle of the treatment area that transitions into a non-classified drainage with wet soils. A portion of the TU behind private residences to the northeast consists of a higher density Cw stand with high fuel loading. The wildfire threat rating of the area is **Low** with a **Moderate** wildfire risk **(WTA-10)** due to proximity to the Seniors Centre and homes. Surface fuel removal and removal of suppressed understory trees would help to further reduce the overall risk to structures to Low.
TU 3 – Community Centre	1.7	Interface	0.0	1.7	0.0	Adjacent to the Ucluelet Community Center, overlaps gravel walking path.	The proposed treatment unit is a small, forested area adjacent to the Community Centre and private residences on Rainforest Drive and Bay St. The TU contains a gravel walking path that bisects the unit, and a non-classified drainage. The area consists of a C-5 fuel type with a high deciduous shrub component and intermediate Cw and Hw

Fuel Treatment ID	Total Area (ha)	Treatment Unit Type / Objective	Local Fuel Threat (Hectares)			Overlapping Values / Treatment Constraints	Treatment Rationale
			Extreme / High	Mod	Low		
							trees acting as ladder fuels. The terrain slopes up approximately 20% from the community centre to Rainforest Dr. The existing wildfire threat rating is **Moderate** with a wildfire risk rating of **High (WTA-8)** due to slope and proximity to infrastructure and homes. A thin from below to and surface fuel reduction would reduce probability of ignitions from the walking path and reduce the probability of a crown fire.

APPENDICES

Appendix A: Determining Wildfire Threat and Risk at a Local Level Based on Updated Fuel Types

The Determining Wildfire Threat and Risk at a Local Level guidance document from BCWS[49] was used to assist in determining the revised local PSTA threat score for each polygon where a Wildfire Threat Assessment (WTA) worksheet was completed in the field (Table 14). Professional judgement was also an important factor, given that the guidance does not specify the specific weighting of each wildfire component to calculate the original PSTA threat score. A majority of the revised PSTA scores remained within the 'Moderate' threat classification represented by the original assigned threat score. Two of the revised PSTA scores saw an increase in threat rating from 'Moderate' to 'High'.

TABLE 14: REVISED LOCAL PSTA SCORES BASED ON STAND ATTRIBUTE DATA FROM WILDFIRE THREAT ASSESSMENT WORKSHEETS COMPLETED IN THE FIELD.

WTA ID	*Updated Fuel Type*	*Original Threat Score*	*New Fuel Assessment Score (60%)*	*Wildfire Density Score (30%)*	*Spoting Impact Score (10%)*	*Revised PSTA Score*
1	C-5 (no change)	4	5	1	2	3.5
2	C-5 (no change)	4	5	1	2	3.5
3	C-5 (no change)	-2	2	1	0	1.5
4	C-5 (no change)	-3	5	1	0	3.3
5	C-5 (no change)	-3	2	1	0	1.5
6	C-5 (no change)	4	8	1	2	5.3
7	C-3 to C-5	-3	5	1	0	3.3
8	C-5 (no change)	4	5	1	2	3.5
9	C-5 to C-3	4	8	1	1	5.2
10	C-5 (no change)	4	2	1	2	1.7

Once the revised local PSTA threat score was determined, it was used to assess the total wildfire risk for each WTA polygon (Table 15). The weighting for each contributing attribute is shown in the table. Weighted scores for each attribute were based on the weighting values within the 2021 WTA worksheet. Relative Risk Classification was determined based on the total weighted score ranges outlined in Table 16, which is provided in the Determining Wildfire Threat and Risk at a Local Level guidance document. The total wildfire risk score for a majority of assessed polygons remained within the 'Moderate' risk classification. However, two assessed polygons increased from a 'moderate' risk classification to a 'High' risk classification.

[49] *https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/fuels-management/2020_determining_wildfire_threat_and_risk_at_a_local_level.pdf*

TABLE 15: LOCAL WILDFIRE RISK SCORE AND CLASSIFICATION FOR EACH WTA POLYGON BASED ON FIELD VERIFIED FUEL TYPES

WTA ID	Local Threat Score (30%)	Proximity (30%)	Fire Spread Patterns (30%)	Slope Position (5%)	Slope % (5%)	Total Wildfire Risk Score	Relative Risk Classification
1	3.5	8	7	1	1	5.7	Moderate
2	3.5	8	7	1	1	5.7	Moderate
3	1.5	10	7	2	1	5.7	Moderate
4	3.3	8	10	1	1	6.5	Moderate
5	1.5	10	10	1	1	6.6	Moderate
6	5.3	2	10	1	1	5.3	Moderate
7	3.3	8	7	2	1	5.6	Moderate
8	3.5	10	10	2	2	7.3	High
9	5.2	10	10	2	2	7.8	High
10	1.7	10	10	1	1	6.6	Moderate

