Community Wildfire Protection Plan

Bow Horn Bay, BC

July 2007

Developed through a grant from the Union of British Columbia Municipalities to:
the Bow Horn Bay Fire Department

Prepared by:
Strathcona Forestry Consulting
strathcona.fc@shaw.ca

CfBC Member

GIS Mapping by:
Madrone Environmental Services Ltd.

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- Ministry of Forests and Range

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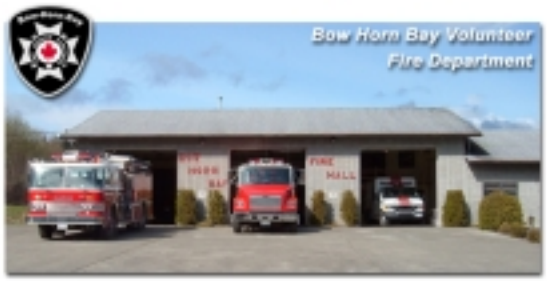
- Regional District of Nanaimo

- Bow Horn Bay Fire Department



“We’ve been lucky so far – but if a fire starts on a hot summer day, and we get a Qualicum wind – watch out – we could have a major wildfire…”

Bow Horn Bay Fire Department

Photo 1. Martin Mars waterbomber at Bow Horn Bay area. B.H.B.F.D.

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Photo 2. Storm at Bow Horn Bay.

GLOSSARY OF TERMS

Biogeoclimatic units: geographic areas influenced by similar regional climates

Biogeoclimatic Ecosystem Classification (BEC): a system that groups similar segments of the landscape into categories of a hierarchical classification system that combines three major classifications: climate, vegetation, and site

Brunisol Soil: Soil Great Group with weak soil development; common on southeastern Vancouver Island

Buildup Index: (combines Duff Moisture Code and Drought Code) – a numeric rating of the total amount of fuel available for combustion

CDFmm: moist maritime Coastal Douglas-fir Biogeoclimatic Subzone

CFFDRS: Canadian Forest Fire Danger Rating System – a model developed by Forestry Canada for evaluating forest fire danger

CWPP: Community Wildfire Protection Plan

CWHxm: very dry maritime Coastal Western Hemlock Subzone

Crown Fires: burn foliage and branches in the upper canopy, and also consume surface and ground fuels

DC: Drought Code – a numerical rating of the average moisture content of deep, compact organic layers

Development Permits / Development Permit Areas: authorised under the Government Act, these local planning tools, which are outlined in the Official Community Plan, address specific conditions, including protection of development from hazardous conditions (i.e., wildfire)

DMC: Duff Moisture Code – a numerical rating of the average moisture content of loosely compacted organic layers of moderate depth

Ecosystem: for purposes of the BEC, an ecosystem is defined as a particular plant community and its associated topography, soil, and climate

FBP: Fire Behaviour Prediction system – modeling that predicts the rate of spread, fuel consumption, and intensity of wildfires

Field mapping: mapping of physical features and key resources

Fire Behaviour: the manner in which fuel ignites, flame develops, and fire spreads

Fire Behaviour Triangle: three elements of the fire environment – fuel, weather, and topography – affect fire behaviour

Fire Danger: a description of the combination of both constant and variable factors that affect the initiation, spread, and difficulty to control a wildfire on an area

Fireflow: water supply for firefighting

Fire Season: officially April 1 to October 31

Fire Service Area: area served by the local Fire Department

Fuel: any substance which will ignite and burn

FireSmart Fuel Modified Zones: (distances vary according to location, lot size, aspect, slope, etc.):
Priority Zone 1 (fuel removal 0-10 m around structure);
Priority Zone 2 (fuel reduction or conversion 10-30 m around structure);
Priority Zone 3 (fuel reduction 30-100 m around structure)

Fuel loading: total amount of vegetative fuel available for potential combustion

Fuel treatment: manipulation of vegetative (and structural) fuels by harvesting, chipping, burning, composting, or other means

Fuel treatment priorities: management of vegetative (and structural) fuels prioritised according to hazard, risk, safety, funding, etc.

FWI: Fire Weather Index – accounts for the effects of fuel moisture and wind on ignition potential and probable fire behaviour

GIS: Geographic Information System – GIS is a computer technology that uses a geographic information system as an analytic framework for managing and integrating data, solving a problem, or understanding a past, present, or future situation

Ground fires: burn in the duff layer (organic soil) and decaying woody material beneath the forest floor

Hazard: the product of risk, vulnerability, exposure, and the capacity of humans to respond to extreme conditions

HIRV: Hazard, Impact, Risk and Vulnerability – an analysis model – designed as a community based-approach to sustainable hazard mitigation

Impact: assessed through the use of social, environmental, economic, and political factors

Interface fires: fires that have the potential to simultaneously involve both structures (and/or other manmade developments) and wildland fuels

ISI: Initial Spread Index – a numerical rating of the expected rate of spread of a fire

Ladder Fuels: aerial fuels that act as a conduit to help spread a fire upward into the tree canopy

MoFR: BC Ministry of Forests and Range

Nanaimo Lowland Ecosection: coastal plain on the south-eastern margin of Vancouver Island. The Ecoregion is the product of a relatively dry, mild climate in the rain shadow of the Vancouver Island Mountain Range. It is one of the most ecologically diverse areas in North America.

Ortho photos: 3-dimensional mapping developed from satellite imagery and digital elevation models

Podzol: Soil Great Group characterised by podzolic B horizon

Priority Zones: See FireSmart Fuel Modified Zones

Probability of ignition: for the purposes of this report, the probability of ignition can be accounted for by assigning a higher hazard rating to areas where fires are most likely to be started

Risk: the measure of probability of occurrence of an event and the expected severity, and an analysis of potential factors (human or natural) which can contribute to the potential for fire occurrence

RDN: Regional District of Nanaimo

Slash loading: branches, limbs, and coarse woody debris left on the forest floor after logging

Suppression constraints: obstacles to extinguishing a fire (i.e., little or no water, difficult access, limited manpower, challenging weather conditions, etc.)

Surface fires: start on the forest floor, where they consume needles, twigs, logs, and branches; if left unchecked, will burn elevated fuels (lower branches of trees; partially downed trees; tall shrubs) above the forest floor

UBCM: Union of British Columbia Municipalities

Vulnerability: the ability of people, property, industry, resources, and areas of environmental and historic concern to weather, resist, or recover from the impacts of a hazard in the long term as well as the short term

Wildland Urban Interface (WUI): the zone where structures, businesses, and other human activities and pursuits are situated among trees and other combustible vegetation

Wildland Urban Interface (WUI) fire hazard rating classes:
Low – urban, suburban, and farm areas with modified forest fuels, generally flat terrain; no readily combustible vegetation; low risk to adjacent development
Moderate – partially modified forest fuels; scattered mixed forest in suburban areas; moderate to good water availability; homes and structures may be threatened
High – areas with little or no fuel modification; continuous ground fuels; sloping terrain with/without gullies present; moderate to low availability of water; some areas hard to access
Extreme – areas with little or no fuel modification, continuous ground fuels; rolling and gullied terrain; rock outcrops may be present; low water availability; some inaccessible terrain; may or may not be heavy use areas; direct threat to homes/structures/values


Photo 3. Bow Horn Bay.

COMMUNITY WILDFIRE PROTECTION PLAN

BOW HORN BAY

SYNOPSIS

1. The wildland urban interface is the zone where structures and other human developments meet and/or intermix with wildland fuels (vegetation). Successful fire suppression over the last fifty years has increased fuel loading in forests across British Columbia. Growing population densities at the wildland urban interface have led to a rising number of anthropogenic causes of fires.

2. Scientific evidence in the recently released United Nations Intergovernmental Panel on Climate Change (2007) points to human-caused burning of fossil fuels as a direct cause of global warming. Climate change is linked to a pattern of warmer, drier summers in some areas. Global warming is predicted to extend the duration of fire seasons in fire-prone locales. Greater frequency of wildfires is anticipated in regions with mild climates (i.e., southeast Vancouver Island).

3. In 2006, the Bow Horn Bay Fire Department received a grant from the Union of British Columbia Municipalities (UBCM) to develop a Community Wildfire Community Plan (CWPP) for the local fire service area, in order to:
   1) define risk areas for interface fires;
   2) identify measures necessary to mitigate risks; and
   3) outline an action plan (see Executive Summary) for improving fire protection and prevention in the interface.
   The CWPP also includes a general introduction to the local fire protection area, a description of internal and surrounding forests, an overview of biogeoclimatic features, and a description of historical fire factors.

4. Risk areas for interface fires in and surrounding Bow Horn Bay were identified through standard fire danger and risk-hazard analyses. Fire behaviour modeling was incorporated into the assessment of wildfire hazard. Hazard assessment criteria for interface mapping were reviewed with the Bow Horn Bay Fire Department. Approximately 80% of the Fire Service Area is identified with high to extreme interface fire hazard ratings.

5. Measures to reduce the threat of interface fire were developed in consultation with the Bow Horn Bay Fire Department. Mitigative measures to improve fire protection and prevention in the interface zone must address: vegetation management; structural design features; and planning tools for local government. Public education is essential to reduce the threat of wildfire.

6. A community action plan to improve fire protection and prevention in the interface zone was formulated in collaboration with the Bow Horn Bay Fire Department. Recommendations in the Community Wildfire Protection Plan will help clarify and refine priorities for the protection of life, property, and essential infrastructure and resources in the interface zone. Potential areas for fuel reduction pilot projects are identified. The CWPP's recommendations should be reviewed and endorsed by local government officials, in consultation with regional government and neighbouring jurisdictions. A public review process is recommended.

7. Ultimately, the responsibility for the success of the Community Wildfire Protection Plan lies with local government. No plan is completed until it is implemented.

SECTION 1: INTRODUCTION AND PLANNING PROCESS

BACKGROUND

The wildland urban interface (interface) zone is commonly described as the area where homes, farms, commercial establishments, key infrastructure, industrial installations, recreational developments, and other human activities are situated among trees and other combustible vegetation (*FireSmart, Protecting Your Community from Wildfire*, 2nd Edition, 2003). Fires that have the potential to involve both structures (and/or other manmade developments) and wildland fuels are known as interface fires. Interface communities are found across Canada.

The threat of fire in the interface zone stems from two sources – fires can move from the forest, bush, or grassland areas into a community, or, vice versa, from the community into adjacent wildlands. Wildfire does not differentiate between fuels in forests, communities, or backyards. If left unchecked, fire will spread rapidly through flammable grasses, shrubs, forest undergrowth and trees to consume homes, businesses, and other structures.

Interface areas range from sharp geographical edges (i.e., residential subdivisions bordering a forest), to "intermix" areas (i.e., isolated structures in the midst of a forest). The density of the interface zone ranges from 1 to 1,000 structures per square kilometre (BC Ministry of Forests and Range). The extent of the interface zone varies widely according to aspect, topography, local weather patterns, and vegetative cover. Logan Lake, a small community in BC's interior, has defined a 5-km interface management zone, based on the distance wind-borne embers travelled in recent interior wildfires.

Wildfires are a part of the natural ecological cycle of forests in British Columbia. Wildfires have been a major and regular occurrence for thousands of years. British Columbia's climate and topography make many areas of the province prone to wildfires.

Human encroachment onto forested lands exacerbates the threat of wildfire in the interface zone. The presence of people near wildland areas has resulted in aggressive fire suppression activities to protect life and limit property damage. As a result, the natural pattern of frequent low-intensity fires has been disrupted. The United Nations Intergovernmental Panel on Climate Change (2007) predicts global warming will extend the duration of fire seasons, and increase the number of wildfires. At risk are loss of life, property, infrastructure, and resources.

Photo 4. Martin Mars waterbomber.

COMMUNITY WILDFIRE PROTECTION PLAN PROGRAM

For decades, British Columbia's Ministry of Forests and Range (MoFR) has advocated community-based interface planning. After serious interface fires at Penticton and Salmon Arm in the 1990's, the provincial Auditor General urged communities across the province to take action. Public awareness of the danger of interface fires peaked in the hot dry summer of 2003, when unprecedented wildfires ravaged British Columbia's interior communities (Photo 5). "Firestorm 2003" destroyed 260,000 ha of forest, 334 homes and businesses, forced the evacuation of more than 45,000 people from their communities, caused over $67 million in damages, and resulted in the loss of lives of three fire fighting airmen.

Photo 5. Firestorm 2003, Kelowna.

In the aftermath of Firestorm 2003, the province of BC commissioned The Honourable Gary Filmon to review the damage caused by the devastating forest fires. The "Firestorm 2003 Provincial Review" provided timely impetus for BC communities to participate in interface planning.

The Firestorm report recommended the province of BC take a leading role in the development of strategic interface management plans in cooperation with local governments. In 2005, the provincial government launched the Community Wildfire Protection Plan (CWPP) program.

The Community Wildfire Protection Plan program is directed at medium- to high-risk interface communities. The program is administered by the Union of BC Municipalities (UBCM) and funded by the Ministry of Forests and Range (MoFR).

The purpose of the Community Wildfire Protection Plan is to establish a cooperative framework under which interface management programs are developed and implemented to protect human and natural resources values in an effective and efficient manner.

The objective of the Community Wildfire Protection Plan is to improve community safety, and reduce the risk of property damage.

British Columbia's Ministry of Forests and Range and the Union of British Columbia Municipalities promote community-based wildfire planning in order to:

- Familiarise local government and elected officials and staff with wildfire protection and fire management issues
- Influence community plans to acknowledge fire threat areas when considering development
- Promote bylaws that acknowledge FireSmart
- Identify high priority areas for fuel management activities
- Facilitate discussions with key stakeholders to encourage a cooperative approach to fuel management
- Encourage public education around wildfire protection and the potential need for fuel management activities

Community-based wildfire planning recognises the vital role of local and provincial fire fighting agencies in fire prevention and protection. Fire suppression in the interface zone is one of the most dangerous operations for fire fighters.

