



Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone: A practitioner's report

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Prepared by Transition Salt Spring with support from Raincoast Conservation Foundation for the consideration of ecosystem managers, local governance authorities, private landholders, and others with an interest in minimizing fire risk through the promotion of ecological integrity in the forests of the Coastal Douglas-fir biogeoclimatic zone.

Acknowledgements

The progress made by the Maxwell Creek Watershed Project team (now referred to as the Climate Adaptation Research Lab) has been made possible by the dedicated community of practice that has assembled around this work. The project team is incredibly grateful for the shared expertise, resources, and time that have been so generously given by this community. Together, we seek to restore biodiversity to, and enhance climate resilience of, these landscapes we all love so much.

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A note about using this document

This report is a synthesis of the expertise shared by the community of practice, who under the leadership of Transition Salt Spring, have assembled around the issue of fire risk in the Coastal Douglas-fir (CDF) biogeoclimatic zone. It centres on the perspectives shared during a virtual workshop that took place in February 2023, and an in-person debrief that occurred a few days later on Salt Spring Island. It is intended to be an informative resource for a variety of practitioners, land holders, and decision makers living and working within the CDF zone.

The report was circulated to all workshop presenters before being publicly shared. It is expected that there will be future iterations as work to study, refine, and strengthen ecologically-focused fire mitigation strategies in the CDF zone continues.

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Executive summary

On February 27, 2023, Transition Salt Spring (TSS) hosted a virtual practitioners workshop, *Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone* as an extension of efforts undertaken by the Climate Adaptation Research Lab (CARL) at TSS and collaborators since 2021. This community of practice works together to explore intersections between ecological enhancement and fire risk reduction in the Coastal Douglas-fir (CDF) biogeoclimatic zone and surrounding areas. Ongoing discussions and preliminary results from on-the-ground work in pilot sites on Salt Spring Island, have highlighted gaps and challenges to addressing fire risk while maintaining ecological functionality and resilience in the highly settled CDF zone.

One of these gaps is a lack of guiding resources for private landholders and managers outlining how to manage fire risk that are specific to the CDF zone where vulnerability to wildland urban interface (WUI) fires is high due to little separation between human settlements/infrastructure and forests. This is exacerbated by the CDF zone having some of the highest rates of human settlement in the province.¹ Regional WUI areas experience some of the highest rates of wildfire exposure in British Columbia.²

Fire risk in this region is not only a function of WUI but is also associated with the ubiquity of degraded, second and third growth forests across the CDF zone. An example of such forests is provided in Photo 1 below. Climate change and extreme weather increase the need for prompt action to address existing hazards and reduce future vulnerability.

A clear message from the community of practice assembled around this work is that some degree of active management is necessary for ecological recovery, climate adaptation, and wildfire risk mitigation. This report outlines some modes of intervention being piloted in the CDF zone; highlights tools, resources, and supports available through the Province of British Columbia and other authorities; and identifies information gaps unique to the CDF zone and neighbouring regions.

¹ B.C. Ministry of Forests, Mines and Lands. (2010). The State of British Columbia's Forests, 3rd ed. Forest Practices and Investment Branch, Victoria, B.C. www.for.gov.bc.ca/hfp/sof/index.htm#2010_report

² Robert Gray, personal communication, January 2023.



Photo 1: Even-aged, monoculture tree plantation.

Background

The [Maxwell Creek Watershed Project](#) (the Project) was launched in November 2021. It is a collaborative, multidisciplinary forest restoration initiative based on Salt Spring Island, British Columbia (BC) under the leadership of [Transition Salt Spring](#) (TSS) with the support of multiple organisations including [Brinkman Earth Systems](#), [Coastal Douglas-fir Conservation Partnership](#), [North Salt Spring Waterworks District](#), [Raincoast Conservation Foundation](#), [Salt Spring Water Preservation Society](#), the University of British Columbia, and a number of private forest managers and other experts. The Project aims to create a template for restoring ecological integrity and climate resilience to Coastal Douglas-fir (CDF) forests and associated ecological communities across the Gulf Islands, while also building a community of practice around established methodologies. Discussions within this community since 2021 have reinforced the reality that there are gaps and challenges to addressing fire risk while maintaining ecological functionality and resilience in the highly settled CDF biogeoclimatic zone.

The Climate Adaptation Research Lab (CARL) was established to oversee the Project in late 2022 and address these gaps and challenges while also responding to community interest in increasing climate resilience.³ The CARL focuses on answering the questions:

- What activities are available to landholders to prevent catastrophic fire?
- What techniques can help mitigate fire risk while enhancing ecological functions (flood regulation, water provision, carbon sequestration) and protecting other forest values such as biodiversity, cultural value, and sustainable timber supply?

³ Transition Salt Spring. (2020). Salt Spring Island Climate Action Plan 2020. *Ethelo*. <https://ethelo.com/case-studies-directory/case-study-salt-spring-island-climate-action-plan-2020/>

Answers to these questions are being pursued through development and implementation of treatments designed to reduce fire risk, protect freshwater supply, and enhance local ecological integrity and climate resilience. Monitoring and documentation of potential benefits are designed following scientific methods and analysis. One early finding of the outreach and engagement component of the CARL is the lack of local tools, resources, and data available for privately held lands to understand and manage fire risk. Given that many conservancies, land trusts, researchers, forest and water managers, and local governments are working to address the same questions - for a range of different values - the time was ideal to host a workshop for practitioners and government representatives.

Workshop summary

The workshop explored the ways humans engage with, and live within ecosystems throughout the CDF. It was facilitated by Carrie Oloriz and hosted by Ruth Waldick, with Dimirti Vaisius providing contextual support throughout. Adam Olsen, MLA for Saanich North-Gulf Islands and a member of the Tsartlip Nation, opened the workshop urging attendees to recognize plants, animals, and islands of the region as relatives and accept the responsibility of being good stewards of Coast Salish Territory.

Photo 2: Establishing characteristics typical of older growth forests is one of the goals of this work.



Next, Quw'utsun (Cowichan) Elder, Robert George, shared a song and prayer, then spoke about the importance of working together rather than separately to protect local ecosystems. Like MLA Olsen, Elder George encouraged people to live in harmony with one another and the environment.

A group of experts and practitioners who work in forest management on the southern coast of BC contributed to the rest of the workshop, which was divided into three sessions. Each presenter shared their experience and described approaches to prevent catastrophic wildfire through ecologically-informed forest management. A complete list of presenters and their affiliations/expertise are provided in Table 1.

