Community Wildfire Protection Plan

Gabriola Fire Protection Improvement District, BC

May 2008

Developed through a grant from the Union of British Columbia Municipalities to:
the Gabriola Volunteer Fire Department

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- Ministry of Forests and Range

- Union of British Columbia Municipalities

- Regional District of Nanaimo

- The Islands Trust – Local Trust Committee

Islands Trust
Preserving island communities, culture and environment.

- Gabriola Fire Protection Improvement District and the Gabriola Volunteer Fire Department

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Photo. Superior Tanker Shuttle test on Gabriola Island, 2007.

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: (used in CFFDRS - 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

DGR: Fire Danger Class Ratings (1 to 5) calculated based on fire weather indices

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

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)

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 Behaviour Output Factors: fire intensity, rate of spread, crown fraction burned

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 Protection Improvement District: autonomous local government body that is administered by an elected board of trustees, and is responsible for providing one or more local services (i.e., fire protection) for the benefit of the residents of the community

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

G.E.S.S. – Gabriola Emergency Social Services

G.F.P.I.D. – Gabriola Fire Protection Improvement District

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

G.V.F.D. – Gabriola Volunteer Fire Department

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

Improvement Districts: autonomous local government bodies responsible for providing one or more local services for the benefit of the residents in a community. Improvement Districts vary considerably in size, from small subdivisions, to urban communities. Improvement Districts are usually located in rural areas of the province where there was no alternative form of local governance available, suitable, or desirable for the community. Improvement Districts are similar in structure to a municipality but are more informal and only provide direct services such as waterworks and fire protection.

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

NFPA: National Fire Protection Association

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

OCP: Official Community Plan

PEP: Provincial Emergency Program

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

STS: Superior Tanker Shuttle

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

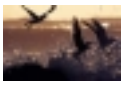
UBCM: Union of British Columbia Municipalities

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

Wildfire Severity: measured through analysis of: fuel types, risk of ignition, structures at risk, and suppression constraints

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.



COMMUNITY WILDFIRE ROTECTION PLAN

GABRIOLA FIRE PROTECTION IMPROVEMENT DISTRICT

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 is resulting in a rising number of human-caused fires. A large wildfire on Galiano Island in the summer of 2006 heightened awareness of the threat of wildfire on the Gulf Islands.

2. The United Nations Intergovernmental Panel on Climate Change (2007), a landmark study on global climate change, warns of long-term future changes in weather patterns, including a trend towards warmer, drier summers in many areas. Climate change is predicted to increase the frequency of wildfires and extend the duration of fire seasons in fire-prone locales (i.e., southeast Vancouver Island and Gulf Islands).

3. In 2007, the Gabriola Volunteer Fire Department received a grant from the Union of British Columbia Municipalities (UBCM) to develop a Community Wildfire Community Plan (CWPP) for the Gabriola Fire Protection Improvement District. The project set out to:
   1) define risk areas for interface fires;
   2) identify measures necessary to mitigate risks; and
   3) develop an action plan (Executive Summary) to improve interface fire protection and prevention.
   The CWPP provides a brief overview of Gabriola Island, with a short description of historical, social, and economic features as they relate to the island's interface zone.

4. Interface fire hazard assessment methodology was based on standard fire danger and risk-hazard analyses. Key fire behaviour output factors were evaluated in consideration to ignition potential, rate of spread, and potential crown fraction burned. Characteristics of fuel types were combined with fuel output factors to determine potential wildfire severity. Hazard-risk modeling was used in a determination of risk management. FireSmart hazard mapping criteria were reviewed with the Gabriola Volunteer Fire Department. Approximately 97% of the Fire Protection Improvement District is identified with high to extreme interface fire hazard ratings. Interface fire hazard ratings are considered acceptable when they fall within the low to moderate range.

5. Mitigative measures to improve interface fire protection and prevention were developed in consultation with the Gabriola Volunteer Fire Department. FireSmart mitigation measures target vegetation management, building construction and design, and planning tools for local government. Public education is an essential component of interface management.

6. A community action plan to improve fire protection and prevention in the interface zone was formulated in collaboration with the Gabriola Volunteer 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. Recommendations in the CWPP should be reviewed and endorsed by local governments, in consultation with local stakeholders, and nearby jurisdictions. A public review process is recommended.

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

SECTION 1: INTRODUCTION AND PLANNING PROCESS

BACKGROUND

The wildland urban interface (WUI, or interface) zone is commonly described as the area where homes, farms, commercial establishments, key infrastructure, industrial installations, recreational developments, and associated 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.

Wildfires are a part of the natural ecological cycle of forests across Canada. Wildfires have been a major and regular occurrence for thousands of years. Wildfires recycle forest nutrients and reduce natural fuel loading. British Columbia's climate and topography make much of the province conducive to wildfires. 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.

Human encroachment onto forested lands exacerbates the threat of wildfire in the interface zone. 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 combustible 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.

The United Nations Intergovernmental Panel on Climate Change (2007), a landmark study of world climate change, predicts global warming will extend the duration of fire seasons and increase the frequency of wildfires in fire-prone interface areas (i.e., Vancouver Island and the Gulf Islands).

In British Columbia's Coastal Fire Zone, nearly 100% of wildfires are caused by human carelessness. Fire officials acknowledge a growing threat of fire escaping from developed areas into wildland areas. At risk are loss of life, property, infrastructure, and resources.


Photo. 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 major 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. "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 $70 million in damages, and resulted in the loss of lives of three fire fighting airmen.

Photos. 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.

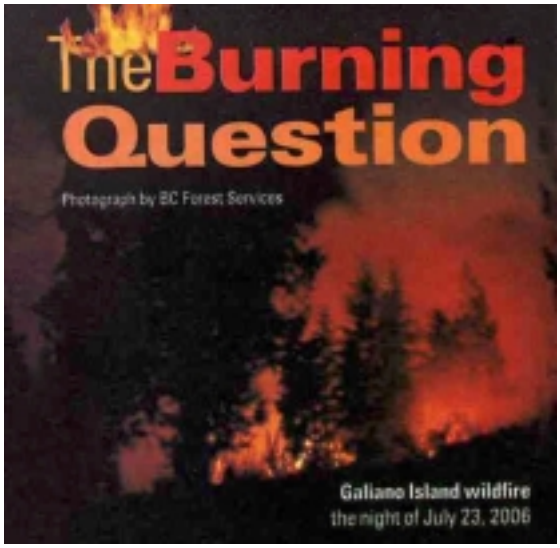
The objective of the Community Wildfire Protection Plan is to improve community safety, and reduce the risk of property damage.

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

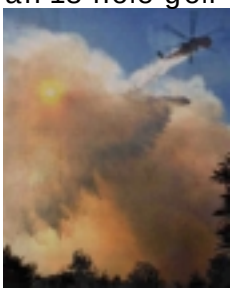
- familiarise local government and elected officials and staff with wildfire protection and fire management issues
- influence community plans to acknowledge fire threat areas when considering development
- promote bylaws that acknowledge FireSmart
- identify high priority areas for fuel management activities
- facilitate discussions with key stakeholders to encourage a cooperate 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.