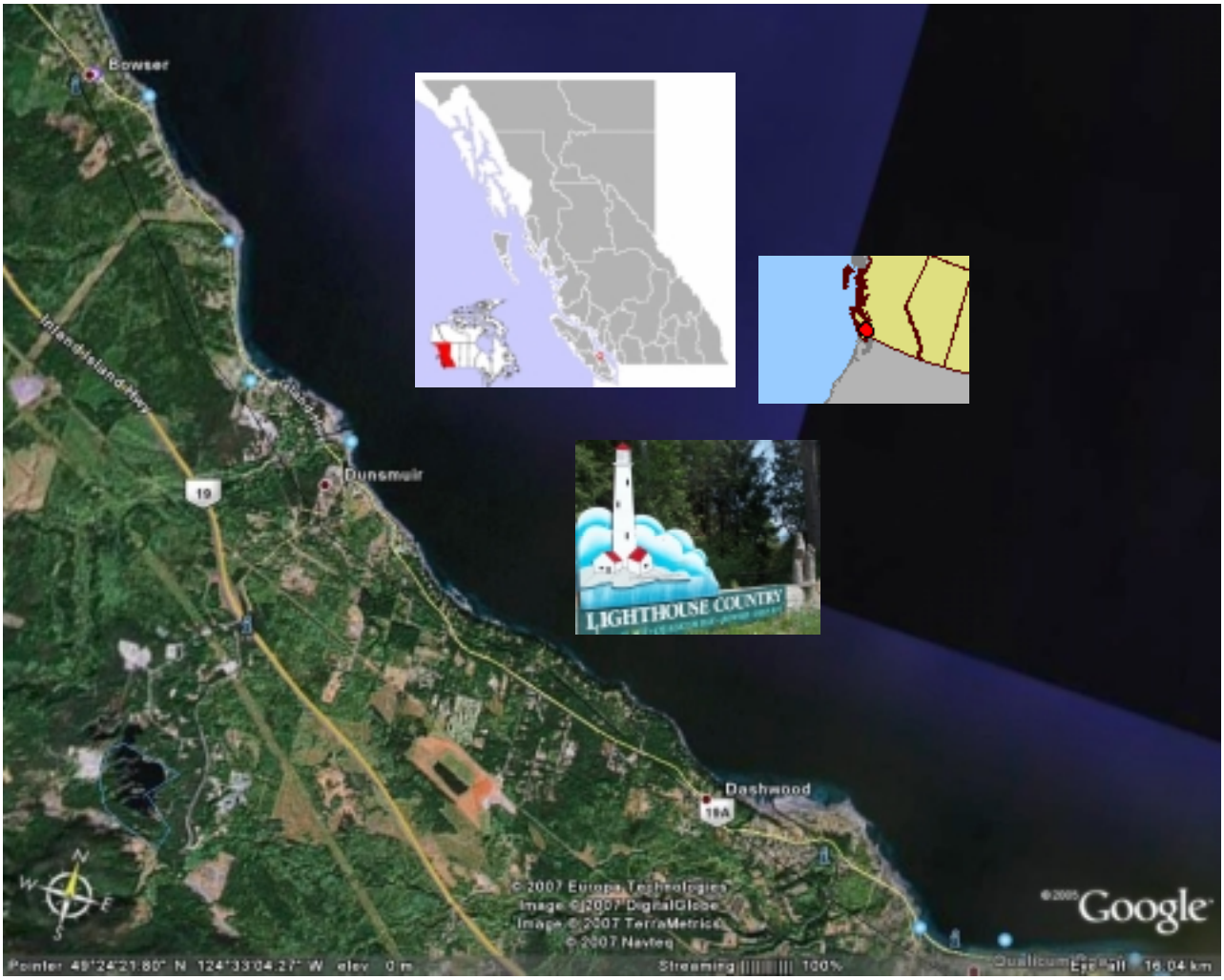
Photo 6. Wildland fire fighter uses drip torch to create a back fire against a wild fire.

SECTION 2: PROFILE OF BOW HORN BAY

SETTING

Bow Horn Bay embraces a handful of small coastal villages and dispersed "backwoods" developments in a thin ribbon of forested land on southeast Vancouver Island (Figures 1, 2, & 3; Photo 7). Bordering the Strait of Georgia in an region known locally as "Lighthouse Country", the Bow Horn Bay area contains several distinct neighbourhoods: the small seaside villages of Bowser and Qualicum Bay; historic Dunsmuir; and the Spider Lake Community, located a few kilometres inland. Bow Horn Bay also includes the Qualicum First Nation Reserve near the mouth of the Big Qualicum River. Bow Horn Bay comprises part of Electoral Area 'H', the northernmost electoral area in the Regional District of Nanaimo (RDN).

The Bow Horn Bay Fire Department is responsible for the Bow Horn Bay Fire Service Area. From its northernmost border with Deep Bay,to its southern boundary with Dashwood, the Bow Horn Bay Fire Service Area sprawls across approximately fourteen kilometres of predominately rural forested lands.



Figures 1, 2, & 3; photo 7. Bow Horn Bay encompasses a thin strip of southeast Vancouver Island between Bowser, Dunsmuir, and inland south to Spider Lake, in an area known as Lighthouse Country.

The Official Community Plan (OCP) for Electoral Area 'H' notes that the area's distinct neighbourhoods have a diverse range of activities and interests, but share several common values. The area contains a broad mix of rural, residential, recreational, tourist, small scale commercial, and resource uses. The combination of a mild climate, scenic natural setting, outdoor recreation opportunities, water resources, and entrepreneurial spirit has resulted in a "highly desirable and vibrant community".

Oceanside communities on southeastern Vancouver Island are experiencing unprecedented growth. Located between the fast-growing urbanised centres of Courtenay and Qualicum Beach, the Bow Horn Bay area is under pressure for change and development. As stated in the OCP, residents of Area 'H' "will embrace compatible development, while at the same time maintaining the values that are fundamental to the health and prosperity of the community". These values, which affect decisions on development, environmental protection, and infrastructure improvement, also have an integral impact on the wildland urban interface zone.

Photo 8. Bow Horn Bay area coastline.

HISTORY

Thousands of years before Spanish explorers first visited the waters off southeastern Vancouver Island, the Salish First Nation made a living off the land and sea in the area now known as Bow Horn Bay. The establishment of the Hudson's Bay Company ("the Company") in the 19th Century in Victoria and Nanaimo prompted exploration and development of Vancouver Island. The Esquimalt and Nanaimo Railway was extended into the Bow Horn Bay area in 1914. A post office was established in Bowser the following year.

Photo 9. The Qualicum Band is part of the Salish First Nation.

Logging generated settlement and growth in the area through the twentieth century. In 1953 a handful of men living near Qualicum Bay started a "little one truck fire service" called the Qualicum Bay Fire Department (Fire Department sources). The intent was to cover a very small area immediately surrounding the bay. As most of the crew lived in a logging camp – then the terminus of Horne Lake Road – a year or so later the name of the small fire department was changed to Bow Horn Bay to reflect the expanded coverage area.

In recent years the area has developed into a retirement destination and bedroom community for larger centres (i.e., Courtenay, Qualicum Beach). Bow Horn Bay is popular with tourists who enjoy outdoor recreation activities (camping, fishing, and boating).

Photo 10. Camping at Qualicum Bay.

POPULATION

The Bow Horn Bay Fire Service Area has an estimated population of 3,400, with approximately 1,100 residences. The small village nodes of Bowser, Qualicum Bay, and Dunsmuir account for a significant proportion of the area's population. Large areas of Bow Horn Bay have sparse population densities. In July and August the visitor population swells at campsites and resorts throughout the area. At the height of summer, occupancy rate of Spider Lake Springs Resort may top 1,000.

Photo 11. Forest lands extend westward from the area's eastern rim on the Strait of Georgia.

First Nation lands at Bow Horn Bay are held by the Qualicum Band and Fort Nelson Band. Approximately fifty people reside at the Qualicum First Nation reserve. The Big Qualicum River estuary and lower corridor of the Big Qualicum River are owned by the Qualicum Band. The Fort Nelson Band owns forested lands on the northeastern edge of the Big Qualicum River corridor.

The Bow Horn Bay Fire Department provides fire protection on a contract basis to the Qualicum First Nation.

ECONOMY

The economy of Bow Horn Bay is based on a mix of natural resource management and service industries. Natural resource management activities in the area consist of aquaculture (area's largest industry), forestry, agriculture, aggregate resource extraction, and environmental conservation (i.e., outdoor recreation opportunities). The service sector encompasses tourism related commercial and retail trade, business services, accommodations, and other services. Service industries are mainly concentrated along the Oceanside Highway.

Forestry is the dominant land use in the area. Much of the forest land within and bordering Bow Horn Bay consists of private holdings. Due to the cyclical nature of the forest industry, private forest tenures have undergone many changes of ownership. In the event of a forest fire starting on or near forest tenures, many rural fire departments may not know who to contact regarding gate keys, conditions of forest road, and other access issues.

A lack of regulations controlling private forestry lands and private lands is a cause of concern for the Bow Horn Bay Fire Department. Two tracts of privately owned forested land in the southeastern part of the area were logged sporadically a few years ago. The properties were owned by absentee landowners who "couldn't afford to have an excavator come back and clean up" (discussion with Fire Department). Large piles of land clearing debris were "primed for fire" (Fire Department sources). When the owners took no action to abate the fire hazard, the Fire Chief requested assistance from the Ministry of Forests and Range. The "Ministry of Forests was helpful" notes the Fire Department, "and convinced the owners to do something" to abate the fire hazard.

Photo 12. The Fire Department is concerned about hazard abatement on private forest lands and private lands.

Recently the Fire Department responded to a fire call on private forest lands bordering the Hydro Transmission Right-of-Way. The Fire Department quickly extinguished an escaped fire that had been started by a firewood contractor. The Fire Department hopes BC's newly introduced Wildfire Act (2005) will improve hazard abatement.

Photo 13. The Fire Department recently responded to an escaped brush fire in forest lands bordering the BC Hydro Right-of-Way.

Areas of Crown-owned Provincial Forest lands are found northwest of Bowser. Most of the Crown-owned parcels, originally part of the Vancouver Island Fruit Lands, are designated for forestry and agricultural land use.

A Crown seed orchard is located near Bowser (Photo 12). The seed orchard is fenced, and has an irrigation system.

Photo 14. Bowser Seed Orchard is located in the northern portion of Bow Horn Bay.

Broad-scale logging has occurred in the area for over a century. Mature second growth forest stands predominate forest lands in the area.

Service industries in the area are generally concentrated around two small "village" centres: Bowser and Qualicum Bay. The Official Community Plan for Area 'H' identifies Dunsmuir as a future village centre.

Along the Island Highway are scattered businesses, including a number of recreational vehicle camping sites and food services (Photo 15).

Photo 15. Restaurants and other service sector industries dot the Oceanside Highway.

INFRASTRUCTURE

Infrastructure consists of network of roadways and communications, services, and local planning tools that define a community. Infrastructure planning is intrinsic to management of the wildland urban interface zone. The relationship between local infrastructure and interface management is reviewed in the following discussion.

TRANSPORTATION ROUTES

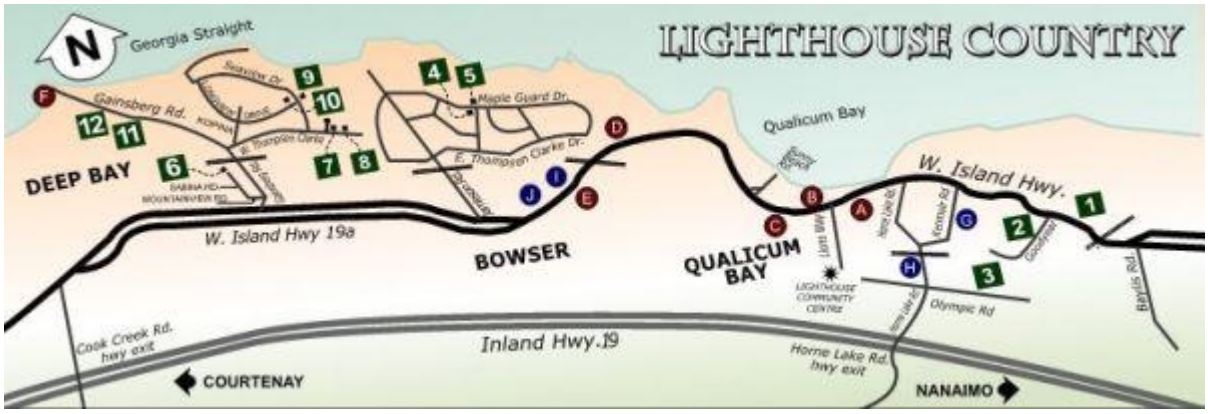


Figure 4. Bow Horn Bay stretches along the Island Highway in Lighthouse Country from Bowser to Qualicum Bay, and extends south across the Inland Island Highway to Spider Lake.

The Oceanside Highway (19A) is the primary transportation route through Bow Horn Bay. Most of the established development in the area is found along the Oceanside Highway (Photos 16 &17).

Photos 16 & 17. Established development is found along the Oceanside Highway.

The Inland Island Highway (19), which was constructed in the late 1990's, serves as Vancouver Island's express by-pass route. The Inland Island Highway meets Horne Lake Road at a traffic light intersection (Photo 18). For safety reasons, Fire Department members responding to a fire call are instructed to wait at the highway crossing if there is a red light. Fire trucks will not proceed through a red light. Logging trucks and other vehicles are often observed passing through the intersection well in excess of the posted speed limit (110 kph). Fire department response time to peripheral regions across the highway (i.e., Spider Lake area) is long (20 minutes) under ideal conditions. The Fire Department has requested a siren-activated light at the intersection.