Table 1. Workshop presenters

Contributor	Role(s)/Expertise
Tony Botica, MSc, RPF	<ul style="list-style-type: none"> • Wildfire Prevention Officer (Coastal), BC Wildfire Service
Conor Corbett, RPF, MSFM	<ul style="list-style-type: none"> • Wildfire & Forestry Division Manager, Diamondhead Consulting
Robert George	<ul style="list-style-type: none"> • Quw'utsun Elder
Bowie Keefer	<ul style="list-style-type: none"> • President, Galiano Ecoforestry Association
Adam Olsen	<ul style="list-style-type: none"> • MLA, Saanich North-Gulf Islands
Mark Lombard	<ul style="list-style-type: none"> • Operations Manager, Cortes Community Forest Network
Adam Olsen	<ul style="list-style-type: none"> • MLA, Saanich North-Gulf Islands
Marlow Pellatt, PhD	<ul style="list-style-type: none"> • Ecosystem Scientist, Parks Canada
Jonathan Reimer, MSc	<ul style="list-style-type: none"> • Fire & Emergency Programs Manager, Capital Regional District
Robert Seaton	<ul style="list-style-type: none"> • Fire Advisor, TSS Climate Adaptation Research Lab • Expert Forest Analyst, Brinkman Earth Systems
Mitchell Sherrin	<ul style="list-style-type: none"> • Assistant Chief, Salt Spring Island Fire Rescue
Margaret Symon, RPF	<ul style="list-style-type: none"> • Owner/Manager, Strathcona Forestry Consulting
Dimitri Vaisius	<ul style="list-style-type: none"> • Wildfire Officer (South Island Zone), BC Wildfire Service
Ruth Waldick, PhD	<ul style="list-style-type: none"> • Lead, TSS Climate Adaptation Research Lab
Jay Zakaluzny, BA	<ul style="list-style-type: none"> • Fire Management Officer, Parks Canada

Session 1 - Practical realities: CDF forests and managing fire risk in the CDF region

Mark Lombard opened *Session one* by sharing experience from the Cortes Community Forest Cooperative (CCFC), which is held by Cortes Forestry General Partnership with Klahoose First Nation. The forest under the CCFC's care amounts to over one third of Cortes Island's land area presenting a significant responsibility to pursue wildfire mitigation projects. The CCFC has done significant planning, producing a [Community Wildfire Protection Plan](#) and complementary Five Year Plans to fulfil this obligation. Activities undertaken to date to reduce fire risk include thinning dense forest stands, creating fire breaks, and building increased access to high risk areas. Lombard also remarked on the socioeconomic challenges associated with working on a small tenure on a remote island where community buy-in is a key component of operational success.

Robert Seaton then discussed his work with the CARL, which aims to transition forest stands toward the ecological and structural diversity inherent to mature CDF forests prior to industrial logging (conditions that fostered fire resistance). Multi-pass thinning and pruning, native species reintroductions, and the installation of deer exclosures were all recommended approaches within the broad toolkit that will be needed to achieve this diversity.

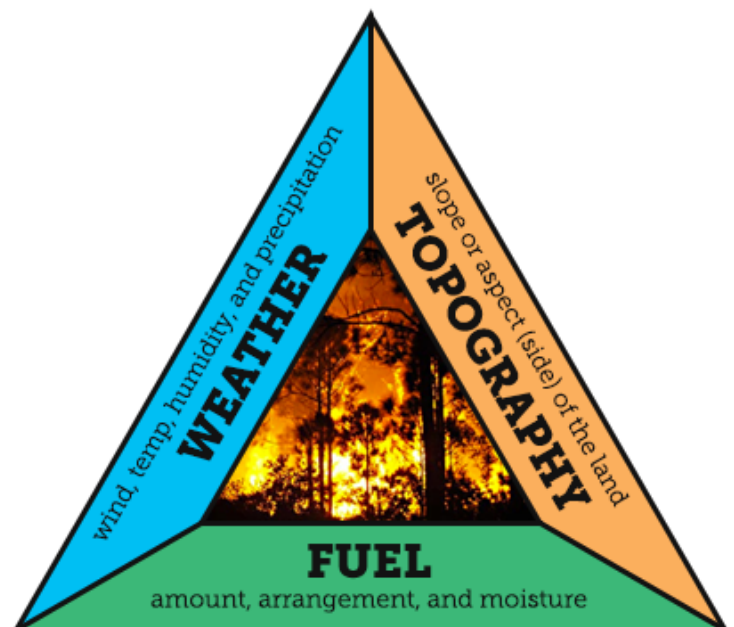
Next, Bowie Keefer of Galiano Island described forest management aimed at rehabilitating abandoned industrial plantations now zoned as Privately Managed Forest Land (PMFL). Keefer and some other PMFL holders on Galiano are employing "light-touch" approaches similar to those recommended by Seaton to achieve recreational, economic, fuel reduction, and forest restoration goals.

Photo 3: Fire behaviour triangle

Finally, Jay Zakaluzny, discussed wildfire risk in areas with high human populations and outlined initiatives Parks Canada has undertaken to reduce fire risk which include a combination of thinning, prescribed burning, and [FireSmart protocols](#).

The discussion portion of *Session 1* revealed some synergies between different scales and sectors. Though expressed in different ways, all practitioners emphasised the importance of:

- collaboration and community engagement,
- employing long-term perspectives in forest management, and
- achieving better balance between competing priorities and values (e.g. conserving biodiversity vs. economic viability).



Fire Behavior Triangle

Session 2 - Panel discussion: Reflections from local experts

The *Session two* panel discussion was moderated by Ruth Waldick and contributed to by Dimitri Vaisius, Tony Botica, Robert Seaton, and Conor Corbett. Though FireSmart Ambassador, Rob Syverson appears on the agenda for this session, he was unable to attend and Mitchell Sherrin filled this gap. The panel opened with a reflection from Waldick about *Session one*: that presenters seemed to be in consensus about the need for active management, but advancing that management at a broad scale is impeded by uncertainties and limitations such as identification of priority sites, funding availability, and determination of appropriate treatments for disparate sites. Each panellist was then asked to describe their work and speak to the issues raised by *Session one* presenters.

Dimitri Vaisius described the structure of the BC Wildfire Service (BCWS) and highlighted the locations of the six regional Fire Centres in the province, which are further divided into [local fire zones](#). Vaisius' presentation focused on the Southern Gulf Islands (SGIs), which are within the South Island Fire Zone, to explain the jurisdictional responsibilities of BCWS. Using the *Fire Behaviour Triangle*⁴ (Photo 3), Vaisius described how fire behaviour is understood, predicted, and planned for. According to Vaisius, the CDF zone is looked at as a “unique area” from a fuel-typing perspective and fires act differently in the CDF compared to other biogeoclimatic zones. Vaisius also reassured attendees that the South Islands Fire Zone experiences few high risk wildfire days per year.

Then Tony Botica briefly took the stage and introduced the [Community Resiliency Investment Program](#), which provides financial support to Indigenous and non-Indigenous communities to pursue wildfire risk reduction efforts. Botica also echoed *Session one* presenters by reiterating the need for collaborative efforts between individuals, organizations, and communities to achieve efficacy in this work.

Next, Seaton returned to the screen, this time in his role as a Forest Analyst with Brinkman Earth Systems, and opened by clarifying the meaning of wildfire risk. Though there may be few days per year during which the likelihood of catastrophic fire in the SGIs is high, as asserted by Vaisius, this assessment fails to consider the magnitude of impact, which according to Seaton “would be horrendous”. Seaton goes on to explain that the “fire issue” is a result of industrial management regimes and its resolution will only be achieved using “ecosystem-[focused]” approaches. Particularly in the “terminally disturbed” CDF zone, ecologies at all scales, from backyards to bailiwicks, must be managed with long-term (i.e., 100+ years) resiliency in mind.