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



In the mid 1930's a wildfire burnt a swath across a large section of Gabriola Island. More recently, a large wildfire swept across Galiano Island (July 2006), heightening awareness of the risk of fires on the Gulf Islands. The Galiano fire started when a resident decided to burn some downed trees in a gravel pit on private property. The fire spread briskly, and grew to more than 70 ha (size of an 18-hole golf course). The fire stretched over 2 kilometres, forcing the evacuation of 150 people. More than sixty local and MoFR firefighters attacked the fire. Suppression efforts involved three water bombers and four helicopters (with water buckets).



Photos. Galiano Fire, 2006. (ExploringTheBest.com)

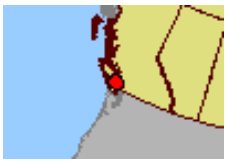
Photo. Wildfire on Galiano Island, July 2006. B.C. Forest Service

Fire suppression in the interface zone is one of the most dangerous operations for fire fighters.

SECTION 2: PROFILE OF GABRIOLA FIRE PROTECTION IMPROVEMENT DISTRICT

SETTING

Gabriola Island is one of the largest and most accessible of the Southern Gulf Islands. Lying in the Strait of Georgia off the southeast coast of Vancouver Island, Gabriola Island is located approximately 3 nautical miles (app. 5.5 km) east of the City of Nanaimo. A short ride on a vehicle and passenger ferry connects the island with the City of Nanaimo. Gabriola Island is located in the Regional District of Nanaimo (RDN), and is a member of the Islands Trust Association. Gabriola Island is a Fire Protection Improvement District (F.P.I.D.).



Figures. Gabriola Island, a Southern Gulf Island, lies off the southeast coast of Vancouver Island.

Figures. The GoGabriola brochure, published by the Gabriola Island Chamber of Commerce, and available at the Gabriola ferry depot, provides a detailed map of the island.

Area

Gabriola Island is approximately 14 km long by 4.2 km wide, with a land area 57.6 km^2 (app. 20 mi^2). Development is confined to a relatively small proportion of the island due largely to limitations in domestic potable water supply. Density of developments is controlled by the Islands Trust (through the Official Community Plan).

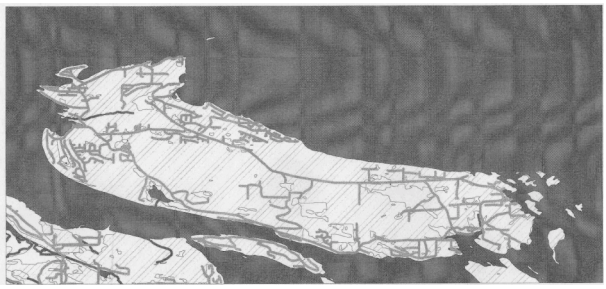


Figure. Development on Gabriola Island closely adheres to existing access routes.

The island's landscape consists of scattered semi-urban development, small agricultural holdings, and extensive forested areas.

Population

The year-round population of Gabriola Island is approximately 5,000, with a large increase (to approximately 6,000+) in the summer (Canada Census 2006; BC Ferry Corporation stats). The population is concentrated on the "north" (northwest) and "south" (southeast) ends of the island.

A growing proportion of the island population is retired. A significant contingent of islanders regularly commutes to work in Nanaimo. Senior school-aged children attend high school in Nanaimo.

Photo. Gabriola islanders regularly commute to Nanaimo.

Gabriola Island is third in population size amongst the Southern Gulf Islands, after Saltspring and Quadra Islands.

Communities in the Islands Trust Area are facing substantial population growth over the next fifteen years. The population of the Georgia Basin, which includes the Gulf Islands, is expected to grow by 35% by 2020 (Islands Trust website).

Climate

Gabriola Island has a mild climate, with warm, dry summers and mild, wet winters. Average temperature range is 3 to10^{o}C in winter, and 18 to 27^{o}C in summer. Average annual rainfall is 90 cm, most of which occurs from October to April.

Governance

Gabriola Island is part of the Nanaimo-Cowichan riding of the federal government, and falls in the Nanaimo riding of the BC provincial government. Gabriola Island is governed by the Regional District of Nanaimo (RDN) and British Columbia's Islands Trust.

The RDN administers services to Gabriola Island (i.e., garbage, noise bylaw, etc.). Zoning regulations in other Electoral Areas of the Regional District of Nanaimo do not apply on Gabriola Island, where planning and zoning are under the jurisdiction of the Islands Trust.

The Gabriola Island Official Community Plan (Islands Trust Bylaw No. 166, 1997) provides the long-term planning vision for the island.

Gabriola Island was incorporated as a Fire Protection Improvement District on July 27, 1995. The boundaries of the Gabriola Fire Protection Improvement District extend 100 yds. beyond the natural high-water mark of the island (encompassing docks and mooring structures).

Regional District of Nanaimo

The Regional District of Nanaimo, one of 27 regional governments in BC, provides and coordinates a range of services in both urban and rural areas, depending on local needs (www.rdn.bc.ca). Regional districts try to ensure that all residents have access to commonly needed services, regardless of where they live. The RDN provides planning, zoning, and development management services to six of the RDN's seven Electoral Areas. Planning and zoning for Gabriola and surrounding islands (RDN Electoral Area 'B') fall under the jurisdiction of the Islands Trust.

Islands Trust

The Islands Trust is a land use and planning agency created through enactment of the Government of British Columbia Island Trust Act (1974) (www.islandstrust.bc.ca). As an elected body responsible charged with preserving and protecting the Gulf Islands, the Islands Trust is a unique federation of independent local governments which plans land use and regulates development.

The Islands Trust Area covers the islands and waters between the British Columbia mainland and southern Vancouver Island, and comprises thirteen major islands, and more than 450 smaller islands covering approximately 5,200 km^2 of land and water.

Island communities elect local representatives every three years. Two local trustees are elected for each group of islands designated as a local trust area (i.e., Gabriola and surrounding smaller islands). Together with an appointed chair from the Executive Committee, local trustees are responsible for land use decisions within the Local Trust Committee (respective local trust area), excluding First Nation reserves.

Land use decisions made by locally elected trustees follow the Official Community Plan (OCP) created through consultation with the local community. In recent years, close adherence to Gabriola Island's OCP has negated "deal making" or "amenity for zoning" land use decisions which can have a negative impact on development.

Fire Protection Improvement District

Improvement Districts are autonomous local government bodies responsible for providing one or more local services for the benefit of the residents of the community. Improvement Districts are administered by an elected board of trustees. Improvement Districts vary considerably in size, and are usually located in rural areas of the province where there is no alternate form of local governance available, suitable, or desirable for the community. Improvement Districts are similar in structure to a municipality, but are more informal and only provide direct services, such as fire protection. More than 200 improvement districts operate in British Columbia.

Improvement Districts are independent public corporations that are subject to supervision by the Ministry. All bylaws passed by the board of trustees must be registered with the Inspector of Municipalities, and the bylaws are not effective until that approval is granted.

The Gabriola Fire Protection Improvement District oversees operations of the Gabriola Volunteer Fire Department.

Photo. The Gabriola Fire Protection Improvement District oversees the Gabriola Volunteer Fire Department.