Photo 18. Traffic intersection at the Inland Island Highway and Horne Lake Road.

The E & N Railway, which provides limited passenger and freight train service along the east coast of Vancouver Island, roughly parallels the Oceanside Highway through Bow Horn Bay (Photo 19). Approximately five rail crossings are located in the area. The Fire Department is concerned about the possibility of an accident involving hazardous materials. Information about freight schedules and contents is difficult to obtain.

Photo 19. The E&N passenger Dayliner crosses the Horne Lake Road at Dunsmuir.

Public boat launching facilities are located north of the area, at Deep Bay Harbour.

UTILITIES

BC Hydro power transmission line right-of-way corridors dissect Bow Horn Bay in three locations. Broom and other invasive brush species have encroached onto the power line corridors.

Photo 20. BC Hydro power line rights-of-way cut through Bow Horn Bay.

REPEATER SITES

No communications towers are located at Bow Horn Bay. Radio communication at the Bow Horn Bay Fire Department is transmitted from the North Island 911 dispatch centre in Campbell River through a repeater tower at Cameron Lake. The system has a satellite back-up. A repeater tower on Errington's Little Mountain provides additional back-up.

The Bow Horn Bay Fire Department has a generator for emergency power use. According to the Fire Department, local phone service is reliable; it "seldom goes out".

WATER

Two small community water services operate at Bow Horn Bay. The Bowser Waterworks and Qualicum Bay-Horne Lake Waterworks provide piped water to localised areas. The two systems have a combined total of 67 hydrants. Piped water is not available in most of the Fire Service Area.

The Qualicum Bay-Horne Lake Waterworks feeds water to residents along Horne Lake Road and the immediate area from three drilled wells and a 50,000 gal. reservoir. The system is gravity-fed. There are no hydrants near the reservoir; only the lower portion of Horne Lake Road is hydranted. Hydrants at nearby Kenmuir Road and Berkshire Road areas are 1,200' (~360 m) apart on a 4" line. (Standard hydrant spacing in residential areas is 150-175 m, with hydrants running off 6" line.) In order to bring the line and hydrant to code, it would be necessary to obtain a "permit to construct" for road construction work. The pavement would have to be cut, and re-paved. Liability issues place the onus for new hydrants and associated costs of installation on the fire department.

Photo 21. Qualicum Bay-Horne Lake Waterworks District office at Qualicum Bay.

Photo 22. Qualicum Bay-Horne Lake Waterworks.

The Bowser Waterworks is a gravity-fed system that feeds water from a reservoir to customers living in a small area in northern Bow Horn Bay. The upper part of the system has pressure issues and is generally inadequate for fireflow purposes (Fire Dept. sources).

Photo 23. Tanker refilling site at Crosley Road: a gravity-operated pipe is connected to a former CPRail 15,000 gallon tank car.

As development advances in the area, a growing number of new residences are being supplied with piped water from the Bowser Waterworks, including a new subdivision development on the southern side of Nile Creek.

Residences of Olympic Springs have a small private water system that operates using low pressure artesian water sources and plastic piping. According to Fire Department sources, the system is "totally inadequate for fireflow".

Groundwater resources in the area have an undefined quantity of water in unconfined Quadra Sands and associated aquifers. The OCP for Area 'H' states water quantity and quality are expected to remain sufficient, providing adequate "precautions are taken to protect this valuable resource".

A substantial portion of Bow Horn Bay is not connected to community water service. Fireflow in most of the area would have to be supplied using a tanker/portatank system.

EMERGENCY RECEPTION CENTRE

Photo 24. Lighthouse Community Centre.

The Lighthouse Community Centre, near the Fire Station at Qualicum Bay, is designated as the area's emergency reception centre.

LOCAL PLANNING TOOLS

Under the Local Government Act, jurisdictions are authorised to adopt community plans "respecting the form and character of existing and proposed land use and servicing requirements in the area covered by the plan" (Section 945(1)). The long range planning goals of Electoral Area 'H' are outlined in Electoral 'H' Official Community Plan (Bylaw 1335). The Official Community Plan (OCP) provides the foundation for local policies relating to land use and development in the area.

An Official Community Plan outlines various planning tools available to local government to manage the interface zone:

- Development Permits (to control the design of building and landscaping on properties in Development Permit Areas)
- Development Permit Areas (to address specific conditions; implemented to indicate areas of different risk levels)
- Restrictive covenants (used to manage how land is subdivided and built upon)
- Servicing and subdivision bylaws (to address risk from interface fire)
- Local building bylaws (used in conjunction with the BC Building Code to control building in areas at risk of interface fires)

Limited accessibility to interface management tools is a challenge to Fire Department officials at Bow Horn Bay.

The OCP for Area 'H' lists Development Permits associated with development in hazard lands (i.e., steep slopes). No Development Permit Areas are designated for wildfires.

Photo 25. Development Application near Spider Lake.

Backyard burning is controlled through a Regional District of Nanaimo bylaw:

- *Permits are not required for backyard burning… Backyard burn piles should be no larger than 6 ft high by 9 ft across. No backyard burning is permitted if Ministry of Forests has a ban in place. Check Ministry of Forests website. Also please check the venting index before you burn and only start a burn if the index and forecast are good.*

  Large fires such as landclearing and agricultural fires require a reference number which can be obtained by calling the Ministry of Forests at 1-888-797-1717.

During the period covered under the bylaw, permits are required for backyard burning, but the requirement can be waived by the Fire Chief, depending on fire danger conditions. There is no specific regulation as to what sort of material may be burnt, other than materials banned by the Ministry of Environment. Open burning is permitted until the MoFR danger rating increases from moderate, after which no permits are issued. Campfires are not usually banned until the MoFR issues a campfire ban. If the MoFR does not impose a campfire ban, the RDN bylaw provides the authority for the Fire Chief to ban fires at any time. The Fire Chief would prefer to do so in conjunction with the MoFR. Local fire officials comment "people have respect for the authority of the Forest Service, but not the Fire Department".

Building inspections are not required in Area 'H'. The Fire Department has observed an increase in fire-resistant materials in new building construction, but notes not all construction is carried out according to FireSmart guidelines.

Various development issues at Bow Horn Bay are causes of concern for the local Fire Department. Insufficient fireflow and inadequate access routes are not acceptable at new developments.

In the mid 1990's, an official Fire Commissioner's report cautioned against expansion of the fire protection district in existence at that time. Despite opposition from fire officials, the fire protection district board in existence at that time expanded the southwestern corner of the fire protection district beyond Spider Lake to embrace several large forested residential lots. Fire Department sources recalled that as part of the expansion, local citizens promised to "get six to eight recruits for volunteer fire fighters". Six men did initially volunteer, but only attended a few practice sessions. Of the six volunteers, only two remained for any length of time.

Development at Spider Lake is "creeping in at the farthest edges of Bow Horn Bay" (Fire Department sources). Residential lots in the Spider Lake area were initially zoned as twenty acres. Subsequent rezoning has allowed subdivision into five acre lots. Many properties around the lake are panhandle-shaped, with limited or no access to the back of the lots. Fire Department response time – twenty minutes – is considered poor.

Public education and community involvement are useful tools in interface management. The Bow Horn Bay Fire Department actively promotes public awareness programs to encourage residents to maintain homes and properties in order to minimise the threat of interface fire. In a recent effort to promote the FireSmart Homeowner's Manual, the Bow Horn Bay Fire Department distributed over 1,000 FireSmart surveys to residences in the area.

In the past year, the Fire Department has received a number of calls from people interested in moving to the area. Questions tend to centre on fire department coverage rather than vegetation management.

RECREATION, PARK LANDS, AND RESORT COMMERCIAL

Recreation, resort commercial uses, and park land in the area include recreational campgrounds, lakeshore cabin developments, boat launches, recreation vehicle parks, regional and provincial parks, and Crown Lands with environmentally sensitive features or which are located immediately over known unconfined aquifers.

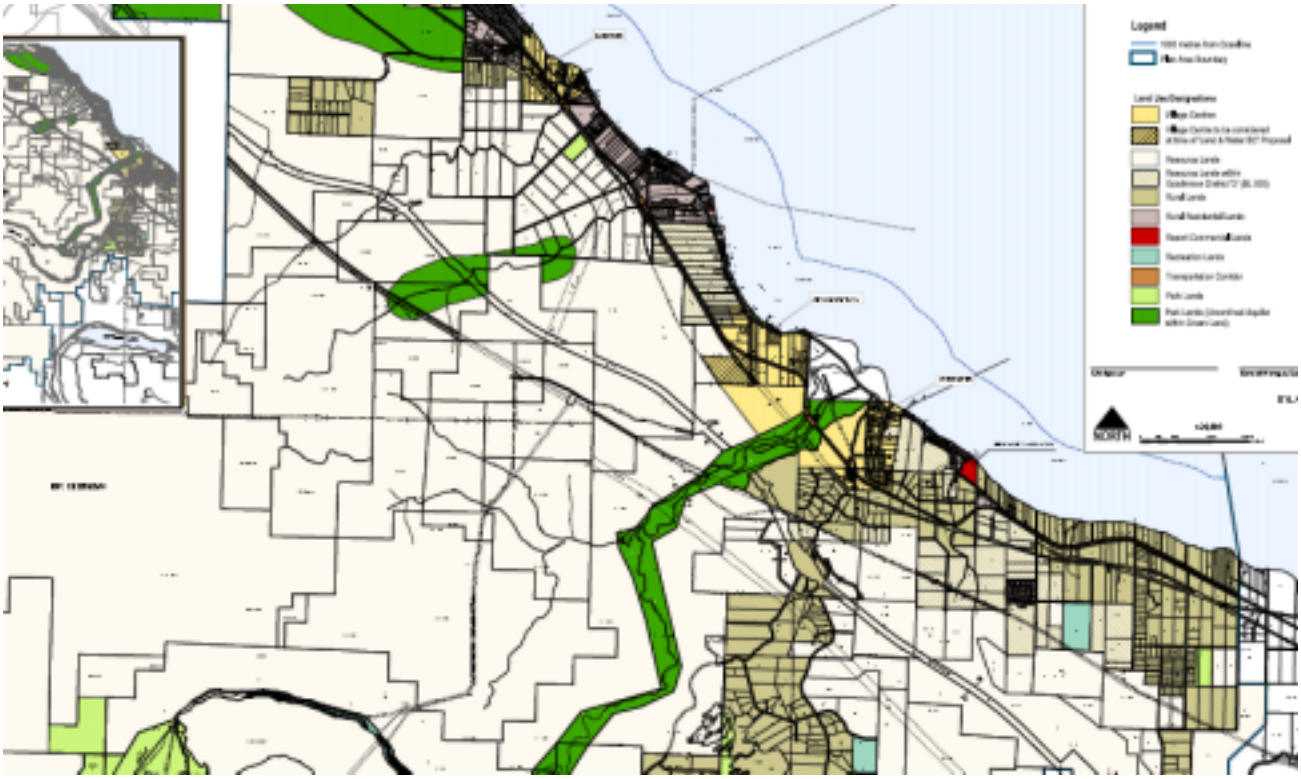


Figure 5. Bow Horn Bay Parks and Green Spaces (OCP).

There are no large parks within the Bow Horn Bay Fire Service Area. Spider Lake Provincial Park and Horne Lake Regional Park are located west of the district. Bow Horn Bay Fire Service Area extends beyond the eastern shores of Spider Lake to the Marshland Road area. The Bow Horn Bay Fire Department regularly responds each summer to human-caused abandoned fires at the Spider Lake area.

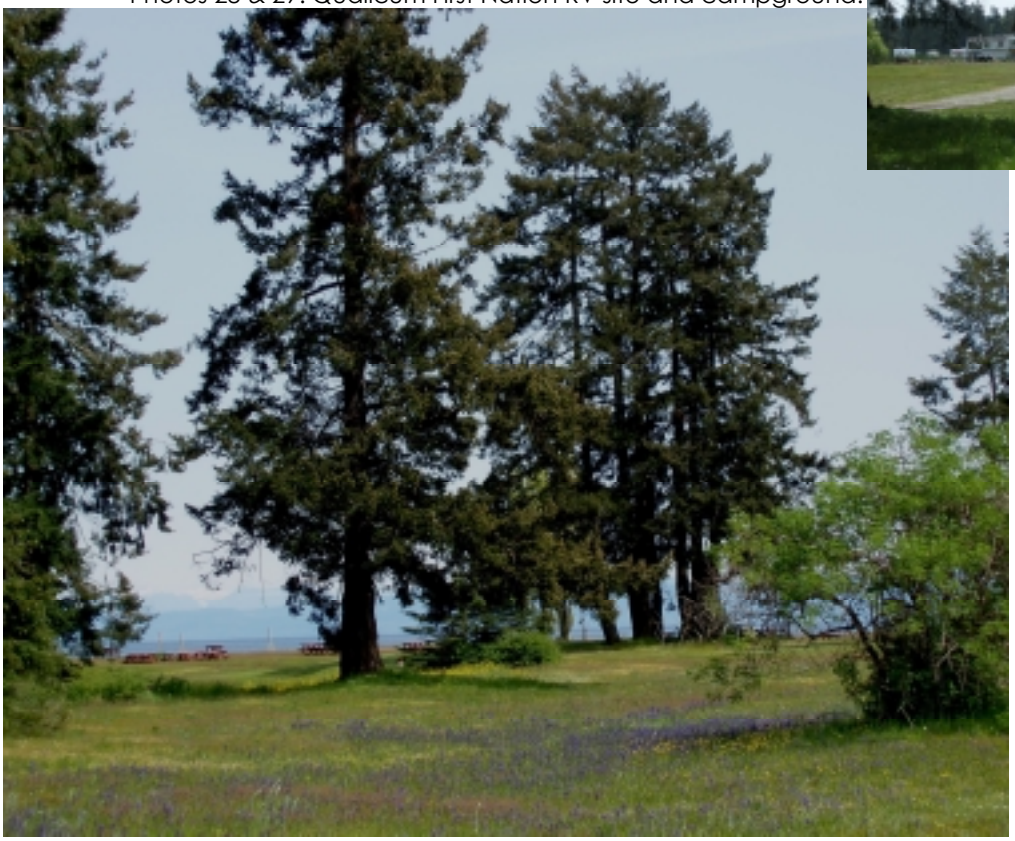
Photo 26. Spider Lake.