⁴ WeatherStem. (2017). Fire behaviour triangle. *WeatherSTEM Lesson*. <https://learn.weatherstem.com/modules/learn/lessons/121/12.html>

“We need to be thinking at a combination of scales. Not only at all scales for the forest stand in terms of heterogeneity, but also at all scales in terms of the work we do: a heterogenous approach to our management of the land”

- Robert Seaton⁵

Next, Mitchell Sherrin opened by describing the natural fire resistance of CDF forests, but remarked that forest conditions have shifted due to climate change, invasions of volatile plant species, and fire suppression activities. Though many forest ecosystems coevolved alongside fire and have historically benefited from its occurrence, current forest conditions in the CDF zone combined with “high [amounts] of human values” mean that allowing fires to burn in this region is not a viable option. As a firefighter working in the CDF with an active interest in protecting human values, Sherrin upheld FireSmart protocols as an avenue toward enhancing community resilience, emphasizing the importance of customizing these protocols to fulfil site-specific needs.

Finally, Conor Corbett revisited the Fire Triangle (see Photo 3), emphasizing that fire history is an important factor to consider when determining the likelihood and severity of wildfire. Corbett also explained that in most regions of BC, communities gradually transition from a developed core (i.e., low wildfire risk) to more rural areas (i.e., higher wildfire risk). These rural areas have a high wildland urban interface (WUI). In the CDF however, this transition is less pronounced as communities are essentially “embedded in the forest”. Though historically, there has been a low frequency of wildfire in the CDF, this high degree of interface between wildland and human values (i.e., built infrastructure) presents a high risk to these communities. Like presenters before, Corbett asserted that wildfire risk in the CDF must be approached at multiple scales with provincial and local governments taking the lead on landscape wildfire management and private landholders taking responsibility for their properties. For the latter Corbett recommended [FireSmart Assessments](#) for residential homes and [Wildfire Threat Assessments](#) for forested parcels.

Wildland urban interface (WUI, pronounced “yooey”): the transition zone between unoccupied land and human development. In these areas, “structures, usually private homes, and other human developments meet or are intermingled with wildland (vegetative) fuels or can be impacted by the heat transfer mechanisms of a wildfire, including ember transport.”

- Adapted from [Natural Research Council of Canada](#)⁶

⁵ Seaton, Robert. (2023, February 27). *Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone*. [YouTube Video]. Transition Salt Spring. <https://youtu.be/BoewPcKSHs0>

⁶ Bénichou N., Adalzadeh M., Singh J., Gomaa I., Elsagan N., Kinatader M., Ma C., Gaur A., Bwalya A., & Sultan M. (2021). *National Guide for Wildland-Urban Interface Fires*. National Research Council Canada: Ottawa, ON. 192 pp. DOI: 10.4224/40002647

Compared to *Session 1*, *Session 2* focused more fully on the risks wildfire poses to privately held land. Engaging in risk management for the communities of the CDF zone, which mostly exist at the WUI, if not completely embedded in the forest, is made more complex by the high proportion of land that is held privately throughout the CDF. Though the panellists demonstrated that resources are being developed and asserted that multi-scale collaborations are the closest solution to a “silver bullet”⁷, it remains unclear how private landholders, in their many forms, including individuals, conservancies, and land managers, among others, will be meaningfully involved. Few of these private entities have the mandates, funding, or in-house knowledge to proceed in wildfire preparedness, but as the majority of land in the CDF is under their care they may be the most essential players in managing fire risk and restoring ecological integrity to the landscape.

Session 3 - Roles, responsibilities, and opportunities for large land owners/managers

The last official session of the workshop focused on actionable solutions to the fire problem. Most of the learnings from this session have been incorporated into later sections of this report, so will be only briefly summarized here.

Session 3 opened with a presentation by Margaret Symon who shared experiences implementing FireSmart protocols in a residential context. Next, in an effort to reintegrate the protection of ecological values in a conversation skewing more heavily toward protection of human assets, Marlow Pellat was invited to discuss ecologically-informed wildfire management at the watershed-scale. Mitchell Sherrin then briefly rejoined the conversation naming an expansion of on-the-ground effort and establishment of education initiatives as essential components of the overall response to wildfire risk in the CDF. The session closed with Jonathan Reimer, who introduced new community resources for the Capital Regional District including an intermittently applied [fire bylaw](#), [evacuation guides](#), and Community Wildfire Resiliency Plans for Salt Spring and the SGIs (see Appendix II). The resiliency plans were described by Reimer “as everything discussed in the workshop and more”, and though they will likely be essential resources for wildfire preparedness for some, they may not be accessible to others due to their technical focus.

The workshop ended with informal final remarks from forest ecologist, Erik Piikkila, forest manager, David Haley, and current Salt Spring Island Local Trustee, Laura Patrick. These contributions are integrated in later sections of the report.

⁷Corbett, Conor. (2023, February 27). Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone. [YouTube Video]. Transition Salt Spring. <https://youtu.be/BoewPcKSHsO>



Photo 4: Common structure and condition of forests found throughout the CDF.

State of knowledge

By synthesizing information shared by the CARL community of practice over the past two years, culminating in the one-day workshop and post event debrief discussions, the following sections of this report (including the Appendices) aim to:

1. enhance understanding of past and current conditions of CDF forests (see Photo 4 for context),
2. identify the primary drivers of change within CDF forests over time,
3. explore how changing conditions have influenced fire risk, and ultimately
4. mobilize teachings to mitigate fire risk through the enhancement of ecological integrity.