History

For thousands of years before European settlement, the Coast Salish Snuneymuxw people frequented seasonal hunting and fishing camps on Gabriola Island and the surrounding islands. According to anthropologists, sandstone petroglyphs in several locations on Gabriola Island were carved by aboriginal peoples over 2,000 years ago. Over one hundred archaeological sites – including petrogplyphs, shell middens, and burial sites – are found on Gabriola Island.

Spanish explorers in the late 18th Century called the island "Punto de Gaviota" or "Cape Seagull" after a family name in a Spanish town. The island eventually became known as Gabriola. The Spaniards lent their name to several features on the island (i.e., Descanso Bay, Malaspina Galleries).

During the 19th Century, immigrants from Britain and Ireland began homesteading on the island, deriving a living from farming, logging and fishing. Towards the end of the 19th Century, the island's sandstone quarry produced grindstones for pulp mills. A brick works on the island operated until the mid 20th Century.

Photo. Island coastline.

Over the years, the community of Gabriola Island has "achieved a rare balance of environmental preservation with close proximity to the dense urban setting of Nanaimo….Gabriolans enjoy easy access to the services, schools, and work opportunities over the water, and can live in a semi-rural atmosphere of small farms and market gardens interspersed with native trees, wildflowers, birds and beaches" (Gabriola Island Chamber of Commerce).

Photo. Berry Point. (Photo: G.I.C.C.)

Economy

IslandServices and Amenities

Gabriola Island supports a full range of services and amenities. The island's Chamber of Commerce provides a listing of local community services: police (RCMP) detachment and on-call BC Ambulance Service, a paid on call volunteer Fire Department which includes First Responder medical response, elementary school, garbage collection and recycling, a visitor information office, a medical clinic, dentist, a vet clinic, and many alternative health practitioners. Other community services include a post office, museum, library, churches, and community hall.

Photos. Gabriola Island's United Church (left) sits beside Petroglyph Heritage Park (right).

Commercial activities on the island are an eclectic mix of business services ranging from diving adventures to upscale tourist accommodation. The island's business community encompasses several grocery stores, a credit union, real estate, restaurants, B&Bs, marinas, kayak and boat rental facilities, lumber yard (built to fire code, with good security), two newspapers (Gabriola Sounder and Flying Shingle), auto service station (tanks recently upgraded to code), two seniors' residential complexes, and a 9-hole golf course. The Folklife Village, located on North Road a few minutes from the ferry terminal, is the island's main shopping/commercial area. A popular Saturday Market throughout the summer features locally grown produce and arts and crafts.

In the last decade a large community of artists has developed a cottage industry of potters, painters, and crafters. The island's annual Studio and Gallery tour is the largest of its kind in the Pacific Northwest. The self-guided fall tour features over ninety artists in sixty studios. The island is also home to many talented musicians.

Photo. Visiting musicians at an island festival.

Photos. The island has an eclectic business community.

Gabriola SOUNDER

The Fire Department notes various island businesses incorporate superior fire protection. For example, the Lion's seniors' home was built as a well-designed (fire resistant) residential facility constructed with interior sprinkling, water tanks, electrically operated sprinkler system with a backup diesel generator that automatically runs pump circuits, and a series of large capacity cisterns. The local lumber yard, which was built to fire code, incorporates security services. Fuel tanks at the local auto service station, and at two marinas, were recently upgraded to code.

SECTION 3: INFRASTRUCTURE AND THE INTERFACE

INFRASTRUCTURE

Infrastructure consists of network of roadways and communications, services, open spaces and parks, water supply, utilities, and local planning tools that define a community. FireSmart infrastructure will increase resident and firefighter safety, and facilitate quick response by firefighters.

Access

Ferry Service The BC Ferry Corporation provides daily vehicle and passenger service between Gabriola Island and Nanaimo. A one-way ferry ride takes about twenty minutes.

At the height of the summer season, approximately 1500 passengers a day take the ferry trip to Gabriola Island (BC Ferry Corporation stats).

Photo. Gabriola Island ferry.

Roads Arterial roads on the island consist of South Road, North Road, and Taylor Bay/Berry Point Road. A network of secondary roads branches from the main road routes. The island has no public transportation. Bicycles are a popular means of transport for some tourists. Taxis operate on the island.

Photo. Bicycling is popular on Gabriola Island.

The role of transportation routes on Gabriola Island is outlined in the island's OCP. The Ministry of Transportation and Highways (MoTH) is responsible for the provision and maintenance of roads on Gabriola Island. The MoTH also has authority over the standard at which roads are constructed in new subdivisions. Due to the unique character of the Gulf Islands, the Islands Trust and MoTH have developed an agreement to work together in establishing road standards and road classifications appropriate for the Islands Trust area. The Fire Department disagrees, and would like to see NFPA 299 used for highway standard. When large properties are proposed for development, property owners are required to provide road access.

The Ministry of Transportation and Highways contracts out road maintenance services to Encon. BC Hydro contracts out roadside brushing and felling (to reduce blowdown and power interruptions).

Photo. Contract crew conducting roadside brushing on Gabriola Island.

Roadways in some parts of Gabriola Island are characterised by a lack of looping access routes, which is problematic for emergency responders. One-way and/or dead end roads, and undeveloped dedicated road accesses can significantly increase response times.

Photo. Gabriola Island is characterised by a lack of looping road networks.

For nearly two decades, the Fire Department has been advocating for an emergency access route between Spruce Ave. and Church St. The distance between the southern end of Spruce Ave. and the northern tip of Church St. (located within close proximity to the ambulance station) is less than a half kilometre; emergency vehicles must travel 8 km to service Spruce Ave.

The possibility of fire at island resorts would pose a significant challenge to the island's emergency services. At the "north" end of the island, a fire in the area behind Surf Lodge would require the Fire Department to stage at the lodge, and pull hose through the bush. The Fire Department says the situation is not satisfactory. The problem is complicated by poor road access (Haig Road and Chichester Road West) in an area which contains many lots, including some commercial (unbuilt) properties.

Photo. Surf Lodge.

A number of properties on Gabriola have houses or other buildings that are not easily accessible to emergency vehicles. Some of the buildings are so remote that it is not possible to reach them in a timely manner. In many cases, long narrow driveways to these properties are overgrown by vegetation, and have sharp turning radii.

The Fire Chief and the Gabriola Fire Protection Improvement District Board are advocating for the Fire Department to have input on driveways (new construction) per NFPA 299 prior to the issuance of an occupancy permit. The Emergency Plan Coordinator has referred the issue to the Ministry of Transportation and Highways.

Photo. Street addresses on the island are not always evident. Note the address screened by the bicycle.

Street addresses on Gabriola Island are not always evident despite RDN and GBPID requirements for visible addresses. The Fire Department acknowledges its members generally have a good sense of general locations, but would prefer well-marked, accessible driveways.

Air: The island does not have an airport. Floatplane service is available between Gabriola Island and Vancouver.

Boat Launching Facilities Public boat launching facilities are located at:

- El Verano
- Grey Road by Degnen Bay
- Silva Bay
- Bells Landing/Whalebone
- Berry Point
- Descanso Bay

Photo. Silva Bay Marina.

Private boat launching facilities are located near the golf course.