Commercial resorts and recreational vehicle (RV) parks and campgrounds at Bow Horn Bay are found primarily along the Oceanside Highway. All of the area's recreational resorts are connected to community piped water. In the event of fire, extensive hose lays would be required to reach some areas.

Photo 27. Sign at Qualicum First Nation campground.

The Qualicum First Nation operates a private RV campground at the estuary of the Big Qualicum River. The Band recently cooperated with the Bow Horn Bay Fire Department on the installation of a new water line. The Fire Department approves of the efforts made by the Qualicum First Nation to promote fire prevention and protection on their lands. Campfires are only allowed in designated spots. Access to the site is controlled through gates that are shut between 9 pm and 7 am.
The Band fully cooperates with the Fire Department during campfire bans.

Photos 28 & 29. Qualicum First Nation RV site and campground.



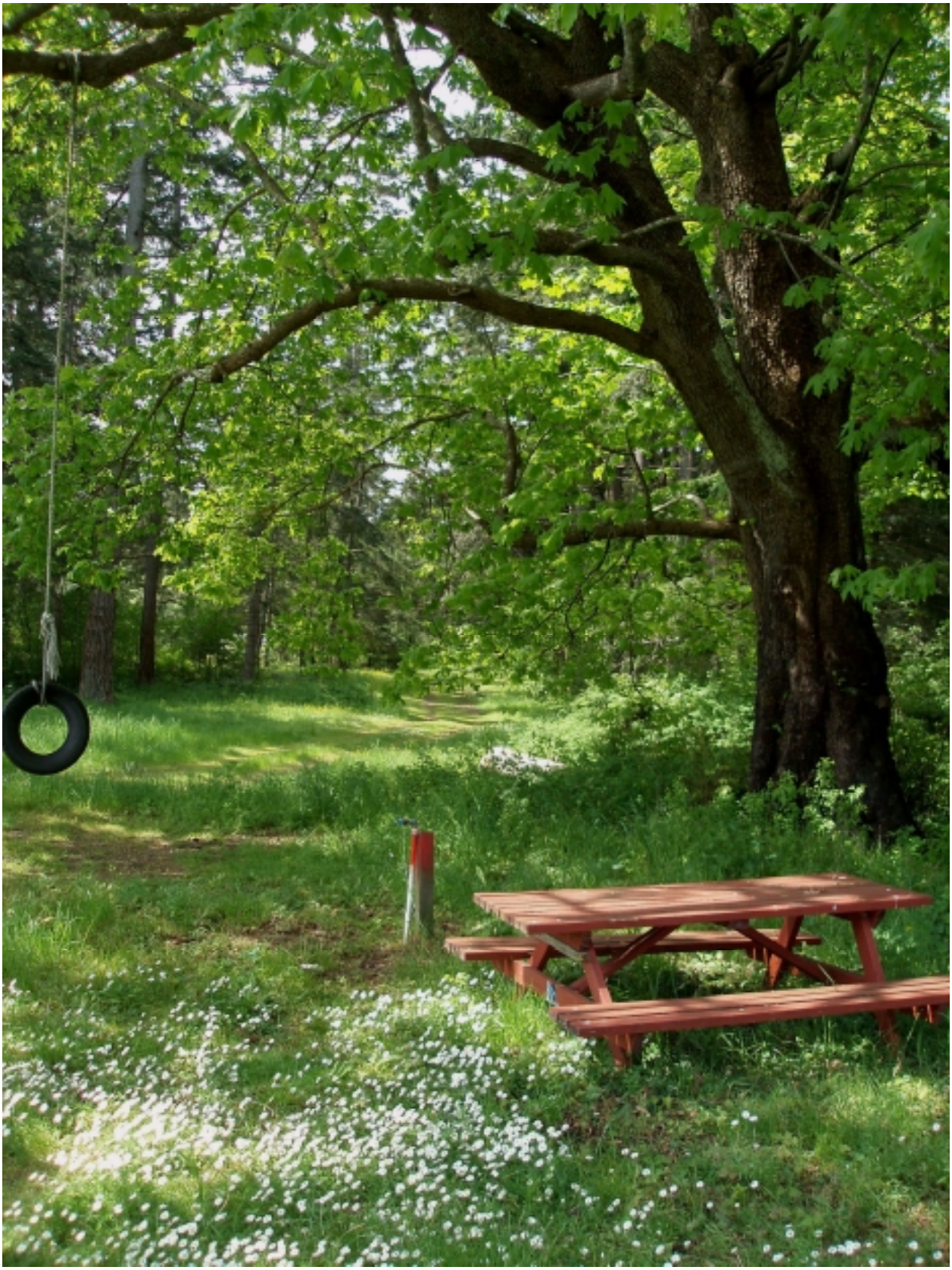


Photo 30. Water tap at Qualicum First Nation campground.

Spider Lake Springs is a summer season recreational vehicle resort at the southern end of Bow Horn Bay. Fire department response time to the area is about twenty minutes. The site operates a limited capacity water system on a 2 – 2 ½" line with small hydrants. In an emergency, small dugout ponds fed from artesian springs could be used for drafting purposes. The site has 3 exits.

Fire Department sources indicate Spider Lake Springs has had only one recent fire incident, which involved a propane fridge exploding. At the height of the summer season, with the campground filled to capacity at 310 sites, over one thousand people could occupy the resort area. The RV sites are situated within close proximity to one another, exacerbating the risk of fire spread. The Fire Department is concerned about "places close together and propane bottles by the millions". The possibility of a fire at Spider Lake Springs, note Fire Department sources, is a "big worry".

Photos 31-33. Spider Lake Springs.

As property values escalate along the southeast coast of Vancouver Island, a growing number of campgrounds and trailer sites are being sold and/or redeveloped as residential properties. The Fire Department wants to ensure adequate fire protection features are incorporated at the time of rezoning.

FIRE PROTECTION AND PREVENTION

BOW HORN BAY FIRE SERVICE AREA

Photo 34. Bow Horn Bay Fire Station.

The area served by the Bow Horn Bay Fire Department originated with a one-truck fire service in the 1950's, evolved to a Fire Protection District with a local board of directors, and, in recent years, has become a Fire Service Area under the Regional District of Nanaimo. The Fire Department responds to both fire and emergency medical calls. In 2006 the Fire Department responded to 89 calls. Call load in the first five months of 2007 exceeded the total call volume of 2004. Call volume has substantially increased in the last five years. Approximately twenty five percent of the annual calls involve fires.

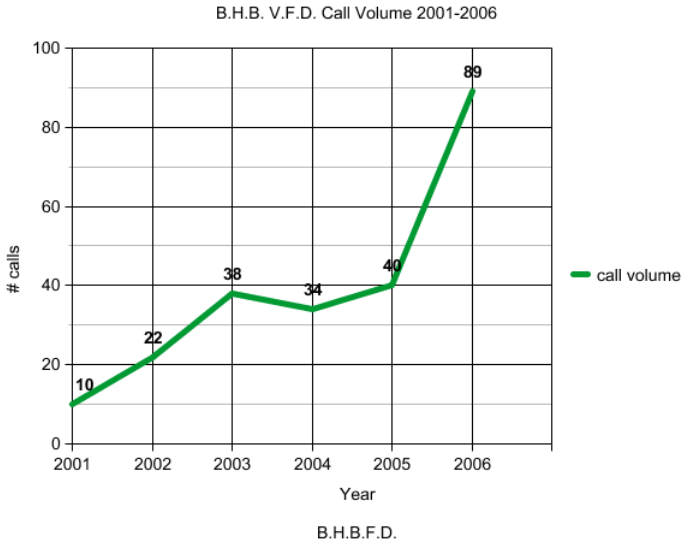


Figure 6. Fire Department Call Volume 2001-2006.

The Bow Horn Bay Fire Department is headed by Fire Chief Steve Anderosov, who has served on the department for twenty years, including the last eight years as chief. Like the heads of many rural Vancouver Island fire departments, Fire Chief Anderosov remarks on the steady increase in Fire Department workload. The Chief muses, "I still don't get to do everything I'm supposed to do".

Chief Anderosov's crew consists of an assistant chief, deputy chief, lieutenant (training officer), three captains, and approximately twenty firefighters. Some senior officers have completed the S-100 (MoFR Basic Fire Suppression and Safety) course. The Training Officer recently qualified to teach the S-215 (MoFR Advanced Fire Suppression and Safety) course.

The average age of firefighters on the volunteer force is approximately thirty five. The oldest member is approaching sixty. The Chief, Deputy Chief, and one Captain are in their fifties. The other captains are in their late thirties.

As with many volunteer fire departments on Vancouver Island, recruitment is an ongoing effort. The Bow Horn Bay Fire Department generally operates with fifteen to sixteen volunteer fire fighters, but often runs with as few as fourteen members. When the force operates with a full complement of volunteers, Fire Chief Anderosov has been heard to comment, "We're up, by the grace of God". The Chief is quick to remark, "no way do we have a wait list". Young, able-bodied people are moving away from the area. Most of the people coming to the area are retired.

The Bow Horn Bay Fire Department operates from one fire station located on Lions Way Road, at Qualicum Bay. About ten years ago, when the Bow Horn Bay Fire Protection District (replaced by the current Fire Service Area) was expanded beyond Spider Lake, a second fire station site was designated on Horne Lake Road near Grumbach's Pit (Photo 35). There are no immediate plans for building the second fire hall.

The Bow Horn Bay Fire Service Area does not extend to the Horne Lake Community, which is beyond the 8-km range of the existing Fire Station on Lions Way. The proposed #2 Fire Hall, which is within the 8-km range of nearly all the lakeside cottages and lies within two kilometres of the regional park at Horne Lake, would have a significant impact on local fire protection.

Photo 35. A second site for a fire station has been designated near Grumbach's Pit on Horne Lake Road.

The Bow Horn Bay Fire Department operates with the following equipment:

- pumper: (1) 1,050 gpm unit with outboard foam educters
- tankers: (2) 1,500 imp. gal. – one of which has a deck-mounted, portable forestry pump used as a car-fire/ interface fire unit w/foam induction at the pump
  -Two tankers carry a total of 6 portable pumps (including 2 floating pumps)
- fire chief's cube van (with four portables) – the addition of a 4WD atv trailer rig is forthcoming
  -cube van also used for MVA responses, as well as a portable refill station for SCBA Bottles
- used BC Ambulance Service ambulance (for First Responders)

The Fire Department operates under a mutual aid agreement (i.e., tanker support) with volunteer fire departments from neighbouring jurisdictions within the RDN (i.e., Dashwood , Deep Bay, Coombs-Hilliers, and Errington). Neither Bow Horn Bay nor Deep Bay Volunteer Fire Department has mutual aid with Fanny Bay, a short distance to the north, in Comox-Strathcona Regional District.

The Bow Horn Bay Fire Department automatically responds to structure fires. Small, easily accessible bush fires are generally suppressed by the fire department. Assistance from the Ministry of Forests and Range is generally requested when larger brush fires occur within or adjacent to the jurisdiction.

Response time from the Bow Horn Bay Fire Hall to most points within the Fire Service Area is eight to nine minutes. Response time to the Spider Lake area is about twenty minutes. The Fire Department notes that after twelve to fourteen minutes, if anyone is trapped in a building, "that's about it". The Fire Department admits that if a fire call comes from the Spider Lake area, "we can't get there in time".

Photo 36. In the summer of 2006, Bow Horn Bay spent 23 days in "Extreme".

"HOT SPOTS"

"We haven't had any significant interface fires." (Bow Horn Bay Fire Department)
"We've been lucky" [a comment echoed from many Vancouver Island Fire Departments].

In the twenty years Fire Chief Anderosov has served on the Bow Horn Bay Fire Department, the force has responded to a number of fires that had potential to become serious interface fires. Fire Department sources recalled recent fires and chronic "hot spots":

- Illusion Lake Rd. area (west side of Spider Lake) – Fire Department is regularly called out each summer to abandoned campfires and problem parties.

- Sunset Terrace – yard fire started by cigarette, spread by a SW afternoon wind. The Fire Department supplied suppression assistance under a Mutual Aid Agreement to the Ministry of Forests and Range.

- Spider Lake Springs – propane fridge ignited
  Fire occurred in "off-season", when there was a low risk of spread to neighbouring trailers.

- Spider Lake area – chimney fire fanned by afternoon southwestern winds quickly engulfed structure; house was a total loss.

- Qualicum Bay area – structure fire "turned into a small forest fire" (Fire Department). Flying embers from a probable arson ignited a number of small brush fires and several large piles of sawdust and hogfuel located near a semi-finished building. Fanned by the wind, the fire spread towards the Qualicum Bay Resort.
  The Fire Department contracted an excavator to work through the night to extinguish the fire in hog fuel piles.

- Inland Island Highway – TimberWest portable crane caught fire in a highway pullout area during the dry spring of 2005, igniting a brush fire which spread into TimberWest property.
  Bow Horn Bay Fire Department provided suppression assistance (ground attack crew and two tankers) under a mutual aid agreement to the Ministry of Forests and Range. Mars waterbomber support was required to extinguish the fire (Photo 37).

Photo 37. Mars waterbomber support was required to extinguish a fire along the Inland Island Highway.