Historical context

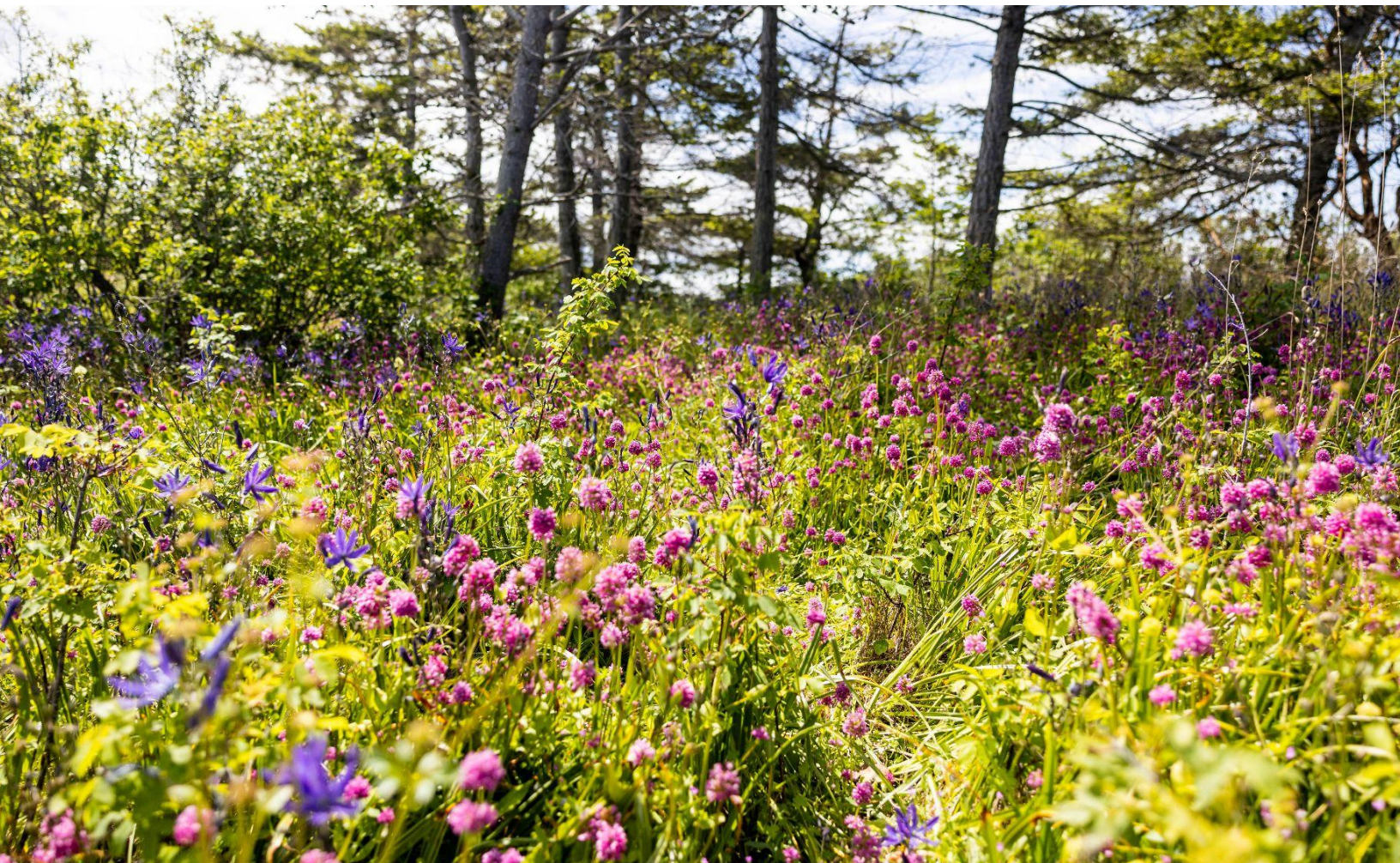
Most biogeoclimatic zones in BC are categorized into a variety of subzones or variants. Conversely, the entire CDF zone is classified as a single “moist maritime” subzone. These moist conditions contributed to the coevolution of a naturally fire resistant assemblage of ecological communities. However, since settler arrival, systematic removal of Indigenous communities and thus Traditional stewardship practices, combined with industrial-scale logging, high rates of development, and fire suppression activities, have fragmented and homogenized forests. The dense, even-aged, low-diversity second, third, and in some cases fourth growth forests that dominate the landscape today are more often than not without ecological management and at risk of experiencing catastrophic wildfire.

Wildfire risk is a function of 1) probability and 2) severity. That is, 1) the likelihood of occurrence and 2) the consequences such an event might have on values such as built infrastructure. In the CDF zone, where communities are embedded in the forest, consequences of wildfire have the potential to be severe. Climate change is increasing this potential via prolonged and intensified droughts, higher average temperatures, and lower water availability. However, the jurisdictional matrix in this region makes coordinated planning and response difficult. The highest rates of private land ownership (about 80%) in a province where 95% of the landbase is provincial or federal crown land adds a particular layer of complexity that is unique to the CDF zone.

Though current conditions may indicate the opposite, there is a long regenerative relationship between humans, fire, and ecosystems in this region.

Humans employed fire to actively manage this landscape for millenia prior to settler contact. According to paleoecological findings and Indigenous Knowledge, low-intensity fires were lit in late summer and early fall to maintain the Garry oak/Camas ecosystems (see Photo 5) once common in the CDF zone with fire return intervals ranging between 27 and 41 years. This pre-colonial Indigenous prescribed fire influenced the presence and structure of Garry oak/Camas *gardens* and it is reasonable to hypothesise that this approach likewise maintained a heterogeneous forest structure with greater levels of biodiversity than seen in forests throughout the region today.

Photo 5: Meadow habitat in the CDF zone. Photo by Alex Harris.



By the mid-1800s settlers began clearing forests and draining wetlands at a broad scale for agriculture, at which point larger and more intense fires were observed. *Terra nullius*, Latin for “land that is deemed to be legally unoccupied” was invoked by colonial governments around this same time, suppressing Indigenous land management practices and restricting prescriptive burns.

Though colonial ideology remains entrenched in land management and policy to this day, there is a growing recognition of the histories of these landscapes and the validity of Indigenous Knowledge in managing them. The reintroduction of Indigenous land management practices is increasingly recognized as key to recovering species diversity, restoring ecological function, and reducing catastrophic fire risk.

The role history plays in forest management was explored by forest ecologist, Erik Piikkila, both during the workshop and the in-person debrief on Salt Spring Island. A high-level summary of Piikkila’s reflections is provided in the pop-out box below, and a list of reference books and other resources Piikkila and others in the community of practice have recommended is provided in Appendix II of this report.

Understanding the history of forests is key to addressing current challenges

It is important to improve understanding of the history of forested ecosystems and watersheds in the CDF zone to envisage a more sustainable future. Reflecting on and learning from the past can aid in navigating current challenges. The preservation of Indigenous Traditional Knowledge and Practice is essential to this process.

Current conditions

Climate change and extreme weather events over the last decade have raised concerns about increased risk of large-scale wildfire in the CDF zone. However, ground fires that left forests standing were common in CDF-associated ecological communities resulting in some degree of fire resistance within those communities. Increased vulnerability to stand disrupting fire today is the consequence of fire suppression and the homogenized structure of industrially logged landscapes.

These over-dense, single-age, species-poor stands are often described as “tree deserts”, “tree farms”, or “monoculture stands”, as they more closely resemble crops than forests to the trained eye. With the added uncertainty of climate change (the consequences of which would be exacerbated by large scale wildfires releasing carbon stores into the atmosphere), a measure of management is needed to help restore the heterogeneity and ecological complexity that once conferred natural fire resistance. This might include strategic thinning to restore the clump and gap structure characteristic of old-growth forests, removal of ladder fuels, and/or planting to increase native tree diversity. Table 2 outlines these and other proposed treatments to improve ecological integrity and reduce fire risk in CDF forests.