Utilities

Gabriola Island is serviced with normal telephone, power and cable (TV and high-speed internet). Cell phone reception on Gabriola Island is not always reliable.

The island's BC Hydro power lines are above ground. There are no power transmission line right-of-way corridors on Gabriola Island.

Emergency Communications

A 911 repeater tower is located at the top of Brickyard Hill (South Road). Rogers Communications had proposed construction of a cellphone communications tower behind Fire Hall #1, but islanders rejected the proposal via public input to the Fire Department. CBC FM presently has an application to install an antenna at the top of Brickyard – about 1 km east of the present tower site. In the event that the application will proceed, emergency services will be offered a location at the site.

Radio communications at the Gabriola Volunteer Fire Department are transmitted via a UHF/VHF (Ultra High Frequency/Very High Frequency) link through the tower at Brickyard Yard via Nanaimo Dispatch to pagers. (Fire Department transmissions to dispatch are normally VHF.) The system communications system has cell back-up. Fire Department sources note radio reception on the island is "bad in some areas".


Photos. Gabriola Island's two fire halls are equipped with generators.

The two fire halls on Gabriola Island are equipped with generators. Gabriola Emergency and Social Services (G.E.S.S.) maintains a generator at the Rollo McClay Centre. Older model Fire Department radios have been provided to G.E.S.S., and operate on PEP frequency. According to the Fire Department, satellite phones are the "only thing that would work everywhere" on the island.

Water

There is no municipal water or sewer service on Gabriola Island. Domestic and commercial water supply is provided through private wells, or cisterns filled by tanker, collected rainwater, or low yield wells.

Emergency Centres

In the event of a large-scale disaster, Gabriola Emergency Social Services (G.E.S.S.) will set up two Reception Centres on the island:

- Community Hall - 2200 South Road ("south" end)
- Rollo Seniors' Centre - 685 North Road ("north" end) – (the elementary school can also be used, if necessary)

Although Gabriola is part of the Provincial Emergency Program (PEP), Gabriola Emergency Social Services realise local resources on a small island will be low on the provincial priority list. The G.E.S.S. website (www.essgabriola.com) contains extensive information about family and neighbourhood emergency preparedness. The G.E.S.S. could provide a valuable role in disseminating FireSmart information to 'interested' parties on the island.

Parks and Open Spaces

Gabriola Island has a variety of provincial, regional and community parks. Regional District recreation services are provided to Gabriola residents through an agreement with the Gabriola Recreation Society. The Society administers a budget and oversees the development and implementation of programs and services. The island's three Provincial Parks are managed by BC Parks.

RDN Parks Formerly known as Gabriola Campground, Descanso Bay Regional District Park is a 40 acre (~ 16 ha) oceanfront park that became the RDN's sixth, and Gabriola's first regional park when it was purchased in 2002. The park's thirty camping sites are maintained under an agreement with a contractor. The campsite is located near the ferry dock. (A private campsite on the island is located at Page's Resort and Marina).

Adjoining Descanso Bay is a 45 ha community park off Taylor Bay Road.

Nearby, Malaspina Galleries Community Park features a sandstone cavern.

Photos. Malaspina Galleries Community Park.

One of the more developed and popular Community parks on Gabriola Island is the Rollo McClay sports field park. The park is the island's evacuation site for BC Ambulance helicopter medical emergencies. Night lights are set up by the Fire Department to aid evacuations. (A large grassy area at Fire Hall #1 was previously used for medical evacuations, but is not usually used at night due to a helicopter safety issue with adjoining tall trees.) Approximately "six to seven" medical evacuations are carried out each year from Rollo McClay Park. The Fire Department notes, "after [ferry] hours, it's the quickest way off the island". A boat (under contract with British Columbia Ambulance Service) is available for emergency evacuations at night. The boat and emergency dock were used 33 times in 2007.

Photo. Forested slopes in centre of Gabriola Island.

The Regional District recently acquired approximately 280 ha (app. 707 ac.) of predominately logged property in the centre of Gabriola island for a Community Park. Forest cover generally consists of a coniferous-deciduous mix. A network of trails is popular with walkers, mountain bikers. Trails are currently not marked. Motorised vehicles are not permitted. There are currently four designated accesses to the park (Coats Rd. East, Fisher Road, Wendy Close, and Ricki Ave.) Roaded access within the park is controlled by one locked gate. At the time the gate was constructed in 2006, the Fire Department was not informed of the installation, and was not provided with a key. (A key was subsequently issued at the request of fire department officials).

The RDN is currently "consulting" on a Management Plan for the park. Measures to improve fire prevention and protection at the Community Park should include marked trails, points of entry signs (with emergency contact numbers), and a designated emergency vehicle route with secured access.

Photo. Mixed forest at new Community Park.

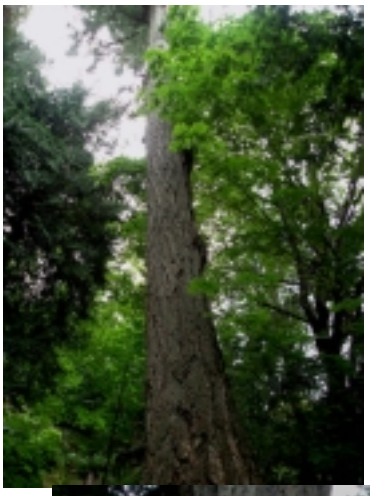
BC Parks Provincial parks on Gabriola Island consist of: Drumbeg Provincial Park, Sandwell Provincial Park, and Gabriola Sands ["Twin Beaches"] Provincial Park. No camping is allowed at the island's provincial parks.

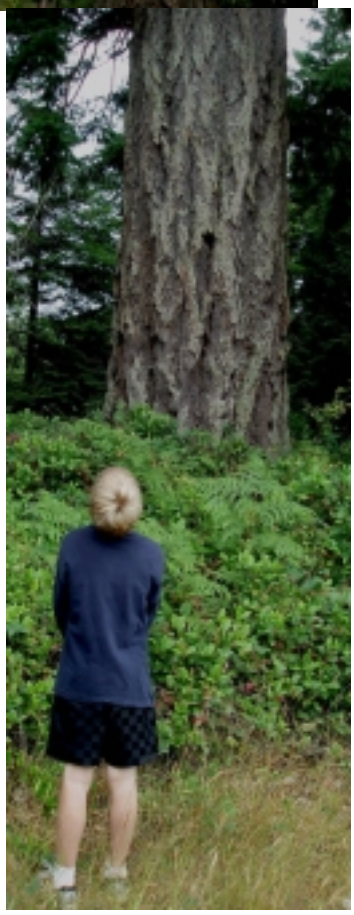
Overlooking Gabriola Passage on the eastern end of the island, 20-ha Drumbeg Provincial Park protects endangered Garry oak ecosystems, undeveloped Douglas-fir ecosystems, and a diverse marine life.

Photos. Drumbeg Provincial Park.

The Fire Department has been called to several abandoned human-caused brush fires at Drumbeg Provincial park.

Sandwell Provincial Park, a 12-ha waterfront park on the northern portion of the island, contains mixed woods and a sandy beach. Mountain biking is becoming popular at the park; some trails cross private property.