- Qualicum Bay – cedar shakes ignited at a resort; fire quickly spread in a 12-15 mph breeze.

- Trailer fire – backyard fire escaped. Trailer saved with garden hose.

- Spider Lake area – escaped debris pile fire. Fire set by firewood contractor attempting to clean up logging slash.

- Human-caused fire at a 115-yr old heritage home (once the home of MacMillan Bloedel forestry giant, H.R. MacMillan) linked to a simultaneous arson fire in a travel trailer at Qualicum Bay Resort.

- Human-caused car fires in hard-to-access bush areas.

Photo 38. Fire hazard rating sign at Bow Horn Bay.

BIOPHYSICAL ATTRIBUTES

CLIMATE AND BIOGEOCLIMATIC CLASSIFICATION

Biogeoclimatic Ecosystem Classification (BEC) groups similar segments of the landscape into categories of a hierarchical classification system. British Columbia is classified into fourteen Biogeoclimatic Zones (BC Land Management Handbook No. 28). Geographic areas influenced by similar regional climates are classified into biogeoclimatic units. Ecosystems within biogeoclimatic units define particular plant communities and their associated topography, soil, and climate.

Climate is the most important factor influencing the development of forest ecosystems. Variation in ecosystems reflects the effect of climate on topography and soils. Climate affects vegetation structure, historical wildfires, and, on a shorter time frame, fire danger.

Located in the rainshadow of the Vancouver Island Ranges, Bow Horn Bay is classified in the moist maritime Coastal Douglas-fir Subzone (CDFmm). The CDFmm extends along the southeast coast of Vancouver Island, inland to approximately 150 – 200 m above sea level (asl). With warm, dry summers and mild, wet winters, the CFDmm has the mildest climate in Canada.

Forests in the CDFmm are dominated by Douglas-fir, with lesser amounts of western redcedar. Shore pine is found is several areas (i.e., Spider Lake). Deciduous trees (i.e., broadleaf maple, red alder, wild cherry, dogwood) may occupy moister sites. It is not uncommon to find arbutus on warm, well-drained aspects. Prominent understorey plant species in the CDFmm include dull Oregon grape, sword fern, salal, ocean-spray and bracken fern.

Prevailing Pacific Coast weather systems during the fire season (April to October) can vary from moderately moist (low to moderate fire hazard conditions) to windy and excessively dry patterns (high to extreme fire hazard conditions). Net radiation values are generally high. Moisture deficits are common in summer, when evaporative demand is at a maximum.

FIRE HISTORY

For thousands of years prior to European settlement, infrequent fires swept through the forests of the Pacific Northwest (Table 1). The majority of fires were sparked by lightning. Aboriginal peoples established a fire regime in order to cultivate plants for food and medicine. The result was a varied mosaic of forest stands and habitats.

Table 1. Mean forest fire return interval and fire size

Biogeoclimatic Unit	Mean Historical Wildfire Fire Return Interval (Years)			Fire Size (ha)		
	Minimum	Average	Maximum	Minimum	Average	Maximum
CDFmm	50-100	100-300	300-400	0.1-5	5-50	150-550

(BC Ministry of Forests and Range)

Periodic low intensity surface fires reduced natural fuel loading and recycled nutrients. In the last century, the demise of traditional aboriginal cultural land management practices, and the advance of modern fire suppression have increased natural fuel loading. As growing populations move into wildland urban interface areas, the number of anthropogenic fires is increasing. From an ecological perspective, human-caused fires occur at random, and do not conform to a previous fire regime, to which native flora and fauna have adapted.

Photo 39. Wildland firefighter.

Post-settlement, the number of fires spiked as a result of land clearing and historical logging practices.

PHYSIOGRAPHY AND SOILS

Landforms and soils influence fire behaviour by affecting ignition and the rate of fire spread. Fires are more likely to spread rapidly on steep slopes with warm dry aspects, and in ravines and gullies, than on moist flat areas.

Photo 40. Wildfire spreading up a steep slope.

Bow Horn Bay is located in the Nanaimo Lowland Ecosection – a coastal plain on the south-eastern margin of Vancouver Island. This low-lying area developed in prehistoric times when ancient rivers, seas, and rivers of ice deposited marine, fluvial, and fluvioglacial deposits on the landscape.

In the event of extreme fire weather (high temperature and low humidity) unusually strong afternoon winds could spread fire rapidly through extensive areas of lowland forest at Bow Horn Bay.

Common soil types – Duric Dystric Brunisols, Duric Humo-Ferric Podzols, Gleyed Humo-Ferric Podzols, and Orthic Humo-Ferric Podzols – reflect local climatic conditions (dry summers and moist winters) and variable drainage.

SECTION 3. PREPARATION OF THE COMMUNITY WILDFIRE PROTECTION PLAN

Preparation of the Community Wildfire Protection Plan for Bow Horn Bay followed steps outlined in FireSmart (*FireSmart: Protecting Your Community from Wildfire*, Partners in Protection, 2003).

STEP ONE: Plan Overview – Objectives and Goals

Objectives and goals of the Community Wildfire Protection Plan were reviewed with the Union of BC Municipalities, Bow Horn Bay Fire Department, Regional District of Nanaimo, and Ministry of Forests and Range Protection Branch.

STEP TWO: Data Acquisition and Information Sharing

Identification and acquisition of resource and community information is necessary in order to share perspectives, priorities, and objectives relevant to the planning process.

Community-planning guides and resources are sources of useful information:

- *FireSmart – Protecting Your Community from Wildfire* (2nd Edition, Partners in Protection, 2003) www.partnersinprotection.ab./ca
- *Firestorm 2003 Provincial Review* (The Hon. G. Filmon, 2004) www.2003.firestorm.gov.bc.ca
- *Addressing the Interface Fire Hazard – A Case Study of the District of Langford* (District of Langford, 2002)
- *Water Supply for Public Fire Protection (*Fire Underwriters Survey, 1999*)*
- *S-100 (BC) Basic Fire Suppression and Safety* (MoFR, 2004)
- *National Fire Protection Association (NFPA) Standards* (NFPA, Massachusetts, US*A)*
- *RDN Electoral Area "H" Official Community Plan* (2005, Bylaw No. 335)
- *Regional District of Nanaimo website www.rdn.bc.ca*
- *MoFR website www.for.gov.bc.ca/Protect*

STEP THREE: Hazard - Risk Assessment

Hazard-risk models used to evaluate interface hazard and risk were:

- Canadian Forest Fire Danger Rating System
- Community Interface Fire Hazard Assessment (FireSmart)
- Hazard-Impact-Risk-Vulnerability Assessment

(Strategic Threat Analysis [STA] mapping, a recent introduction to BC fire prediction modeling, was not used due to the limited applicability to Vancouver Island.)

STEP FOUR: Hazard Mapping

Interface hazard mapping was developed in order to identify:

- Areas at potential risk from wildland fire
- A designation of the community's wildland urban interface zone

The Regional District of Nanaimo provided base mapping (topographic, cadastral, and ortho) for field work. Global information system (GIS) based mapping provided a useful tool for spatially identifying the severity of a wildfire hazard. Pre-mapping was confirmed with ground truthing of lands in and adjacent to the area. Madrone Environmental Services Ltd. converted field mapping data (using ArcGIS 9.2 software) to digital format (shape files). Map data are compatible to the GIS system used by the provincial government.

STEP FIVE: Community Hazard Reduction Priorities

Once the community assessment and base map were completed, local protection and hazard mitigation needs were analysed.

STEP SIX: Action Plan

Mitigation measures were identified in an action plan.

STEP SEVEN: Education and Awareness

The process of developing a Community Wildfire Protection Plan can lead community members through valuable discussions regarding management options and implications. Effective public education and awareness will help motivate people to create FireSmart communities.

STEP EIGHT: Implementation

Community planning officials must mutually agree on fuel management priorities, equipment needs, requirements for additional local planning tools, and other necessary actions. Local government should establish an assessment strategy for the Community Wildfire Protection Plan to ensure the plan maintains its relevance and effectiveness over the long term.

SECTION 4: HAZARD-RISK ANALYSIS

HAZARD ASSESSMENT METHODOLOGY

Hazard assessment methodology was based on standard fire danger and hazard assessment models:

- The **Canadian Forest Fire Danger Rating System** (CFFDRS) – internationally recognised fire danger rating system
- **Interface Community Fire Hazard analysis** - quantitative assessment of interface fire hazard (based on FireSmart)
- **Hazard, Impact, Risk and Vulnerability (HIRV) model** – community risk assessment

Canadian Forest Fire Danger Rating System: Developed by Forestry Canada, the CFFDRS comprises two major subsystems: the Fire Weather Index (FWI) system and the Fire Behaviour Prediction (FBP) system (Figure 7).

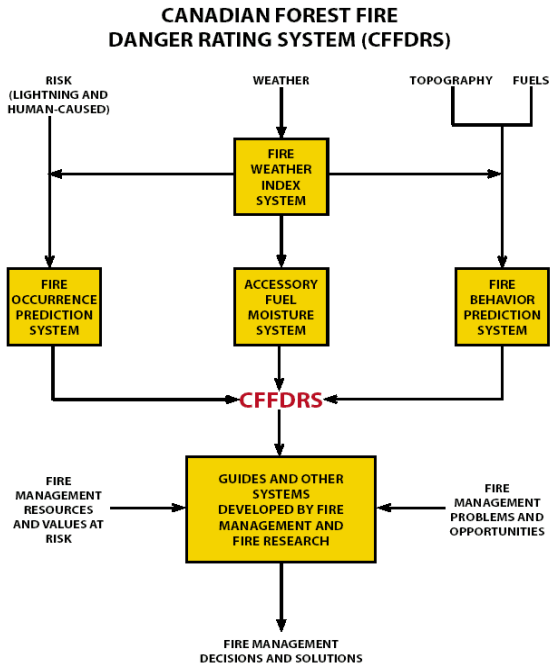


Figure 7. Canadian Forest Fire Danger Rating System.

The Fire Weather Index system accounts for the effects of fuel moisture and wind on ignition potential and probable fire behaviour. Fuel moisture codes reflect the fuel moisture content of fine surface litter (Fine Fuel Moisture Code – FFMC), loosely compacted duff of moderate depth (Duff Moisture Code – DMC), and deep compact organic matter (Drought Code – DC).

The FWI fuel moisture codes plus wind are linked in pairs to form two intermediate and one fire behaviour index. The Initial Spread Index (ISI) combines the effects of wind and fine fuel

moisture content (FFMC). The Buildup Index (BUI), based on DMC and DC represents a measure of the total fuels for combustion.

The Fire Behaviour Prediction System predicts the rate of spread, fuel consumption, and intensity of wildfires. Fire Danger Class Ratings (DGR) are calculated based on the fire weather indices from a network of automated weather stations (Table 2).

Table 2. Fire Danger Class (DGR)

Build-up Index (BUI)	**Fire Weather Index (FWI)**				
	0	***1-7***	***8-16***	***17-30***	***31+***
0-19	I	II	II	III	III
20-42	II	II	III	III	IV
43-69	II	III	III	IV	IV
70-118	II	III	IV	IV	V
119+	III	III	IV	V	V

FWI = Fire Weather Index; BUI = Buildup Index

Fire Danger Class I Very Low

Fire Danger Class 2 Low

Fire Danger Class 3 Moderate

Fire Danger Class 4 High

Fire Danger Class 5 Extreme

DGR Rating	**Description**
Class 1	Forest fire is not likely to start. (**VERY LOW**)
Class 2	Forest fire danger is **LOW.** It is possible for fires to start in light flashy fuels, but they will have a slow rate of spread.
Class 3	Fire danger is **MODERATE**. Fine fuels in open areas and sunny slopes may spread rapidly. Use caution during any forest activities.
Class 4	Fire danger is **HIGH**. Fires will start easily from all causes, and will spread rapidly, and increase in intensity - they will be hard to extinguish. Spot fires may occur and will burn deep. Extreme caution must be used in any forest activities. Burning permits and industrial activities may be restricted.
Class 5	Forest fire danger is **EXTREME**. Small fires will spread very rapidly - they will be hard to extinguish. Severe spotting may occur. Mop-up will require a great deal of effort. General forest activities may be restricted, including burning permits, industrial permits, and campfires.

Photo 41. Wildfire.

Over the last decade, local fire weather data from the Ministry of Forests and Range Coastal Fire Centre indicate long periods of days at Bow Horn Bay in Fire Class Hazard 3 (moderate danger class) or higher. During the summer of 2006, the Bow Horn Bay Fire Department registered 23 consecutive days in "Extreme".

Interface Community Fire Hazard Analysis: The Ministry of Forests and Range Protection Branch "Interface Community Fire Hazard" analysis (customised for use on the BC south coast) provides a quantitative procedure for assessing the interface fire hazard. Based on FireSmart, over twenty five risk factors are rated (i.e., fuel types; potential fire behavior; structures at risk; susceptibility to ignition; suppression constraints; general location; fire history; type of development; access; above-ground utility corridors; tenure types; developed recreation sites; watersheds; wildlife habitat; cultural features).

The Interface Community Fire Hazard analysis assigns points – the greater the hazard, the greater the number of points – to each hazard-risk factor. Hazard categories are low, moderate, high, and extreme. An interface area, site, or structure is not considered to be "fire safe" unless it obtains a low or moderate assessment score.

Hazard, Impact, Risk and Vulnerability (HIRV) Process: Risk assessments allow communities to anticipate and reduce the impacts of natural and manmade hazards by analysing current and historical data and information resources. The HIRV model is a useful planning tool for local governments.

The HIRV process consists of:

- Hazard Identification
- Risk Analysis
- Vulnerability Assessment
- Impact Analysis
- Risk Management

Hazard can be loosely thought of as the product of risk, vulnerability, exposure, and the capacity of humans to respond to extreme conditions. For the purposes of this report, hazard refers to an unplanned or unwanted natural or human-caused fire, or a prescribed fire that threatens to escape.