Table 2. Desired conditions and proposed treatments for fire resistant forests

Desired Conditions	Proposed Treatments
1. Uneven age and distribution (i.e., clump/gap structure)	<ul style="list-style-type: none"> • Multi-pass gap/clump to open forest stands and accelerate development of bigger trees (without removing too many stems which would create excessive windthrow risk).
2. Increased tree and understory species diversity	<ul style="list-style-type: none"> • Create gaps in the canopy (see Row 1) to increase light penetration to the forest floor. • Plant native fire-resistant species. • Plant and seed in areas where desired/missing species have been extirpated, particularly deciduous/broadleaf species (eg., big-leaf maple, red alder, bitter cherry). • Reduce herbivory: In areas with a hyperabundant deer population install exclosures at some sites to allow time for understory recovery post-thinning. • Retain moisture: keep woody materials for carbon and moisture storage by, for example, leaving some thinned trees and materials as both standing and lying deadwood. <ul style="list-style-type: none"> ◦ Note: this also provides wildlife habitat and is an example of how multiple values can be achieved alongside fire hazard management. • Remove invasive species with a particular focus on highly flammable species such as Scotch broom and gorse.
3. Breaks in canopy to allow light penetration to the forest floor thus fostering understory growth and reduction of canopy fire risk	<ul style="list-style-type: none"> • Thin using ecologically-informed approaches (see Row 1) • Prune/trim lower branches in areas with high ignition potential to address fire ladder risk (i.e., along trails, roads and other areas with high visitation rates by people).
4. Increased volume of standing and downed deadwood* <i>*Though this will increase fire risk for a short-time (i.e., during transition phase) it is expected to increase soil nutrient and moisture content in the long-term.</i>	<ul style="list-style-type: none"> • Retain 'mulch'/ ground cover and organic composition of soils to increase local soil moisture. (e.g., retain and manage wood 'fuel' distributions on site in the form of Assembled Nurse Logs**; clumps/berms, or similar innovative, ecologically-enriching methods to increase moisture and nutrient retention). <ul style="list-style-type: none"> ◦ Note: This has the added benefit of restoring habitat features that are missing in many mono-age stands. • Leave thinned stems as both standing and lying deadwood. <p><i>**Some recommendations in this section are experimental and still under development by the community of practice.</i></p>



Photos 6 & 7: Assembled nurse logs as a fuel management technique being piloted in the Maxwell Creek Watershed by Transition Salt Spring under the guidance of forest manager, Tal Engel.

Understanding fire risk in the CDF zone: Challenges ahead

Though ecologically-informed management is a vital strategy for minimizing wildfire risk and maximizing local benefits (e.g., increased climate resilience, biodiversity, habitat availability, access to food and other non-timber forest products, etc), such management requires operating on ecological timescales. Securing long-term investment in forest management was one of the major challenges discussed during the workshop. For example, most thinning treatments require multiple passes by a trained professional who can appropriately select trees for removal to prevent windthrow and undue stress at a rate of once every ten-to-twenty years. Funding/grant programs are not designed to support sustained management activities of this sort. As a result, working with ecological timescales in mind, as recommended by Robert Seaton, is a significant challenge for practitioners within the community of practice and beyond.

As reiterated throughout this report, current conditions within the CDF zone have created a higher likelihood of severe wildfire. However, the average number of days per year with a high risk of catastrophic burning in the South Island Fire Zone is small (i.e., less than 10 days per fire season). Yet, as noted by Robert Seaton, should a wildfire occur, particularly on a Gulf Island, the consequences could be catastrophic. Even if wildfires are expected to occur with low frequency and under very specific conditions, there is strong impetus to proactively pursue educational initiatives and targeted management activities to reduce the likelihood of an ignition during high risk periods. The pop-out box below outlines the factors that intersect to increase the likelihood and severity of a wildfire in the CDF zone.

Intersecting factors to consider when assessing the likelihood and severity of a wildfire⁸

- **Location:** Does the area have a high visitation or presence of human activity?
 - Note: Most fires in the CDF region are caused by human activity
- **Vegetation:** Is the area heavily vegetated? Is vegetation flammable (i.e., high leaf flammability index)? Are the trees in good health, with thick bark? Does the landscape support wetlands and/or are there gaps throughout the forested area? Are trees young, stressed or dead, and in close contact with each other?
- **Climate:** Is the area experiencing hot, dry conditions (i.e., temperature >30°C with relative humidity <30%)? Is there someone monitoring fire risk? Is there an educational campaign or other community outreach initiative underway to mitigate risk in the immediate area?
- **Terrain:** Is the area steep? What direction are the slopes and, is the area prone to strong winds?
- **History:** Has the area experienced severe fire before? How recently? Has the area recently been cut? Are there piles of dry slash present?

Under typical conditions, BC Wildfire Service has high response capacity within the South Island Fire Zone. Wait times for aerial support are generally between three and ten minutes depending on which island requires service. Due to the physical isolation of the many island communities within the CDF zone, aerial response capacity is vital. However, as recent fire seasons have revealed, the “typical conditions” that have informed wildfire response in the past are shifting which may present a challenge for BCWS’ suppression resources in the future.

Particularly because many residents within the CDF zone depend on ferries, it is important that communities familiarize with resources like the evacuation guides prepared by the CRD (mentioned in the *Session 3* summary) while also participating in on-the-ground wildfire prevention and preparedness planning. This presents another challenge because, as noted in *Session 2* of the workshop, private landholders do not necessarily have access to the information or resources needed to engage in wildfire readiness. This is made doubly challenging by the dual purpose of this work: 1) wildfire mitigation through 2) enhancement of ecological integrity. One-size-fits all approaches are not necessarily conducive to fostering ecological integrity, but most existing resources are not site-specific or even generally specific to the CDF zone.

Further, due to the complex interjurisdictional management matrix within the CDF zone, it is challenging to establish and implement best management practices to prevent the occurrence of catastrophic wildfire. The pop-out box below provides an example of this complexity from the perspective of a fire chief based on the Southern Gulf Islands.

⁸Adapted from: Corbett, Conor. (2023, February 27). Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone. [YouTube Video]. Transition Salt Spring. <https://youtu.be/BoewPcKSHs0>

Demonstrating the complexity of an inter-jurisdictional land management matrix

A fire chief is tasked with structural fire protection in a distributed intermix community, with large District lots, many of which were once managed as tree farms (i.e., plantation-like conditions) and are now under the care of newer, urban-experienced owners. Other large parcels of land are under the care of the Province of BC, Capital Regional District Parks, and local land trusts, the last of which holds conservation covenants that in some cases restrict wildfire risk reduction activities. Most landholders (including both individuals and organizations/societies) are ineligible for the same kinds of funding available to manage fire risk on crown land.

What options are available to allow the fire chief to adequately protect their community from wildfire risk?

This complexity is partially the outcome of past zoning and jurisdictional management paradigms that are still in place in some areas, or, have not been updated to consider contemporary issues regarding land use. These issues include the current state of forests and their vulnerability to fire and settlement patterns, including the increasing WUI that is created as people choose to live in isolated forested areas. The combination of shifting, once fire-resistant systems toward more fire prone, young stands via industrial scale logging, replacement of Indigenous management with fire suppression, and the 'leave it to mend itself' approach to protecting forested areas are part of the challenge. Some key questions raised during the workshop and following debrief in regards to these issues included: 1) how should we be managing vulnerable forest areas? and 2) who should be responsible for ensuring they are appropriately (i.e. accounting for all the values outlined in this report) managed?

Private landholder and forest manager, David Haley, explored the complexity of this interjurisdictional matrix near the end of the workshop with a particular focus on the challenges of implementing government programs on private land. Haley's reflections are outlined in the pop-out box below.

Thoughts from a private land manager

A current lack of proactive government involvement/leadership has delayed progress in addressing fire risk in the CDF zone. Some landholders (David Haley included) have been working to fill that gap by advocating for, and demonstrating responsible land stewardship. This has taken the form of implementing FireSmart protocols, increasing water resources, and keeping access roads clear (in case of need by emergency responders). However, there is some uncertainty around how to manage trade-offs between maintaining watershed values and creating fire resilience at a broader scale. Additionally there are financial costs associated with these efforts and few clear opportunities to be compensated for good stewardship. Stronger connections between individuals, their communities, and local services will be necessary to make progress towards landscape-level resilience.