Photos. Sandwell Provincial Park.

Gabriola Sands Provincial Park ("Twin Beaches"), a popular 6-ha day-use park for swimming, picnicking, and organized sporting events, is located on the northwest side of Gabriola Island. The park protects two sandy beaches that form an isthmus dividing Taylor Bay and Pilot Bay.

Photo. Gabriola Sands Provincial Park.

BC Parks regularly maintains provincial parks on the island. Routine maintenance, fire prevention signage, and innovative management programs (i.e., joint broom removal project between local elementary school and BC Parks project at Drumbeg Provincial Park) alleviate the potential for fire starts at the island's provincial parks.

Photo. BC Parks signage.

Photo. Broom removal project.

Photo. Sandwell Provincial Park.

Photo. Maintenance work at Sandwell Prov. Park.

Other Public Lands: Potential Federal Treaty Settlement Lands constitute approximately 17% of Gabriola Island. These forested lands, which straddle North Road, do not fall under local government responsibility, and do not have an approved management plan. Trails are used regularly despite no legal access to the area. Various unmarked trails meander through the property.

Photos. North Road passes through the forested Federal Treaty Settlement Lands.

The Islands Trust Fund nature reserve on North Road has an adopted management plan, but does not have a fire control plan. The reserve does not have vehicle access.

Fire Protection and Prevention

Gabriola Volunteer Fire Department

Photo. Gabriola Volunteer Fire Department.

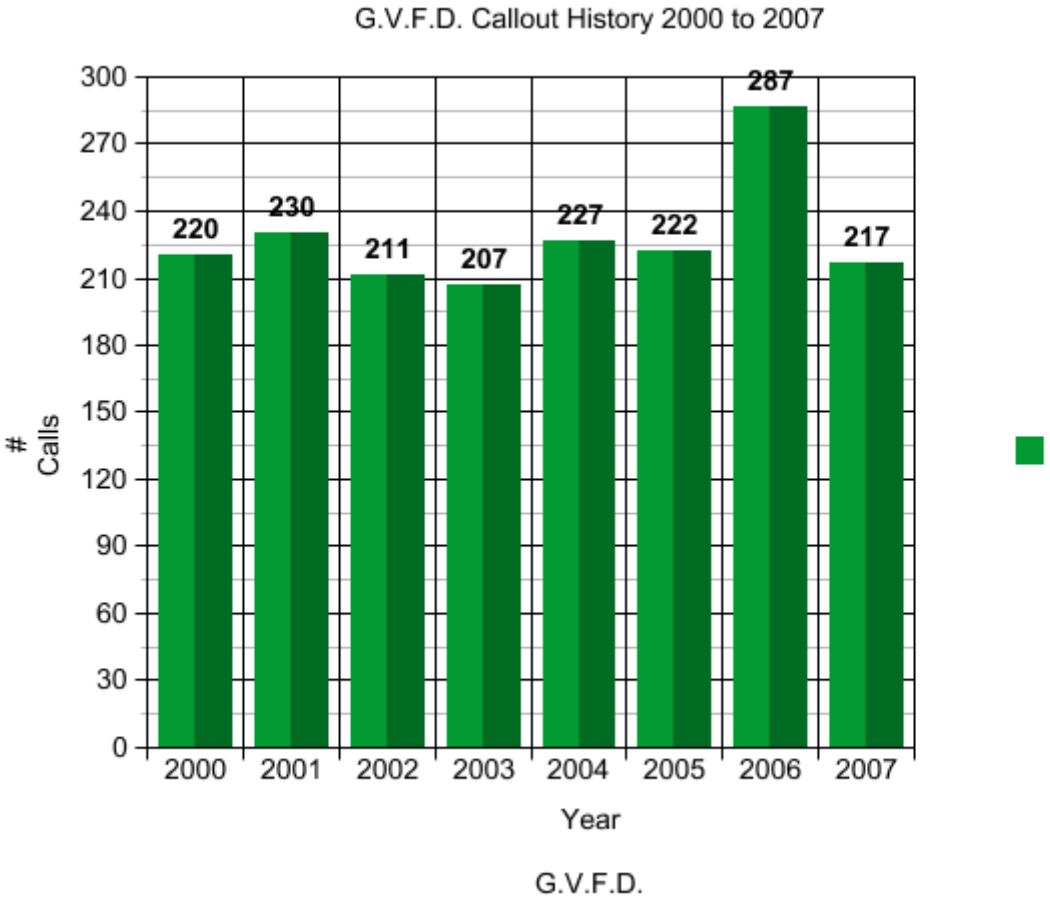
The Gabriola Fire Protection Improvement District oversees the Gabriola Volunteer Fire Department, an on-call department (paid for practice and callout). Incorporated on July 25, 1969, the Fire Department (and First Responder service) serves the island from two Fire Halls. The department is headed by Fire Chief Rick Jackson, who, in 2008, had served on the Department for 24 years, including 15 years as Chief. Members of the department are "dedicated to the community, proud of their performance, and motivated to maintain and improve their capabilities" (G.F.P.D. Long Range Plan, 1999).

The Fire Department responds to fire and medical emergencies. Medical calls constitute 50% of call volume. Mutual aid with fire departments from nearby communities is not feasible due to limiting BC Ferries service (greater than hourly intervals).

Photo. Gabriola Fire Department Information at Folklife Village.

As an example of "not so typical" day for the busy Gabriola Volunteer Fire Department, one day in late July 2007 commenced with an early morning single motor vehicle fatal accident, followed a short time later by a two-car non-life threatening motor vehicle accident, after which fire ban signs were installed around the island, a fire prevention tactic regularly implemented during extreme fire weather.

In 2007, the latest full year for which Fire Department call volume is available, 217 calls were received, of which approximately 10% involved fires (structure and brush fires). The Fire Department is proud of "remarkable response times day and night". The duty officer generally responds within one minute of a call. Mean average response time to fire calls is approximately 11 minutes.



Like other jurisdictions on the Gulf Islands and southeast Vancouver Island, human-caused brush fires are always a cause of concern for local fire officials. G.V.F.D. Fire Chief Jackson concedes local islanders are "pretty good about bush fires", and generally comply with burning bylaws and fire bans.

The Gabriola Volunteer Fire Department is responsible for all fires on the island. Additional assistance may be requested from the Ministry of Forests and Range (MoFR) Protection Branch. The Fire Department requested assistance from the MoFR once in the last twenty years (escaped slashburn). The Fire Department has a good relationship with the MoFR Wildland Fire Service.

The Gabriola Volunteer Fire Department is aiming to operate with 40 positions. The department operated with twenty-seven positions in 2007. With an average age of thirty, the crew has a relatively young profile compared with volunteer fire departments on other Gulf Islands. Captains are in their early thirties. The Fire Chief is in his mid fifties, and the Training Officer is "sixtiesh". In 2007 the Gabriola Volunteer Fire Department had three active female firefighters, plus one female on a pregnancy leave of absence.

Like many Gulf Islands, continued gentrification of Gabriola Island has resulted in escalation of real estate and property values, effectively limiting the supply pool of younger potential firefighters able to afford Gabriola living. Saltspring Island is encountering a similar problem, and is striving to secure more full-time firefighters to ensure manpower coverage (G.F.P.D. Long Range Plan, 1999). The Gabriola Volunteer Fire Department is promoting a permanent-duty roster to guarantee coverage.