Risk is a measure of the probability of occurrence of an event and the expected severity, and an analysis of potential factors (human or natural) which can contribute to the potential for fire occurrence.

Risk should not be confused with risk of ignition. For the purposes of this report, the probability of ignition can be accounted for by assigning a higher hazard rating to areas where fires are most likely to be started.

Vulnerability defines the ability of people, property, industry, resources, and areas of environmental and historic concern to weather, resist, or recover from the impacts of a hazard in the long term as well as the short term.

Impact is assessed through an analysis of social, environmental, economic, and political factors. Impact analysis provides the necessary links between vulnerabilities and hazards.

SECTION 5: FIRE BEHAVIOUR

FIRE BEHAVIOUR TRIANGLE

Fire behaviour is the manner in which fuel ignites, flame develops, and fire spreads. A wildfire behaves according the environment in which it is burning. Fire behaviour is affected by three elements of the fire environment – fuel, weather, and topography (Figure 8).

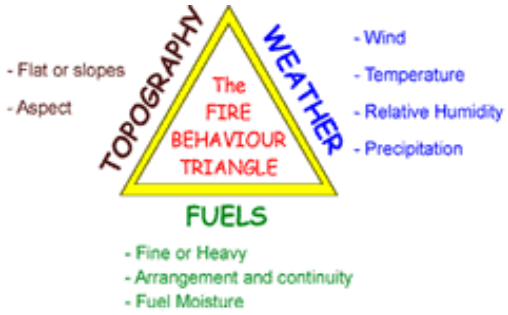


Figure 8. Fire Behaviour Triangle

A change in any of the components of the fire environment will cause a change in the behavior of the fire – the change can be very abrupt and rapid. Of the elements affecting fire behaviour, only fuel can be managed (see Table 3).

Table 3. Fire Behavior Triangle Components

Weather	Wind	Wind can push a fire forward; fires also create their own wind currents.
	Temperature	Heat results naturally (lightning strike) or is introduced by people.
	Relative Humidity	Low relative humidity can dry out fuels, causing them to ignite more easily.
	Precipitation	Precipitation can put out a fire; conversely, a lack of precipitation dries fuels, increasing the fire threat.
Topography	Flat or Slopes	A fire moves more rapidly up hills.
	Aspect	A fire is more likely on drier southern and western aspects.
Fuels	Light or Heavy	The drier and lighter the fuels, the more easily they will ignite.
	Arrangement	A continuous layer of fuels on the forest floor aids the spread of a fire.
	Fuel Moisture	Low fuel moisture can promote chance of ignition and increase fire spread.

Adapted from U. S. Dept. of Agriculture – Forest Service

ASSESSMENT OF WILDFIRE HAZARD

Potential wildfire hazard was assessed using standard criteria:

1. Fire behaviour (including fuel types)
2. Risk of ignition
3. Structures at risk
4. Suppression constraints

FIRE BEHAVIOUR AND FUEL TYPES

Fire behaviour predicts how wildfire will behave under extreme weather conditions. Fire weather, fuel types and topography were analysed to predict three output fire behaviour factors:

1. Fire Intensity – a measure of the rate of heat energy released – based on the rate of spread and predicted fuel consumption.

2. Rate of Spread – measure of the speed at which a fire extends horizontally – based on the hourly Initial Spread Index (ISI) value, and adjusted for steepness of slope.

3. Crown Fraction Burned – measure of the proportion of tree crown involved in a fire – based on the rate of spread, crown base height, and foliar moisture content.

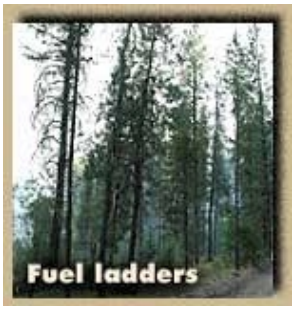
Fire behaviour predictions are linked to fuel types. Any substance that will burn is a fuel. Forest fuels are typically classified according to the forest layer in which they are burning – ground, surface, or crown:

- Ground fires creep through the duff (organic soil) and decaying woody material beneath the forest floor.
  Ground fires often smolder for a long time. Ground fires are persistent, slow burning, and difficult to detect.

Photo 42. Ground fire.

- Surface fires burn needles, cones, twigs, branches, logs, stumps, and leaves on the forest floor, in addition to lower branches of standing timber.
  Surface fuels include "ladder fuels" (aerial fuels) – i.e., branches, leaves, and bark on tall bushes; the lower branches of trees; or young understorey trees – which help

ground and surface fires spread upward through the forest canopy into the tree crowns. Surface fires spread more rapidly by wind.

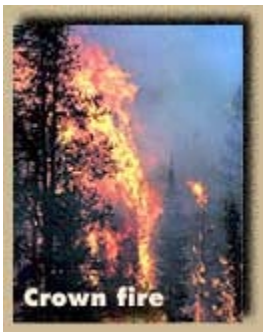


Photos 43-45. Surface fuels; surface fire; fuel ladders.

- Crown fires burn in the upper foliage and branches, and also consume surface and ground fuels. Crown fires occur when high-intensity surface fire spreads ("ladders") through the lower foliage into the canopy above. Crown fires spread from tree to tree.
  Crown fires travel quickly, are difficult to control, and are the most destructive fires.

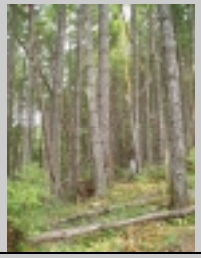
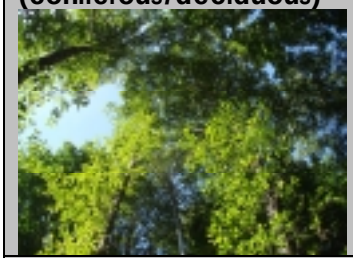
Photo 46. Crown fire.

U.S.F.S. photos



The Fire Behaviour Prediction System uses sixteen benchmark fuel types, divided into five major groups, to forecast how a wildfire will react. Fuel types are described qualitatively, rather than quantitatively, according to ground, surface, and crown characteristics of the forest stand. Table 4 provides a summary of major fuel types in the local area, based on the Canadian Forest Fire Behaviour Prediction (FBP) System*.

*N.B. FBP System fuel types are generic; they represent a type of behaviour pattern, rather than the specific type of stand found in an area.

Table 4. Fuel Types – Bow Horn Bay Fire				
	Fuel Characteristics			
Layer: / Fuel Type Complex:	Forest Floor and Organic Layer	Surface and Ladder Fuels	Stand Structure and Composition	Comments – Distribution Mitigation
Coniferous stands 	-typified by a moderately shallow organic layer (duff): needle litter, small twigs, cones, and feather moss	-discontinuous to moderately continuous understorey -proportion of ladder fuels varies between younger immature stands and older mature stands;	-immature to mature stands of Douglas-fir (with western redcedar, and minor hemlock and grand fir) -moderately well-stocked to dense stands	Extensive coniferous stands throughout Bow Horn Bay
Affect on fire behaviour:	Thick duff layers increase chance of ignition and spread	Ladder fuels increase potential for surface fire climbing into crowns During extreme fire weather, surface fuels dry out and become very flammable (i.e., bracken fern)	Dense stands with high fuel loading pose greatest risk. Ladder fuels will facilitate spread of a ground fire upwards into tree crowns. Crown fires spread quickly, and are difficult to control	Extreme fire weather exacerbates risk of ignition and spread of wildfire
Pine /(Douglas-fir) Stands 	-typified by a continuous layer of needle litter, small twigs, cones, and feather moss	-tends to have high proportion of ladder fuels (lower live and dead branches, shrub layer, downed stems)	-generally comprised of younger, immature stands -often densely stocked -low height to live crown	Widely distributed on rapidly-drained, sandy loam soils in eastern parts of the area
Affect on fire behaviour:	High capability of carrying surface fire	High capability of carrying surface fire into crowns	Crown fires more common in dense pine-dominated stands	Extremely flammable
Mixed wood stands (coniferous/deciduous) 	-discontinuous to continuous leaf and needle litter -organic layers are generally uncompacted and friable	-sparse to continuous herb layer -moderate to continuous shrub layer -ladder fuels often extend to ground	-moderately well-stocked mixed stands of Douglas-fir and western redcedar, with broadleaf maple and red alder	Distributed throughout area, especially by water-courses. Shade is beneficial.
Affect on fire behaviour:	Low to mod. capability of carrying surface fire	Risk of fire spread increases in extreme fire weather, when deciduous leaves dry out.	Local stands contain sufficient proportion of flammable coniferous trees to sustain and spread a wildfire, especially during extreme fire weather.	Fuel types differentiated by season and percent conifer/decid-uous composition.

Slash 	-moderately deep to deep uncompacted to compacted organic layer, often with continuous needle litter and accumulations of feather moss	-moderate to high foliage retention (especially if there is a high content of western redcedar)	-individual and clumps of standing trees sometimes scattered through logged areas	Active logging/land clearing - private lands, private forestry lands, and Crown Lands.
Affect on fire behaviour:	High risk of ignition and spread during extreme fire weather		Dead standing trees act to spread a ground fire into crowns of adjacent stands.	May be highly flammable (flammability increases with cedar content)
Grass 	-continuous live and dead grass litter (may be cured depending on weather) -shallow, moderately compacted organic layer	-discontinuous to continuous with scattered shrubs; -in early summer: grass is generally green -in late summer, brown cured grasses greater fire hazard on coast	Clumps of brush species and trees increase potential for fire spread.	Primarily limited to coastal areas (i.e., Big Qualicum River estuary). Well maintained by First Nations.
Affect on fire behaviour:	Low to high risk of ignition & spread (depending on season)	Low to mod. risk of ignition and spread (depending on season)		Wind will spread fire rapidly in dried, cured grass

RISK OF IGNITION

The risk of ignition at Bow Horn Bay is primarily from human activity. Common human-caused ignition sources include: discarded cigarettes and matches from smoking, campfires, motorised machinery (i.e., welding equipment), motorised recreational vehicles (i.e., dirt bikes), and fires started in homes or backyards adjacent to woodland areas.

Ninety nine percent of the wildfires started on Vancouver Island are human-caused.

Table 5. Risk of ignition

Location	Probability of Ignition
Areas within 20 m of any roads and trails	Moderate to High
Areas within 20 m of power lines	High
Areas within 100 m of housing	High
Areas frequented by party goers	High

Photo 47. Interface fire.

STRUCTURES AT RISK

Structures at risk include all human-made structures (buildings and facilities) that have the potential to be destroyed or damaged by wildfire.

The range of structure types at Bow Horn Bay includes new and older commercial buildings, residential homes, and resort accommodations. (Table 6).

Table 6. Structures at Risk

Unnatural Fuel Types- Structures at Risk (human structures and facilities)	-Construction materials of local structures in high-risk interface areas vary from highly combustible (i.e., cedar shake roofing; wood siding) to fire-retardant (metal roofs, cementitious siding materials). -Many structures in high-risk interface areas are surrounded by flammable vegetation.	-100 m zone around structures and facilities in high-hazard interface areas at greater risk
Affect on fire behaviour:	-Difficult-to-access structures with inadequate fireflow have highest risk. -Remote structures constructed with flammable materials (combustible roof-covering assemblies and non fire-resistant siding), surrounded by forest coniferous cover present very high risk. -Extreme fire weather, combined with poor access, will challenge suppression efforts.	Reduce interface fire risk by promoting: -fire-resistant construction -vegetation management -infrastructure improvement

Photo 48. Interface fire (photo - FireSmart, 2003).

SUPPRESSION CONSTRAINTS

Suppression constraints are based on the availability of:

- suppression resources
- access restrictions
- topographical features

Suppression response to flat, well-roaded neighbourhoods with hydrants within close proximity to a fire station will be relatively fast, compared to poorly accessed, rugged perimeter areas with no water supply for fireflow. Access to water sources (fire hydrants) is vital for fire suppression. Areas further than 300 m from a fire hydrant pose a higher risk (and are usually subject to higher insurance premiums). Areas further than 8 km from a fire station are generally outside fire protection boundaries.

Table 7. Suppression Constraints

Factor	Specifics	Rating
Distance from roads	0-50 m from a road	Low
	50-100 m from a road	Moderate
	>100 m from a road	High
	>300 m from a road	Extreme
Gradient of roads	All-weather road surface (i.e., paved):	
	<20%	Low
	≥20%	Moderate - High
	Gravel	
	<15%	Low - Moderate
	≥15%	High - Extreme
Availability of water sources	Areas < 300 m from a fire hydrant	Low
	Areas > 300 m from a fire hydrant	High
Distance from fire hall	Areas < 8 km from a fire station	Low
	Areas > 8 km from a fire station	High - Extreme

Photo 49. Fire suppression.

SECTION 6: COMMUNITY RISK ASSESSMENT (HIRV MODEL)

A Hazard-Impact-Risk-Vulnerability (HIRV) model was developed to compare the potential impact of interface fire at various areas at Bow Horn Bay. Examples below highlight two contrasting interface areas: Spider Lake area (extreme risk of interface fire), and Qualicum Bay Village (moderate risk rating) (Tables 8, 9).