Among all the challenges associated with ecologically-informed wildfire mitigation, perhaps the most limiting are the disparate focuses and priorities of different agencies and responsible authorities. For example, though BCWS actively works at fire hazard assessment and risk reduction in applied forest settings, Private Forest Land managers, watershed managers, and conservancies have limited capacity and/or resources to manage fire, particularly given the complexity of regulatory, land management, and jurisdictional requirements (e.g., navigating fuel management near watershed boundaries, permits for tree thinning, etc).

Experts within the CARL community of practice agree that there is no single approach or ‘rules’ when it comes to managing wildfire risk in the CDF zone, as the features and traits of different locations create different problems, many of which call for different approaches. Adaptive management will likely become an essential tool to develop a selection of diverse and site specific approaches.

“It is humbling to try to do forestry in a good way, and it's humbling to do forestry in a way that makes sense for fire because what works in one place doesn't always work in other places”

- Mark Lombard⁹

⁹ Lombard, Mark. (2023, February 27). Fire risk reduction in the Coastal Douglas-fir biogeoclimatic zone. [YouTube Video]. Transition Salt Spring. <https://youtu.be/BoewPcKSHs0>

Key challenges and takeaways summary

A high level summary of the key challenges to addressing wildfire risk through an ecologically-informed lens is provided in this section. More detailed explanations can be found in Appendix I.

The ten key challenges identified through the workshop and associated gatherings are:

1. The CDF is a multi-jurisdictional landscape with few tools/resources available for preventing fire risk and enhancing ecological integrity on privately held land.
2. FireSmart is one of the only resources available to guide activities on privately held land.
3. There is a strong understanding of fire behaviour in other biogeoclimatic zones in BC, but little research has been done on the CDF specifically.
4. There is a lack of guidance for implementing ecologically-focused practices to reduce fire risk in the CDF zone.
5. Competing community values.
6. Provincial legislation is designed to support industrial-scale logging.
7. Climate change.
8. Inertia.
9. Funding availability.
10. Addressing fire risk in protected places.

A number of potential solutions were also proposed, including, but not limited to:

- New local policy tools, such as an “Educational Wildfire DPA” to guide wildfire preparedness planning.
- A new standard to guide conservation covenant holders in writing wildfire risk prevention measures into protection agreements.
- Funding programs to increase community collaboration and preparedness.

Ultimately, addressing the complexities of wildfire mitigation in the CDF zone will require 1) inter-jurisdictional land management to build community resilience and 2) the introduction (and reintroduction) of ecologically-informed land management practices, such as prescribed fire, thinning and ground fuel management strategies to recover ecological integrity on the landscape.

Conclusion

In the CDF, and indeed across BC, a fundamental change in the relationship between forests, fire, and people is needed. The zero fire model (i.e., suppression) has failed and it is time to set new goals. Unfortunately, no one solution will work for all situations. The experts involved in the preparation of this workshop agree that education and generational effort will be central to ensuring that forest health is enhanced while risk of catastrophic fire is reduced in years to come.

Though there are challenges to working in a multi-jurisdictional context, without collaboration efficacy will be limited. One landholder stewarding their property does not make much difference if their neighbour mismanages theirs. Collaboration and partnerships among stakeholders, including First Nation and other governments, local communities, NGOs, and the private sector, are crucial for effective forest management and conservation. Sharing resources, working together, and investing in the future of CDF forests and associated ecosystems for a variety of values will be important steps forward. These ecosystems have historically done much to support human communities, but colonial landscape management approaches over the past 100+ years have given ecological integrity little consideration. It is time to learn from lessons from the past and look to the future.



Appendix I: Key challenges and proposed solutions

The tables below contain detailed explanations of key challenges and proposed solutions identified in the workshop and associated discussions. They are coded red or yellow based on timescale. Red-coded challenges require immediate attention to address wildfire risk in the short-term, while yellow-coded challenges will likely require more time to address. A yellow code does not necessarily mean lower priority.

Key things to remember in reviewing this section of the report:

- Challenges within each colour code have been assembled in no particular order.
- Some challenges yielded fewer potential solutions than others.
- Some proposed solutions are not applicable in all cases, while others are applicable in multiple.
- Some solutions will require further development to address the associated challenge.

Ultimately, each challenge identified will be a focal point for ongoing work in the days following these early gatherings of experts and practitioners from across the CDF zone.

Key Challenge # 1: The CDF is a multi-jurisdictional landscape with few tools/resources available for preventing fire risk and enhancing ecological integrity on private land.

Considerations:

- The amount of industrial-scale forestry occurring in the CDF zone has dramatically decreased in the last 20 years, but little remediation has occurred.
- The majority of land within the CDF is privately held, yet there are no site-specific programs in place to include landholders in efforts to reduce fire risk beyond the more generalized FireSmart program.
 - How can resources and support be provided to private landholders to holistically address wildfire risk, that is, by considering values beyond just built infrastructure (i.e., community and sociocultural values (e.g. water protection) and linked landscape-level issues (e.g., erosion))?
 - Who will provide support and resources?
- Though there is a high capacity for collaboration and cooperation on fuel management techniques and other treatment options with the BCWS, and the CRD Fire and Emergency Program has just completed a Community Wildfire Resiliency Plan, jurisdictional mandates are directed largely at crown lands and built infrastructure on private land. A broadening of mandates to include multiple objectives and values beyond just wildfire hazard and risk reduction would be required to allow agencies like the CRD, BCWS, Fire Rescue Services, Emergency Management BC, and provincial ministries to better support private landholders. Operative questions are:
 - What would be required to expand existing programs to private lands?
 - How can this best be achieved in light of climate change and extreme weather events?

Proposed Solutions:

- Development Permit Areas for wildfire.
 - Option 1: An educational model providing resources and support.
 - Option 2: A regulatory model that requires certain ecologically-informed treatments/interventions in areas identified as being at high risk of fire.
- Development standards for new development/buildings.
 - Official Community Plans could consider the placement of new buildings and/or subdivisions to ensure they are built in areas of low fire hazard (and with fire resistance and resilience in mind).
- FireSmart Critical Infrastructure programming:
 - Continue to support replacement of old infrastructure with new, fire-resistant alternatives (e.g. replace old shake roof with metal roof).
- Legislation to require fire preparedness, emergency evacuation routes, ecologically-informed land management practices, etc.
- Pilot or demonstration sites that include participation by fire managers and responsible authorities from different organisations - with the aim of identifying techniques, policies, and educational resources that can aid private land holders.
- Funding program that provides incentives and information for private landholders, similar to the FireSmart for Farms provincial test project.
- Education programs for private landholders and managers that consider multiple goals (i.e., those of Island Trust, CRD, conservancies/land trusts, foresters, watershed organisations, etc).
- Most of the mandate letters for BC Ministers (Finance, Forests, Environment, Emergency Management, Agriculture, Municipal Affairs, and Land, Water, and Resource Stewardship, etc) include a statement about community health and resiliency. Resiliency should include social, environmental, and economic values.