The Gabriola Volunteer Fire Department maintains the following inventory of emergency vehicles:

Hall No. 1
2000 g full-size pumper with compressed air foam (1999)
Mini pumper with compressed air foam (doubles as a snow plow during the winter)
Tanker 3500 gal
Tanker 1500 gal
Old pumper 1000 g - No. 3 – back in temporary service at Hall No. 2
Rescue truck has cascade system for filling bottles
Tanker 1500 g (1976) - scheduled for replacement with a 3500 g tanker

Hall No. 2
Pumper 1000 g – destroyed in a rollover MVA while avoiding a car that pulled out at a stop sign while truck was responding to a call
Tanker 1500 g
(Hall No. 2 uses a foam injector with water)



Photos. The Gabriola Volunteer Fire Department maintains an inventory of emergency vehicles.

The Gabriola Fire Protection Improvement District has a new pumper and new tanker on order. A new Fire Hall (to replace the seismically substandard Fire Hall #1) is being planned within the next five years.

Gabriola Island does not have a community water supply (no water mains with hydrants). The Insurers' Advisory Committee (IAO) Fire Underwriters Survey (FUS) recognises a Shuttle Tanker (ST) Credit in place of a hydrant distribution system. The Shuttle Tanker Credit is equivalent to an approved water distribution system for single family dwellings within a specified distance from a station.

In April 2007, the Gabriola Volunteer Fire Department achieved Superior Tanker Shuttle (STS) accreditation, becoming only the second fire department (after the District of Errington – also in the RDN) west of Ontario to earn the rating. The Superior Tanker Shuttle Service test, administered by the Insurers' Advisory Organization, forms part of the Fire Underwriters Survey Rating. To achieve the accreditation a Fire Service must be able, within 5 minutes of the first apparatus (pumper) arriving on the fire scene (test site), flow a minimum of 900 litres/minute (200/GPM) of water, and maintain the flow uninterrupted for two hours. The test site must be within 8 kilometers of the fire station and must be at least 5 kilometers from the location where the tankers are reloaded.

In the years preceding the STS system on the Island, the Gabriola Fire Protection Improvement District had installed overhead tanks (Emergency Water Storage System – known as EWSS) at strategic locations. The EWSS did not have the capacity to provide the minimum total fire flow specified by the Fire Underwriters Survey and National Fire Protection Association (NFPA).

Implementation of the STS system on Gabriola Island involved years of preparation. Fireflow is supplied from a variety of water supply systems: hydrants (i.e., Camp Miriam, Island View and Chernoff Roads, ferry lineup, elementary school), gravity-fed tanks (i.e., Whalebone Rd., Moby Dick Rd., Ricardo Rd., Firehall #1), gravity-fed hydrants (Degnen Bay), and ponds (i.e., Martin Road/Rollo McClay park). Ponds are not generally used, as it is more efficient to use nearby hydrants or standpipes.

Photo. A dry hydrant for fire protection at Degnen Bay was paid for by the federal government.

Photos. Gravity-fed hydrants and tanks on Gabriola Island.

Most insurance companies recognise the Superior Tanker Shuttle accreditation. Rural residents with homes within 8 km of a fire hall, by road, may receive a reduction in insurance premiums. Since the STS rating was achieved, homeowners on Gabriola Island have received insurance savings of $300 to $400 or more per household.

Photos. FUS STS testing on Gabriola Island, 2007 (G.F.P.I.D.)

Prevention and Training The Gabriola Volunteer Fire Department acknowledges education is an effective fire prevention tool. The Fire Department promotes fire safety and prevention through an active public awareness program that includes visits to the local elementary school, a prominent signage campaign, and promotion of FireSmart.

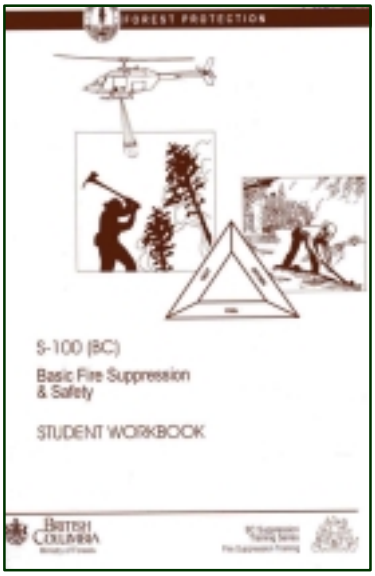
According to Fire Department sources, determined efforts by the Fire Department to promote fire prevention have instilled in most islanders a healthy respect for fires. The Fire Department acknowledges the island has "many concerned citizens" who report suspicious burning and illegal fires.

The signage program on Gabriola Island has proven to be particularly effective.

Photos. The Gabriola Volunteer Fire Department actively promotes fire prevention information.

Starting in 2005, the Fire Department has mailed FireSmart Home Owners manuals to island residents on an annual basis. (Fire Department sources note that response to the mail out is generally poor; many FireSmart manuals end up in the recycling box at the Post Office).

The Fire Department promotes development of its members through regular training programs to the NFPA 1001 standard. Cooperation with the Ministry of Forests and Range enabled a portion of the department's members to take the S-100 (BC Suppression Training) Basic Fire Suppression and Safety Course.



Recent Fire History on Gabriola Island

Fire Department sources indicate “two to three serious fires generally occur each year” on the island. Quick response from the Fire Department prevented several recent fires from becoming serious interface fires. Recent fires include:

- Sailboat fire at Silva Bay Marina
- Bush fire on upper Berry Point Road
- Bush fires at Sandwell Provincial Park
- House fire at residence on large acreage at “south” end (fire started in chimney; no spark arrestor)

Photos. Silva Bay sailboat fire, 2007 (G.V.F.D.)

The Wildland Urban Interface on Gabriola Island

Gabriola Island residents enjoy a pleasant rural setting of forests, sandstone shorelines and quiet beaches. Islanders benefit from a mild temperate climate, relaxed lifestyle, and strong sense of community. The island's close proximity to Nanaimo and larger centres in southwestern British Columbia attracts an influx of visitors, especially in the summer months. Rising tourist visits, combined with local activities and steady development on the doorstep of wildland ecosystems, are placing undue pressures on the small rural fire department.

Photo. Estate acreage for sale on Gabriola Island.

Basic interface mapping conducted more than a decade ago by the Ministry of Forests and Range rated much of the island at a high to extreme interface hazard.

Almost a decade ago, a comprehensive study of the facilities and operations of the Gabriola Volunteer Fire Department (Gabriola Fire Protection District – A Long Range Plan; A. Reed, 1999) was developed to examine ways to improve the effectiveness of the fire protection of the island. The study warned that interface fire "could rapidly exceed the protection capability of Gabriola's fire department". Recommendations focused on imposing fire prevention through public education and regulations.

Photo. Gun shot marks scar an old fire prevention sign on Gabriola Island.