Table 8. Hazard Impact Risk and Vulnerability Model. Wildfire Hazard – Midsummer

Hazard	Risk Rating	Certainty	Vulnerability Rating	Certainty	Impact Analysis*	Certainty	Risk and Vulnerability Analysis
Wildfire Hazard – Interface Zone - Spider Lake	**Extreme**	**Data is well established**	**High to Extreme**	**Data is well establish'd**	**Env=3 Soc=1-2 Econ=1 Pol=1-2**	**Data is well established**	**Risk=Extreme Vulnerability= Extreme**

***** Env=Environmental Soc=Social Econ=Economic Pol=Political Ratings: 1=Low, 2=Moderate, 3=High, 4=Extreme

Table 9. Hazard Impact Risk and Vulnerability Model. Wildfire Hazard – Midsummer

Hazard	Risk Rating	Certainty	Vulnerability Rating	Certainty	Impact Analysis*	Certainty	Risk and Vulnerability Analysis
Wildfire Hazard – Qualicum Bay Village	**Mod**	**Data is well established**	**Low-Moderate**	**Data is well establish'd**	**Env=1-2 Soc=2-3 Econ=1-2 Pol=1-2**	**Data is well established**	**Risk=Mod Vulnerability= Low-Moderate**

***** Env=Environmental Soc=Social Econ=Economic Pol=Political Ratings: 1=Low, 2=Moderate, 3=High, 4=Extreme

Impact factors in the HIRV community risk assessment are outlined in Table 10.

Table 10. Impact Factors

Impact Analysis		
Impact	**Examples**	**Rating**
Social	-possible injuries -possible deaths -loss of housing -disruption of family life -critical facilities lost	**Low -** Minor disruption of society **Medium** - Possible injuries and small-scale disruption of family life **High -** Serious injuries; large-scale community disruption **Extreme -** Multiple fatalities; major disruption of community life and loss of critical facilities
Political	-coerced risks -catastrophic risks -unresponsive process -memorable events -industrial risks	**Low** - Minor opposition **Moderate** - low level of political backlash – intervention may be required **High** - significant event embroils government - major actions required **Extreme** - Significant intervention required from all levels of government In the event of a major catastrophe government declares "Disaster Area"
Environmental	-quality of life -water quality -destruction of natural resources	**Low** - Minimal environmental impact at area of effect **Moderate** - Regional environmental damage **High** - Long-term recovery. Requires significant after action **Extreme** - Severe long-term effects on biodiversity
Economic	-structural; non-structural damage -loss of services; jobs -loss of revenue	**Low** - Economic impact minimal **Moderate** - Loss of business **High** - Regional long term loss **Extreme** - Chronic long-term economic downturn

SECTION 7. WILDLAND-URBAN INTERFACE FIRE HAZARD RATING

Wildland Urban Interface mapping was conducted using four standard Ministry of Forests and Range wildland urban interface hazard mapping classes: Low, Moderate, High, and Extreme (Table 11). Hazard mapping criteria were reviewed with the Bow Horn Bay Volunteer Fire Department.

TABLE 11. WILDLAND-URBAN INTERFACE FIRE HAZARD RATING CLASSES

Low – urban, suburban, and farm areas with modified forest fuels; generally flat terrain; no readily combustible vegetation; superior fire protection with fast response times; minimal history of interface fires; low risk to adjacent development

Moderate – partially modified forest fuels; scattered mixed forest in suburban areas; moderate to good water availability; good fire protection coverage with adequate response times; periodic fire starts; gentle to sloping topography; homes and structures may be threatened

High – areas with little or no fuel modification; continuous ground fuels; sloping terrain with/without gullies present; moderate to low availability of water; delayed fire protection coverage, or no fire protection; some areas hard to access; direct threat to homes/structures/values

Extreme – areas with little or no fuel modification; continuous ground fuels; rolling and gullied terrain; rock outcrops may be present; little or no water availability; often outside fire protection boundaries; some inaccessible terrain; may or may not have heavy use (recreation/resource industry); often has history of frequent fire starts; direct threat to homes/structures/values

Adapted from MoFR

Approximately 80% of the Fire Service Area served by the Bow Horn Bay Fire Department was assessed with a high to extreme hazard interface fire hazard rating.


Photo 50. Wildfire.

Areas with a **Low** interface fire hazard usually consist of "built-up", serviced, development (i.e., residential, commercial structures) with a superior transportation network and good fireflow. Areas with a Low interface fire hazard rating could also include well-maintained urban parklands, irrigated golf courses and agricultural lands, and natural wetlands.

Local Examples: no significant areas

Table 12. General Characteristics of Areas with Low Interface Fire Hazard.

Fire Behaviour	Low Fire Intensity - low Rate of Spread – slow (flat to gentle slopes) Crown Fraction Burned - low
Risk of Ignition	Low – limited ignition sources.
Structures at Risk	Low – developed areas have high degree of modified natural fuels.
Suppression Constraints	Low – good access and fireflow; close to fire station.
Comments	Low concern - "built-up" areas; modified fuels; good detection.

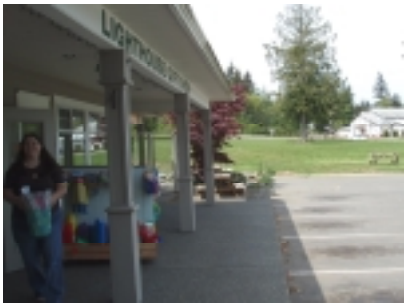
Areas with a **MODERATE** interface fire hazard rating at Bow Horn Bay include small areas of established residential and commercial properties with reasonable to good fire suppression capabilities within close proximity to the fire station.

Examples: "developed" portions of coastal fringe, including village areas of Qualicum Bay, Bowser, and Dunsmuir.

Table 13. Moderate WUI Hazard Areas.

Fire Behaviour	Moderate Fire Intensity - low Rate of Spread – slow (flat to gentle slopes) Crown Fraction Burned - low
Risk of Ignition	Moderate – forested/bush areas near structures constitute ignition risk.
Structures at Risk	Moderate – small rural villages with varying degrees of natural fuel loading. Limited areas of modified natural fuels.
Suppression Constraints	Low to Moderate – fireflow adequate (hydrants) to inadequate (limited and/or no hydrants). Reasonable access, although access to back ends of long rural lots is problematic.
Comments	The area contains a maximum of 67 fire hydrants. A significant proportion of hydrants and water lines do no meet current FUS standards for fireflow.

Photos 51-54. Areas with a Moderate interface fire hazard are found along the coastal fringe. Well-established "developed" areas contain a significant component of unmodified natural fuels.



Areas with a **HIGH** interface fire hazard rating at Bow Horn Bay include large, forested properties with poor access and inadequate fireflow.

Examples: "long" forested lots between the E&N Rail Line corridor and the Oceanside Highway; properties at east end of area between Inland Island Highway and Oceanside Highway (i.e., Olympic Springs, Whistler Rd.)

Table 14. High WUI Hazard Areas.

Fire Behaviour	High Fire Intensity - high Rate of Spread – rapid (if fanned by wind) Crown Fraction Burned – moderate to high
Risk of Ignition	High - close proximity of continuous wildland fuels to structures - early detection is key to swift ignition
Structures at Risk	High – homes, commercial buildings, and resorts located within or adjacent to areas with high fuel loading. Development generally buffered by roads and water; high intensity fire could cross buffers.
Suppression Constraints	Low to High – range of fire suppression resources (from good access and fireflow to poor fireflow or fireflow lacking; some areas have difficult access)
Comments	Primary concerns are fire behaviour characteristics, constraints to suppression, and growing number of human-caused fires. Early detection and rapid response have contributed to successful suppression of recent blazes.

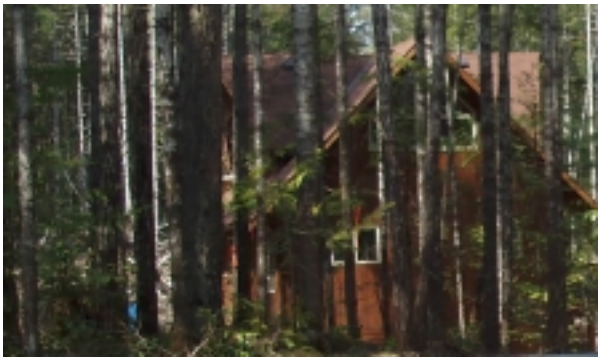
Photos 55. Large forested properties with inferior suppression capabilities have a high interface fire hazard.

Areas with an **EXTREME** interface fire hazard rating at Bow Horn Bay consist of large areas of forested lands with a wide range of suppression constraints.

Examples: Northwestern tip of area (forested acreages on Cowland Road and Anderson Ave.); southwestern tip of area (forested properties around Spider Lake); forested areas (various tenures) border much of area.

Table 15. Extreme WUI Hazard Areas.

Fire Behaviour	Extreme Fire Intensity – high to extreme Rate of Spread – very rapid (wind and slopes will increase rate of spread) Crown Fraction Burned – high to extreme
Risk of Ignition	Extreme - influx of summer campers increases risk of ignition in areas with forest and brush (i.e., cigarettes, campfires) - Fire Department has responded to calls that could have resulted in major interface fires - logging, land clearing, and recreational activities contribute to risk of ignition
Structures at Risk	High to Extreme – rural, combustible structures surrounded by flammable vegetation present the highest risk.
Suppression Constraints	Very Low to High – characterised by poor fire suppression resources (poor fireflow or fireflow lacking; some areas have difficult access)
Comments	Outlying areas with high fuel loading and delayed response times are a cause of concern for the local fire department.



Photos 56-58. Significant portions of Bow Horn Bay are rated with an extreme interface fire hazard.

SECTION 8: INTERFACE ISSUES AND MITIGATION

"The worst case scenario would be a fire starting in the perimeter – or from outside the Fire Service Area – blowing down into residences, and cutting the fire protection area in half. Who could get to the Fire Hall? The Fire Department would have limited capability. We would have a real smozzle."

Bow Horn Bay Fire Department

Fire fighters at the Bow Horn Bay Fire Department readily admit their fire protection area is a prime example of interface "sprawl". The Fire Service Area, which slices through a thin section of Area 'H' in the Regional District of Nanaimo, spans almost fifteen kilometres of "ribbon development" on forested lands between Bowser, Qualicum Bay, the Qualicum First Nation Reserve, and Spider Lake. Much of the Fire Service Area – including extensive forested areas in the north, south, and west – is assessed with High and Extreme Interface fire hazard ratings.

Prior to settlement by non Europeans, forest lands on the southeast coast of Vancouver Island were razed by intermittent wildfires started by lightning. Aboriginal peoples developed a fire regime to promote cultivation of edible and medicinal plants. Infrequent fires reduced underbrush and flammable vegetation. Ecosystems in the area adapted to periodic recurrence of wildfires that recycled nutrients and renewed system functions.

The southeast coast of Vancouver Island is undergoing an unprecedented period of development. Growth pressures are pushing development further into the wildland urban interface zone. Advanced fire suppression efforts in the last fifty years have resulted in high levels of fuel loading in interface areas. From the standpoint of community fire protection, interface fires have the potential to develop into catastrophic wildfires of a scale and intensity beyond the range of historical variability (Agee, *Fire Ecology of the Pacific Northwest*. 1993). Almost one hundred percent of the wildfires on Vancouver Island are started by humans (MoFR).

Photo 59. Mars Water Bomber attacks a human-caused fire on Vancouver Island.

Photo 60. Kelowna Firestorm 2003

No major wildfires have occurred in the Bow Horn Bay area for many decades. Fire officials say it is not a question of "if" a wildfire will occur, but "when" (Photo 60). The United Nations Intergovernmental Panel on Climate Change (February 2007) predicts global warming will extend the duration of fire seasons and increase the frequency of wildfires.

Greater fluctuations in local weather patterns are predicted as a result of global warming. During periods of extreme fire weather at Bow Horn Bay, a gusting Qualicum wind could rapidly transform a small blaze into an extensive forest fire.

"Qualicum winds generally pick up on a summer afternoon, often in advance of a low pressure system. The winds come from the southwest, changing to southeast, gusting up to 70 or 80 mph."

Bow Horn Bay Fire Department

Photo 61. Wildfire at Bow Horn Bay.

"There's been quite a change in the types of fires, and frequency of fires. If we keep on having hot dry summers, and more and more people move out into the bush, with trees and vegetation dripping over homes, we're going to be in for it".

Bow Horn Bay Fire Department

Photo 62. Qualicum Bay against a backdrop of the Beaufort Range.

The Bow Horn Bay Fire Department cites a variety of interface planning challenges:

- Despite opposition from a Fire Commissioner's report about ten years ago, the Bow Horn Bay Fire Protection District (now designated as a Fire Service Area under the regional district) was expanded beyond the 8-km coverage area to include forested 20-acre residential parcels at Spider Lake. The parcels have since been rezoned for subdivision into 5-acre lots.

- Response time to Spider Lake area is 20 minutes. In order to improve the delayed response time, the Bow Horn Bay Fire Department has made requests to the Ministry of Transportation and Highways to install a siren-activated traffic light at the Inland Island Highway/Horne Lake Road intersection.

- Provincial cutbacks in parks budgets have reduced the ability of parks officials to provide patrols during the summer fire season. The Fire Department is regularly called out to abandoned campfires and out-of-control parties at the Spider Lake/Illusion Lake Rd. area.

Photo 63. During Extreme fire weather, the Coastal Fire Centre may authorise a campfire ban.

- During extended periods of warm, dry summer weather, the local Fire Department is challenged with supervising campfires in widely disparate campgrounds. Under a regional district bylaw, the local Fire Chief has the authority to ban campfires (even if a campfire ban has not been imposed by the Ministry of Forests and Range), but the Fire Chief would prefer to act in conjunction with the MoFR.

- A lack of controls for logging and land clearing practices on private lands frustrates the Fire Department. Local fire officials must contend with absentee landlords, hazardous debris piles, and access problems.

- Information about current ownership of private forest lands is vital to local and provincial fire officials. A flurry of private forest land takeovers in recent years has left many rural fire departments with sketchy details about forest land ownership, emergency contact numbers, status of access roads, locations of gates, keys, etc.

- Portions of Crown forest lands in the area are managed by British Columbia Timber Sales (BCTS) to provide opportunities for small-scale harvest operators. The Fire Department would like BCTS to provide local and provincial fire officials with a schedule of forestry activities in the area.