TABLE 16: RELATIVE WILDFIRE RISK CLASSIFICATION BASED ON A WEIGHTED TOTAL WILDFIRE RISK SCORE

Relative Risk	Weighting
Low	0-3.9
Moderate	4-6.9
High	7-8.9
Extreme	9+

Appendix B: Climate Modeling Using Climate BC

Climate BC is a MS Windows application and program that uses the PRISM, Parameter-elevation Relationships on Independent Slopes Model, to project climate variables in British Columbia at an Annual, Seasonal or Monthly increment. The program generates scale-free climate data for specific locations or areas. The following methodology was used when creating spatial climate layers in Climate BC as well subsequent scaling that occurred post processing of variables.

Inputs and Parameters:

A DEM layer that is representative of the study area is loaded into the program to instigate area processing. With the DEM layer in the program a decision in what General circulation models (GCMs) were to be used and at which Shared Socioeconomic Pathway (SSP) they would be evaluated at.

The following table represents the different SSPs that could be chosen from for a projects analysis:

Shared Socioeconomic Pathways in the IPCC Sixth Assessment Report[2]

SSP	**Scenario**	**Estimated warming**	**Estimated warming**	**Very likely range in °C**
		(2041–2060)	**(2081–2100)**	**(2081–2100)**
SSP1-1.9	very low GHG emissions: CO_2 emissions cut to net zero around 2050	1.6 °C	1.4 °C	1.0 – 1.8
SSP1-2.6	low GHG emissions: CO_2 emissions cut to net zero around 2075	1.7 °C	1.8 °C	1.3 – 2.4
SSP2-4.5	intermediate GHG emissions: CO_2 emissions around current levels until 2050, then falling but not reaching net zero by 2100	2.0 °C	2.7 °C	2.1 – 3.5
SSP3-7.0	high GHG emissions:	2.1 °C	3.6 °C	2.8 – 4.6

	CO_2 emissions double by 2100			
SSP5-8.5	very high GHG emissions:	2.4 °C	4.4 °C	3.3 – 5.7
	CO_2 emissions triple by 2075			

A SSP of 2-4.5 (245) is chosen for the evaluation in this report as it represents an intermediate GHG emission and is considered to be the most likely temperature projection.

An ensemble of GCMs is evaluated together to get a representative output for a study area. This is done to find the most accurate projections for both current Climate standings and future normal period predictions. An ensemble of 13 GCMs is evaluated against one another to get representative outputs for a multitude of climate variables available through the program. An ensemble of 8 GCMs can be used as well as both options are available within the program. The Amount of GCMs used for an evaluation depends on the intricacy of the analysis and the detail required for the anticipated outputs. The climate variables selected for evaluation in this project were as follows:

- Winter Average Precipitation (mm)
- Summer Average Precipitation (mm)
- Winter Average Temperature (C)
- Summer Average Temperature (C)

Each climate variable was represented spatially for the study area and values were compared to the Current normal Period derived values. To keep consistency, the program was also used with the same parameters to produce the current normal period derived values so a comparison evaluation could be done.

Normal periods were chosen to show the change over time until the end year of 2100. The following are the normal period ranges:

- Current: 1991 – 2020
- 2040: 2011 – 2040
- 2070: 2041 – 2070
- 2100: 2071 – 2100

Rescaling Temperature:

Temperature outputs given by ClimateBC needed to be rescaled to match the metric scale, this process was done using processing tools in ArcPRO. To rescale the georeferenced tiff. The output layer from ClimateBC needs to be loaded into ArcPRO and run through the Raster Calculator tool. The following equation was run to rescale the raster:

'Raster layer' / 10 = Rescaled Temperature Raster

Difference Comparison:

With all the outputs processed, rescaled and downloaded a comparative analysis is done to determine the relative change in precipitation and temperature when future normal periods are evaluated against the current periods modeled outputs. The difference comparison takes the change in precipitation and temperature in each future normal period and converts the value into a proportion for that variable range. If an area experiences more precipitation in future periods the percent change value recorded will be a positive value. Similarly, if the temperature increases in a future normal period, the percent change value will be positive indicating the percent of change the variable experienced compared to the baseline.

Findings are presented in a Table format with conditional formatting of percent change to indicate the severity.

Disclaimer:

Climate modeling is a complex and intricate process that requires a high degree of manipulation and input to get the desired analysis. The parameters chosen for this analysis were carefully considered and evaluated so as to produce the most accurate results for the project and its associated area. It is understood that many different variables could be changed or manipulated in order to produce different outputs for the same analysis.