The Wildland Urban Interface from the Fire Departments Perspective

- According to the Gabriola Volunteer Fire Department, one of the department's "biggest worries" is the Whalebone subdivision. The subdivision has one of the densest populations on the island, and a one-road in/one-road out system. Fire at the subdivision could have "disastrous" consequences.
- Lack of direct (looping) accesses to many areas of the island with one-way/dead-end roads significantly increases response times. For over twenty years the Fire Department has been advocating for access improvements at various locations on the island.
- Access approvals at new subdivision developments tend to get "bogged down" in different layers of government.
- Lack of spark arrestors on chimneys increases fire hazard to structures and surrounding vegetation.
- Several island residences are rendered almost inaccessible by long, winding driveways.
- Summer visitors are steadily increasing – some tourists are not as vigilant as local residents about fire risk.
- Many people disregard the risk associated with WUI living in favour of more trees around their residences.

Photo. Firefighting in the interface zone.

Government Planning Tools

A small fraction of wildfires intrudes into areas of human settlement, but the impact of wildfire is generally devastating to life and property. Governments can use a variety of tools to manage interface fire hazards. Key actions from local government, working in concert with local and provincial fire fighting agencies, can play a lead role in wildfire risk reduction in the interface zone.

As noted, two local governments serve Gabriola Island: the Regional District of Nanaimo, which provides services, and the Islands Trust, which is responsible for land-use planning.

Services provided to Gabriola Island by the regional district include garbage collection, recycling, park management, and emergency planning coordination (i.e., emergency preparedness and emergency wharf for medical evacuations).


Photo. Gabriola Island Emergency Wharf at Descanso Bay.

The Regional District of Nanaimo is also responsible for building inspections. The Fire Department has requested driveway accesses be part of the RDN Building Inspection Services mandate, along with properly installed and visible address signs. As noted, many acreages on Gabriola have houses or other buildings that are not easily accessible to fire protection equipment. Some buildings are so remote it is almost impossible for the Fire Department to reach them. Should the property owner not wish to upgrade a driveway, the possibility exists to install an NFPA approved 3" or larger dry stand pipe from the public road to an area acceptable to the Fire Department, for use in a fire emergency. Fire attack crews would still need to forward other required equipment, but the time-consuming hose laying process would be alleviated, increasing the likelihood of a more successful outcome.

In recognition of the need for “localised regulations and restrictions governing fire prevention, suppression, and control”, the Trustees of the Gabriola Fire Protection Improvement District enacted Fire Regulations Bylaw 56 (May 1996), a wide ranging bylaw addressing a range of issues, from hazardous chimneys and deposits of combustible materials, to burning permits. Under Fire Regulations Bylaw 56, no person is permitted to ignite an open air fire during fire season (April to October) without first obtaining a permit from the Fire Chief. Fires smaller than 1 m3 are not required to have a permit. When the level of danger reaches a certain level, all open burning is forbidden and is strictly enforced.

Residents of the Gulf Islands regularly gather windfall and pull broom. Inadequate means of disposal have increased accumulations of dried, combustible fuels. The Islands Trust LTC on Gabriola Island is advocating for the Regional District of Nanaimo to develop a environmentally-based, community program for managing yard waste in order to avoid a repetition of the Galiano wildfire of 2006.

BIOPHYSICAL ATTRIBUTES

CLIMATE AND BIOGEOCLIMATIC ECOSYSTEM 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 (MoFR, 1994). 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, Gabriola Island is classified in the moist maritime Coastal Douglas-fir Subzone (CDFmm). The CDFmm extends along the southeast coast of Vancouver Island and the southern Gulf Islands, inland to approximately 150 – 200 m above sea level (a.s.l.). With warm, dry summers and mild, wet winters, the CDFmm has the mildest climate in Canada.

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.

Forests in the CDFmm are dominated by Douglas-fir, with lesser amounts of western redcedar. Grand fir is found in mixed-species stands of Douglas-fir and western redcedar. Deciduous trees (i.e., broadleaf maple, red alder, wild cherry, dogwood) generally occupy mixed stands. Arbutus is common on warm, well-drained aspects. Prominent understorey plant species in the CDFmm include dull Oregon-grape, sword fern, salal, snowberry, baldhip rose, western trumpet honeysuckle, and ocean-spray.

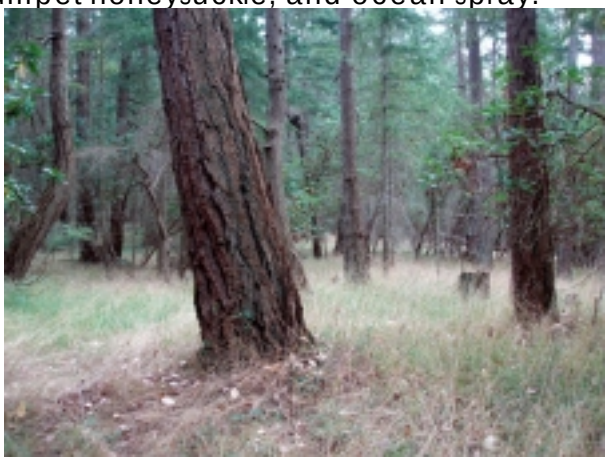


Photo. Open, park-like Douglas-fir forest on Gabriola Island.

Fire History

For thousands of years prior to European settlement, infrequent fires swept through the forests of the Pacific Northwest (see Table). 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. Post-settlement, fires increased as a result of land clearing and historical logging practices. (In the 1930's, a wildfire burned across most of Gabriola Island.)

Table. 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)

Photo. Prior to settlement by non-Europeans, low intensity fires periodically regularly razed Gabriola Island.

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 human-caused 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.

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, compared to moist flat areas.

Photo. Wildfire spreading up a steep slope.

Gabriola Island is located in the Nanaimo Lowland Ecosection – a coastal plain that extends from south-eastern 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. Gentle to moderate slopes characterise the region. A long, gradual northwest-southeast ridge runs through the central portion of Gabriola Island.

Photo. Gabriola Island is generally characterised by gentle to moderate topography.

In the event of ignition during extreme fire weather (high temperature and low humidity), brisk onshore afternoon winds could rapidly spread fire through continuous fuel complexes. Strong winds would fan fire rapidly up the slopes of the island's wooded interior.

Photo. Strong onshore winds are common in summer.

SECTION 4. PREPARATION OF THE COMMUNITY WILDFIRE PROTECTION PLAN

Preparation of the Community Wildfire Protection Plan for the Gabriola Fire Protection Improvement District followed protocol 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, Gabriola Volunteer Fire Department, Islands Trust (Local Trust Committee), 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 websites provide 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, USA)
- Gabriola Fire Protection District – A Long Term Plan (A. Reed, P.Eng., 1999)
- Gabriola Island Chamber of Commerce. www.gabriolaisland.org
- Islands Trust website *www.islandstrust.bc.ca*
- Gabriola Island Official Community Plan www.islandstrust.bc.ca/ltc/gb
- Gabriola Island Studio *Tour www.gabriolartscouncil.org*
- 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 in this project consisted of:

- 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 its limited applicability to Vancouver Island.)

STEP FOUR: Hazard Mapping

Interface hazard mapping was developed 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 the Fire Protection Improvement District. 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 in consultation with the G.V.F.D. and local governments.