Key Challenge # 2: FireSmart is one of the only resources available to guide activities on privately held land.

Considerations:

- The aim of FireSmart is not to prevent fire but to reduce catastrophic losses caused by fire.
- FireSmart efforts are currently underway in some residential areas, with many fire departments interested in and ready to engage in this work. FireSmart approaches are also being trialled in farm and other contexts, with an emphasis on reducing fire hazard. However:
 - Zone of influence ends at 100 m (i.e., zone of greatest impact to private property).
 - The retention of organic materials and management of forest areas is currently outside the scope of the program (beyond 100 m).
- Can FireSmart protocols be adapted to consider the broader issues of the WUI of inhabited large forest areas and the complex forest values outlined through this report?
 - In the past, wildfire control measures have tended to be reactive rather than proactive. Regenerative, ecological approaches for wildfire management, including forest management that consider multiple values have been identified as a priority by contributors to practitioner discussions.
- Areas that are most susceptible to fires include those recently cleared landscapes which retain large quantities of slash (fuels) and/or sites where burning has been inadequately overseen. Regional Fire Rescue Services and BCWS acknowledge that almost all fires in Gulf Islands are caused by human activities (largely open burn and land clearing fires).

Proposed Solutions

- The FireSmart framework highlights key areas of concern around built infrastructure and supports different pathways to reduce risk according to what is important to different individuals. For some this includes xeriscaping, vegetable gardens, and fire resilient shrubs and forbs. The use of fire resistant native plants should also be encouraged.
- FireSmart protocols could be more site-specific incorporating locational and ecological considerations (such as position in watershed, aspect, etc).
 - Local conservancies and responsible authorities can work together to develop resources/training programs that consider multiple values to support private land holders.
- Burning and active cutting must be restricted and conducted in accordance with local regulations, all of which are dictated by local conditions, topography, weather, and meteorological conditions.
- Mitigation efforts to protect trees and forests can be similar to those suggested by FireSmart to protect built infrastructure. That is, targeted limbing of ladder fuels, and reducing or managing fuels around and below trees.
- There is potential to expand education through the Community Wildfire Resiliency Plan for Salt Spring Island Electoral Area and associated plans (see Appendix II).

Key Challenge #3: There is a strong understanding of fire behaviour in other biogeoclimatic zones in BC, but little research has been done on the CDF specifically.

Considerations:

- The Canadian Forest Fire Behavior Prediction (FBP) System, or the “Red Book”, is a systematic method that aids practitioners in predicting wildfire behaviour based on fuel typing, weather patterns, and other factors. Currently the BCWFS is using proxies for the CDF zone as information for this region is not readily available. Creating a new designation specific to the CDF may be helpful, particularly if goals for restoration and resiliency are included that consider the natural fire resistance capacity of native trees, plants, and ecologies.
- There is a need for better definitions and clarity on goals for ecological integrity and restoration in the CDF zone.
- Forest management practices should be based on scientific research and data to ensure they are effective and sustainable.

Proposed Solutions:

- Conduct research needed to create a new Red Book designation specific to the CDF.
- Collect more data on WUI/fire risk status for the Islands Trust area, particularly under projected climate conditions.
 - The fire behaviour knowledge gap can be addressed using field data, models (which constitutes most fire behaviour work, including crown fires), and experimental treatments that are designed to reduce hazards (eg., fuel management).
- Engage with and learn from Indigenous experts to implement multiple value fire management/use. Although Traditional practices such as prescribed burns are not always options for private landholders, the value of recreating the conditions introduced by burns can be mimicked using other approaches.

Key challenge #4: There is a lack of guidance for implementing ecologically-focused practices to reduce fire risk in the CDF zone.

Considerations have been deeply explored throughout this report.

Proposed solutions:

- Seek answers to key questions to better guide wildfire management through an ecological lens:
 - What condition is determined to be most representative of the CDF's characteristic state (e.g. conditions when a protected area was established? pre-colonization condition? something else?) but also likely to demonstrate resilience to climate change and associated extreme heat and other weather anomalies?
 - What, if any, temporal baseline should be used to assess ecological integrity?
 - What other characteristics or traits should be used to identify relevant management targets that capture multiple values?
 - How can climate change adaptation goals be considered in the context of ecological integrity and resilience?
 - Are there climate change adaptation and mitigation requirements that have not been captured?
- Establish large demonstration sites where potential methodologies for reducing fire risk can be tested and modelled (e.g., Cortes Community Forest, Maxwell Creek Watershed, Galiano Conservancy Association (and other conservancy managed) lands, select Parks Canada sites).
- Identify and evaluate strategies to retain wood and other organic materials to increase nutrients in soils, moisture retention, and carbon sequestration. For example, bucking and flattening logs to promote decomposition while reducing fire risk. [These strategies can also benefit wildlife by replacing missing habitat features.](#)
 - In some cases, smaller woody debris up to about 5 cm diameter, can be chipped (though the retention of larger woody debris is preferable) . These chips can be left in-situ* and might briefly increase risk (this can be mitigated through scattering), but over the long-term could create improved conditions. Chips can also be used in the creation of:
 - [Assembled Nurse Logs](#)
 - Berms
 - Swales
 - Paths
- Local land trusts/conservancies and governments to guide land holders in pursuing ecologically-informed fire risk management on their properties.
 - There are a number of land trusts operating within the CDF zone who have direct ties to the communities where they operate. This is an untapped relationship when it comes to engaging in wildfire mitigation.

** Chipping must be done carefully to avoid depths that will smother native understory herbs. In some places chip piles have eliminated native plants which are replaced by invasives like Canada thistle (*Cirsium arvense*).*

Key Challenge #5: Competing community values

Considerations:

- There are deep ties to forestry in many communities throughout BC with varying opinions regarding how it should be practised in the future (e.g., clear cuts vs. selective harvest).
- Old growth logging in particular has a contentious history, but old growth CDF forests are most resistant to fire and little of it remains on the landscape today. Mature second growth is increasingly important in this regard in the absence of old growth stands.
- The management of forests must factor in multiple ecological, sociocultural, and economic values. This includes the needs of local communities to have wood supply and sustainable jobs. The retention of ecosystem services such as flood control and carbon storage as cost effective strategies for risk reduction to extreme weather events are being discussed provincially at the time of writing (during the 2023 fire season).

Proposed Solutions:

- Education opportunities for practitioners, land managers and members of the public.
 - This includes education for those working in the forestry sector to transition toward more ecologically-informed harvesting approaches.
 - Certification and training programs to develop regional capacity for multiple-value forest management practitioners.
 - This direct outreach by local community members should be supported wherever possible. In addition, a cornerstone of community engagement regarding emergency management is the POD Program.
- Broader approach for programming among responsible authorities to include private land and multiple values (e.g., FireSmart Program builds in protection of ecological values and other goals).
- New policy or programs that recognize changes in land use and climate change adaptation goals.