- There are several uncontrolled railway crossings at Bow Horn Bay. The Fire Department is concerned about the possibility of an accident involving hazardous materials. Information about scheduling of hazardous materials would be useful to local fire officials.

- As property values escalate on the southeast coast of Vancouver Island, there is a growing trend for owners of campgrounds and recreational vehicle sites to sell their properties for residential subdivisions. Servicing and subdivision standards must be enacted and enforced to ensure new developments are properly developed with adequate fire protection.

- Of the half dozen campgrounds in the Fire Service Area, Spider Lake Springs Resort "worries [the Fire Department] the most". Cooperation between the resort owners and local fire officials is required to improve fire prevention and protection at the site. At issue are: questionable fireflow, accessibility, summer population densities, and flammability of trailers and vegetation.

- Prior to rezoning, local government must ensure the Fire Department is provided with an opportunity to review applications for new development.

- Rising property values and limited prospects for local employment are driving young families from the area, negatively impacting recruitment of volunteer fire fighters.

Photo 64. Recruitment of volunteer firefighters is an ongoing effort.

- Cooperation between local waterworks, fire officials, and local government is needed in order to derive a fair costing system for the replacement of aging waterlines and low-pressure hydrants with fireflow systems meeting Fire Underwriters Survey standards.

- Cooperation between local landowners and BC Hydro is required to ensure regular removal of invasive/flammable plant species (i.e., broom) along power line rights-of way.

- The Bow Horn Bay Fire Department has a good relationship with the Qualicum First Nation band. The Fire Department would like to continue to provide fire protection to the Qualicum First Nation on a contract basis, with rules and regulation defined under the terms of the contract.

- Subdivision of large forested properties into small lots (especially in peripheral reaches of the Fire Service Area) should be reviewed by the Fire Department in order to ensure fire protection needs are addressed.

- The Fire Department distributed FireSmart Home Owner Manuals to over 1,000 property owners in the Fire Service Area. Fewer than five individuals responded to the Fire Department. Fire Department officials are looking for effective ways to promote FireSmart vegetation management and other FireSmart practices.

- There are no building inspections in Area 'H'. Since the 2003 Firestorm, the Fire Department has observed a general trend to fire-resistant building construction materials. A significant proportion of new development and retrofit still utilises flammable materials.

Photo 64. Don't Stick Your Head in the Sand – Be FireSmart .

MITIGATIVE ACTION

There is no standard prescription for wildfire safety. The key to successful mitigation should include:

- community support
- cooperation from all levels of government, private sectors, and neighbouring jurisdictions
- recognition of liability
- creative, innovative approaches to interface management

Effective communication is crucial to preventing or minimising fire risk in the wildland urban interface. Effective communication about wildland urban interface fire prevention and control will help motivate people to create FireSmart communities.

Mitigative measures to reduce the hazard posed by interface fire must focus on:

- Vegetation Management
- Structural Options
- Infrastructure

Effective mitigation provides the ways for communities to coexist with the threat of interface fire.

SECTION 8: EXECUTIVE SUMMARY – ACTION PLAN

Mitigative action to reduce the threat of fire in wildland urban interface areas is primarily a responsibility of the community. Local government, in concert with local and provincial fire officials, should take the lead in development and implementation of risk reduction strategies and policies.

Effective public education and community involvement can encourage home and property owners to take their own preventative measures in interface fire risk areas.

Government planning tools can be used to develop various mitigative strategies, and to ensure mitigation is carried out on a long-term basis.

The following recommendations are aimed at reducing the risk of interface fire at Bow Horn Bay:

Education and Community Involvement:

- **Strive to involve homeowners and the public – including summer visitors – in interface issues through an effective education and public awareness program.**

Photo 67. Summer camping.

- **Adopt the FireSmart (Partners in Protection, 2003) standard for community protection, both for public and private property.**

Working Towards a FIRE SMART Community

Photo 68. FireSmart Homeowner's Manual.

- **Promote *FireSmart* at community events: (i.e., Fire Department pancake breakfasts).**

- **Ensure campgrounds and resorts are familiarised with pertinent sections of BC's new Wildfire Act (SBC 2004) – including forest fire protection and campfire restrictions. Cooperate with campground owners to improve fire protection and prevention.**

- **Ensure any regulatory action taken to educate residents about interface actions is done in consultation with the Ministry of Forests and Range Protection Branch.**

- **Collaborate on interface management planning with nearby jurisdictions (i.e., City of Parksville, District of Errington, Town of Qualicum Beach, Deep Bay Waterworks District) that have completed Community Wildfire Protection Plans. Invite Mayor Ella Brown of Logan Lake to present *In Our Defense*, the inspirational story of Logan Lake's fire safety protection plan.**

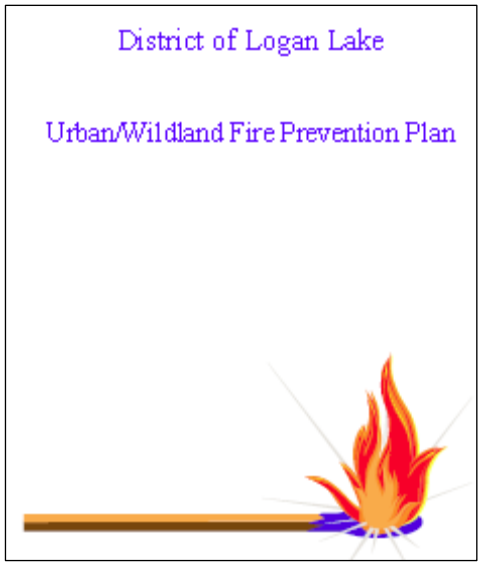


Photo 69. Fuel reduction at Logan Lake.

- **Cooperate with the Ministry of Forests and Range to ensure standardised implementation of Coastal fire bans throughout the Region.**

Vegetation Management:

Fuel Modification Areas –

- **Encourage home and property owners to establish and maintain FireSmart Fuel Modification Zones around structures.**

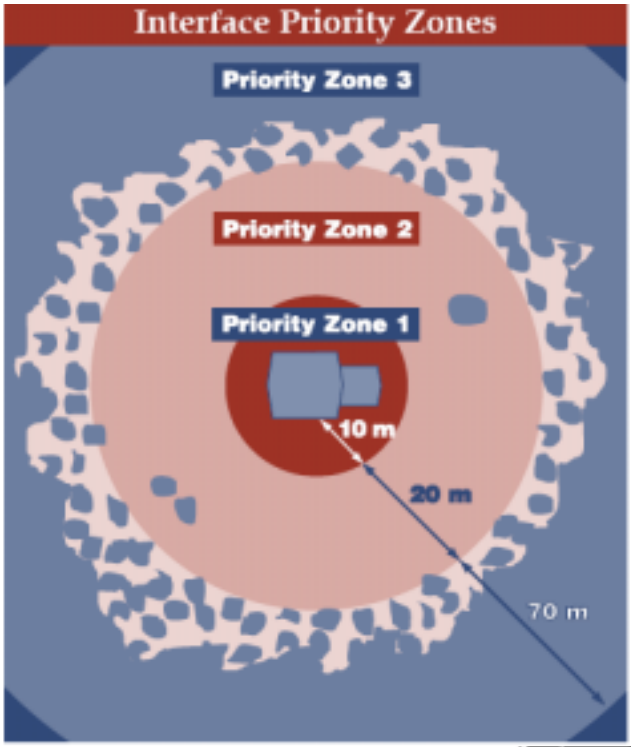
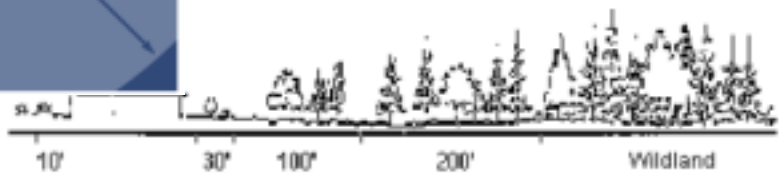


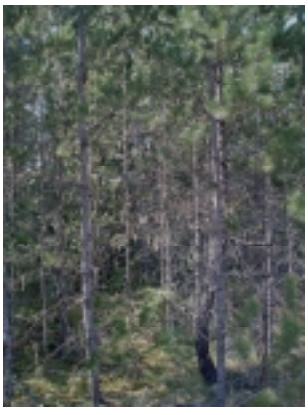
Photo 70. Interface dwelling.



- **Pursue opportunities for fuel management pilot projects (through UBCM) at high-hazard interface areas in order to reduce natural fuel loading and improve accessibility for fire fighting. Prioritise potential fuel management projects based on usage and values-at-risk. Candidate sites to consider for UBCM Pilot Projects include flammable fir/pine stands at:**

- Crown Lands at the north end of the District
- Provincial park lands at Spider Lake

Photos 71 & 72. Potential fuel reduction sites.



- **Cooperate with private forest land owners in the area to ensure local and provincial fire officials are regularly updated about ownership status, emergency contacts, and information about roads and gates.**

- **Cooperate with local and provincial government to ensure private land owners abate hazardous fuels in a safe and environmentally friendly manner.**


Photo 73. Slash.

- **Cooperate with British Columbia Timber Sales to ensure local and provincial fire officials are informed of harvesting activities in the local area.**

- **Encourage local government to cooperate with BC Hydro to ensure invasive and flammable vegetation are regularly removed from power line rights-of-way.**


Photo 74. Hydro right-of-way corridor.

Fire-resistive Vegetation –

- **Encourage residents to landscape with fire-resistive vegetation.**
  ***See FireSmart Landscaping on Southeastern Vancouver Island*,**
  Strathcona Forestry Consulting, 2004
  http://www.district.langford.bc.ca/document/brochures/FireSmartLandscaping.pdf

Fuel Disposal –

- **Encourage homeowners to compost deciduous litter and grass clippings.**

- **Investigate with the Regional District of Nanaimo the feasibility of a bylaw to license the disposal of land clearing debris in machine stacked piles (to be taken to a licensed disposal facility, or burned onsite using air curtain burners, or chipped onsite).**

Photo 75. Air curtain burner. 

Infrastructure:

Strategic Planning –

- **For areas that are designated for future development in the OCP (that is, not already zoned for development), ensure that the secondary plans or bylaw amendment applications contain development permit areas for interface fire risk mitigation. Request to the Regional District of Nanaimo that development permit areas be applied to existing developed/subdivided areas in high or extreme interface hazard areas.**

 Photo 76. Interface fire.

- **Work closely with the Regional District of Nanaimo in the rezoning applications of any undeveloped lands to ensure that servicing requirements for water and fire protection are met.**

 Photo 77. Interface fire.

- **Encourage the Regional District of Nanaimo to issue FireSmart pamphlets to development applicants.**

- **Continue to regulate by bylaw the provision of works and services to lands that are being subdivided in order to provide consistent standards for access and water service (where applicable).**

 Photo 78. Firefighters.

- **Continue to provide fire protection to the Qualicum First Nation on a contract basis, with rules and regulation defined under the terms of the contract.**

Photo 79. Qualicum First Nation sign.

Forest Watch –

- **Encourage residents to institute "Forest Watch" patrols during fire season (i.e., Spider Lake area).**

Access –

- **Continue to cooperate with the Ministry of Transportation and Highways on the installation of a siren-activated light at the intersection of the Inland Island Highway and Horne Lake Road.**

Photo 80. Inland Island Highway/Horne Lake Road intersection.

- **Cooperate with owners of the E&N Railway corridor to ensure local fire official are provided with rail schedules, including information concerning the transportation of hazardous materials through the area.**


Photo 81. Dayliner.

- **Continue to ensure roads and driveways are maintained for emergency access.**


Photo 82. Interface zone.

- **Continue to refer any development applications to the Bow Horn Bay Fire Department for review to ensure that access to the future residence is sufficient to allow fire trucks access to the property. The requirements for driveways and accesses are clearly outlined in the FireSmart Home Owner manual.**


Photo 83. Fire suppression.

Fireflow -

- **Encourage cooperation between local government, waterworks, and the Fire Department on improvements on existing waterlines to ensure fireflow meets FUS standards.**


Photo 84. Fire hydrant.

Firefighting at the Grassroots Level –

- **Encourage homeowners bordering areas of extensive forest to equip homes with personal fire fighting equipment, including: rooftop access ladder, shovel, rake, large water barrel, and 10-L pail. The MoFR recommends on-site fireflow capacity of 7500 L for initial attack.**

SECTION 9: IMPLEMENTATION

No plan is complete until it is implemented.

Local government must take the responsibility for implementation.

The Community Wildfire Protection Plan for Bow Horn Bay should circulate to local government departments within three months of the plan's submission. Recommendations in the plan should be reviewed by local government in consideration of official adoption of the plan. An opportunity to review the plan should be provided to neighbouring jurisdictions (i.e., Horne Lake Community, Deep Bay) in the electoral area. A public review process should be scheduled within six months of the plan's submission.

Maintenance of the Community Wildfire Protection Plan should include an annual schedule for monitoring and evaluating the programmatic outcomes established in the Plan.

Regular evaluations of the Community Wildfire Protection Plan should 1) assess the effectiveness of programs, and 2) identify any changes in hazard-risk assessments.

Coordinating agencies responsible for various implementation processes should report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised or removed. Organizations participating in the Plan evaluation should be clearly identified in the evaluation.

Fire protection and prevention in the interface is an ongoing process.

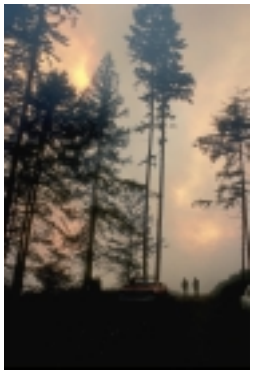


Photo 85. Wildfire.