Key challenge #6: Provincial legislation is designed to support industrial-scale logging

Considerations:

- Provincial targets and harvesting approaches are best suited to large-scale forestry operations. More selective, multi-value logging approaches are not specifically acknowledged under existing regulations, making sustainable forestry more challenging to practise.
 - There is a lack of incentives to encourage smaller scale forestry operations to pursue wildfire mitigation treatments.
- Intensive forestry practices of the type seen previously in this region, can increase vulnerability to wildfire and should be discouraged.

Proposed solutions:

- New policies or programs tailored to, or piloted in, the CDF zone for small-scale forest management targeting multiple values including fire risk reduction, forest/wildlife stewardship, and value-added forestry operations.
- Incentives and financial support to encourage forest/land managers to use ecological and sustainable forest management practices on private lands.
- Create economic opportunities through responsible forest management:
 - *Example:* Many homes on Cortes Island are firewood heated. The Community Forest Co-op rarely meets demand due to small harvest volume. To rectify this a portion of co-op profits will subsidize heat pump installations, reducing firewood demand and increasing home heating efficiency.

Key challenge #7: Climate change

Considerations:

- It is beyond the scope of this report to solve the wicked problem of climate change, which must be addressed at all levels including local land-based work. Solutions proposed are starting points for increasing local adaptive capacity.
- Forests and other intact ecosystems are essential for mitigating climate change, increasing carbon sequestration, supporting biodiversity, and supporting human livelihoods.

Proposed solutions:

- Incorporation and consideration of climate impacts and adaptation strategies in existing and new policies, programs, and land use practices (including zoning, construction, etc).
- Development of a climate resilience strategy that connects existing programs (e.g., [Farmland Advantage Funding Extension Program](#), FireSmart, CRD plans, Official Community Plans, etc.)
- Development of evacuation guides and community preparedness training in case of an emergency event like an out of control wildfire

Key challenge #8: Inertia

Considerations:

- The CDF zone comprises islands and other coastal areas that are geographically siloed. This separation makes it difficult to build a united community of practice.
- There is a lack of capacity and leadership to undertake the coordination of multiple values into consideration and coordinate work at the scale needed to meaningfully address existing and future fire risk and community vulnerability to climate change.
- Coordination among local and regional governments is necessary to engage local communities and decision-makers in the challenging work of risk reduction and climate adaptation.

Proposed solutions:

- Tap into community resources to bridge communities and generations in accomplishing the goals of this work.
 - Examples provided by workshop presenters include: working bees, more community workshops, restoration training, more engagement between local decision-makers and land holders, etc.
 - The Community Wildfire Resiliency Plan for Salt Spring Island Electoral Area (February 2023) outlines mechanisms for coordination by government agencies to provide the support needed in these communities.
- Establish cross-island partnerships (i.e., build wider regional community of practice)
- Make use of local and regional strategies (e.g., CRD plan for Community Resilience)

Key challenge #9: Funding availability

Proposed solutions:

- Some local governments have programs to provide free assessments which could be adapted for stewardship (multi-values) fire and other values
- [Community Resilience Investment Program](#)
- FireSmart Community funding/rebates (and their expansion to include broader values and community stewardship goals)
- Partnerships expanded to allow training and support to communities from Provincial experts (eg., BC Wildfire Services, CRD Emergency Program/Emergency POD program, etc)
- Explore [Municipal Natural Asset strategies](#), such as those implemented in the Town of Gibsons, BC

Key challenge #10: Addressing fire risk in protected places

Considerations:

- Conservation covenants are among the foremost tools for protecting intact ecosystems within the CDF region. However, it is challenging to maintain that protection, adapt to changing climatic conditions, and actively manage landscapes to reduce fire risk.
- In some cases, land protection has been pursued using a “fortress” model, which excludes humans from visiting, and active management from being pursued on the landscape.
- There is a gap between fuel reduction standards for mitigating wildfire risk and conservation of ecological values.
 - Allowing fuel removal for fire risk reduction is needed, but the nature of conservation lands requires approaches that will not negatively impact the natural values in a covenant area.

Proposed solutions:

- Financial and legal support for land trusts, conservancies and other large land managers to adapt covenants and forest management allowances to consider climate adaptation and ecological service stewardship goals.
- Develop a standard that can be adopted into existing covenants to guide acceptable fuel reduction and forest stewardship measures.
 - If FireSmart improves its content to include ecological values, it has the potential to be the professional body to uphold this standard.
- Allowances for conservation covenant agreements that permit parties to work together on special projects to achieve overarching ecological objectives and address fundamental issues such as risk of catastrophic fires.
- The Natural Areas Protection Tax Exemption Program (popularly known as NAPTEP) currently only applies to the Islands Trust Area. If it could be extended to the rest of the CDF zone, this incentive to protect intact habitat might prevent future ecological degradation. Further, *if* covenants are written with fire resilience in mind there might be increased opportunity for land trusts to liaise with property owners/forest managers to determine how best to introduce that resilience while maintaining (and even enhancing) ecological values.
 - Restoration and conservation of degraded forest ecosystems is essential for improving their ecological and socioecological functions.

Appendix II: Recommended Resources

(Not linked in text)

Books

- [Pattern and Processes in a Forested Ecosystem: Disturbance, Development and the Steady State Based on the Hubbard Brook Ecosystem Study](#) by F. Herbert Bormann & Gene Likens
- [Ecological Forest Management](#) by Jerry F. Franklin, K. Norman Johnson, and Debora L. Johnson
- [Creating a Forestry for the 21st Century: The Science Of Ecosystem Management](#) by Kathryn A. Kohm and Jerry F. Franklin
- [Conserving Forest Biodiversity: A Comprehensive Multiscaled Approach](#) by David B. Lindenmayer and Jerry F. Franklin
- [Habitat Fragmentation and Landscape Change: An Ecological and Conservation Synthesis](#) by David B. Lindenmayer and Joern Fischer
- [Salvage Logging and Its Ecological Consequences](#) by David B. Lindenmayer, Philip J. Burton, and Jerry F. Franklin
- [Watershed Management: Balancing Sustainability and Environmental Change](#) by Robert J. Naimen
- [The Tree Farm: The Evolution of Canada's First Community Forest](#) by Michelle Rhodes
- [Old Growth in a New World: A Pacific Northwest Icon Reimagined](#) edited by Thomas A. Spies and Sally L. Duncan

Government reports

- [Density Management in the 21st Century: West side story](#) - United States Department of Agriculture Pacific Northwest Research Station (2013)
- [Community Wildfire Resiliency Plan for Salt Spring Island Electoral Area in the Capital Regional District](#) - Diamondhead Consulting produced for the Capital Regional District (Feb, 2023)
- [Southern Gulf Islands Community Wildfire Resiliency Plan At-a-Glance](#) - Diamondhead Consulting produced for the Capital Regional District (Feb, 2023)

Films

- [The West is Burning](#)

Articles and op-eds

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- [CARL Project Field Files](#)
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- [Story of the CDF article series](#)
 - [The return of fire to the landscape](#)
 - [An ancient legacy, a critical future](#)
- Wong, C., B. Dorner, and H. Sandmann. (2003). Estimating historical variability of natural disturbances in British Columbia. B.C. Min. For., Res. Br., B.C. Min. Sustain. Resource. Manage., Resource Plan. Br., Victoria, B.C. Land Manage. Handb. No. 53. www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh53.htm