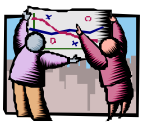
STEP SIX: Action Plan

Mitigation measures were identified to address community interface fire protection requirements. The Gabriola Volunteer Fire Department was instrumental in development of 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 governments 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 5: 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.

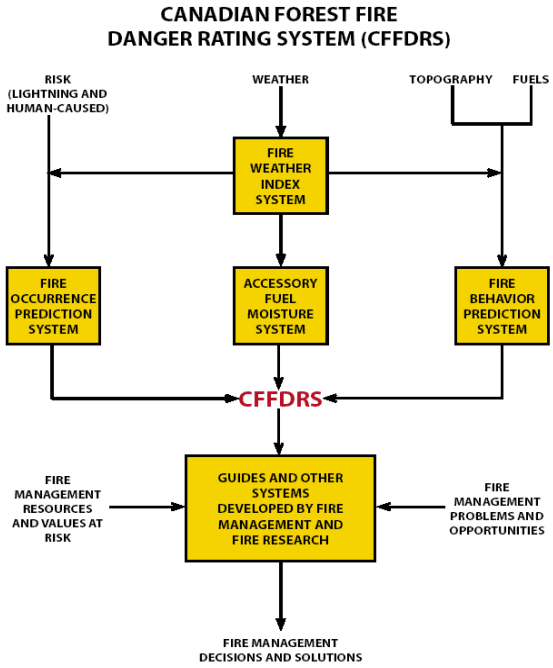


Figure. Canadian Forest Fire Danger Rating System.

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 (see Table).

Table. 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. Wildfire.

Over the last decade, local fire weather data from the Ministry of Forests and Range Coastal Fire Centre indicate long periods of days in Fire Class Hazard 3 (moderate danger class) or higher.

Photo. Wildland firefighter.

Interface Community Fire Hazard Analysis: The Ministry of Forests and Range Protection Branch "Interface Community Fire Hazard" analysis provides a quantitative procedure for assessing the interface fire hazard. Based on FireSmart, the analysis ranks over 23 factors and assigns points – the greater the hazard, the greater the number of points – to each hazard-risk factor. An interface area, site, or structure is not considered to be "fire safe" unless it obtains a low or moderate assessment score.

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 areas; may or may not be heavy use areas; direct threat to homes/structures/values.

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 6: 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.

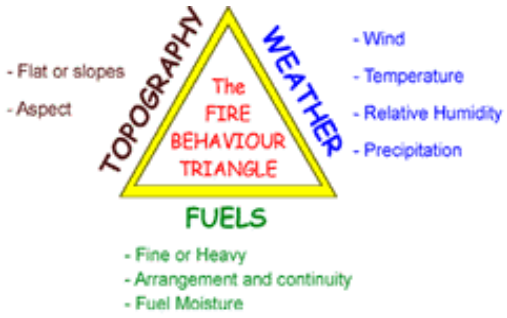


Figure. Fire Behaviour Triangle

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).

Table. 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

Fire Behaviour and Fuel Types Fire behaviour predicts how wildfire will behave under extreme weather conditions. The Fire Behaviour System uses sixteen benchmark fuel types to forecast how a wildfire will react. Fuel types are described qualitatively, rather than quantitatively, according to characteristics of the forest stand. 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, and are persistent, slow burning, and difficult to detect.

Photo. Ground fire (spreading to surface fuels).

- 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. Surface fuels.

- 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.

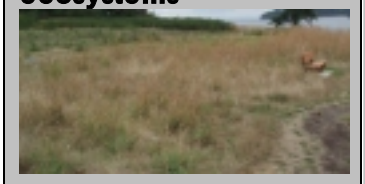
Photo. Crown fire.

The following table summarises major fuel types on Gabriola Island, based on the Canadian Forest Fire Behaviour Prediction (FBP) System*.

Table. Fuel Types* – Gabriola Island

*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.

	General Fuel Characteristics			
Layer: / Fuel Type Complex:	**Forest Floor and Organic Layer**	**Surface and Ladder Fuels**	**Stand Structure and Composition**	**Comments– Distribution Mitigation**
Coniferous stands 	-shallow to moderately shallow organic layer (duff), consisting of 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 -stand density ranges from open to moderately well-stocked to dense	Extensive coniferous stands on Gabriola Island.
Effect on fire behaviour:	Thick duff layers increase chance of ignition and spread	Ladder fuels increase potential for surface fire climbing into crowns	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 stands (often with Douglas-fir) 	-continuous layer of needle litter, small twigs, cones, and feather moss	-high proportion of ladder fuels (lower live and dead branches, shrub layer, downed stems) tend to be found in younger stands	-generally comprised of younger, immature stands -often densely stocked -low height to live crown	Small pure stands occupy coastal fringes
Effect 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 (due to natural resins)

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 big leaf maple (and/or red alder)	Throughout area. Common in upland seepage areas.
Effect on fire behaviour:	Low to mod. capability of carrying surface fire	Risk of ignition and fire spread increases during extreme fire weather in stands with high surface fuel loading	Local stands contain sufficient proportion of flammable coniferous trees to sustain and spread a wildfire, especially during extreme fire weather	Fuel types differentia-ted by season and % of coniferous & deciduous cover
Slash and Downed Woody Debris 	-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 trees and clumps of standing trees located near slash piles increase risk of fire climbing into crowns	Logging and land clearing.
Effect on fire behaviour:	High risk of ignition and spread during extreme fire weather	Elevated surface fuels have a greater capacity for "drying out"	Dead standing trees act to spread a ground fire into crowns of adjacent stands	Highly combustible in certain seasons
Grass-dominated ecosystems 	-continuous live and dead (may be cured depending on weather) grass litter -shallow, moderately compacted organic layer	-discontinuous to continuous with scattered shrubs; -in early summer: grass is generally green -in late summer, brown cured grasses pose fire hazard	Clumps of brush species (i.e., broom) and scattered trees may increase potential for fire spread	Not widespread, but found at several island locations: -park areas -agricultural lands -coastal bluffs
Effect on fire behaviour:	Low to high risk of ignition & spread (depending on season)	Low to mod. risk of ignition and spread (depending on season)	An understorey of dry grass and leaf litter in a forest stand contributes to surface fuel loading.	Wind will spread fire rapidly in dried, cured grass

Fire weather, fuel types and topography are combined 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.

TABLE. FIRE BEHAVIOUR CHARACTERISTICS AND FIRE BEHAVIOUR OUTPUTS BASED ON WEATHER CONDITION PREDICTIONS FOR 90TH PERCENTILE FW INDICES: GABRIOLA ISLAND.

OUTPUT FACTORS? FUEL TYPES?	FIRE INTENSITY (BASED ON RATE OF SPREAD AND PREDICTED FUEL CONSUMPTION)	RATE OF SPREAD (SPEED OF FIRE – ADJUSTED FOR STEEPNESS OF SLOPE AND WIND)	CROWN FRACTION BURNED (PROPORTION OF TREE CROWNS INVOLVED IN FIRE)
CONIFEROUS STANDS	MODERATE TO HIGH	MODERATE TO RAPID	HIGH
PINE STANDS	HIGH	RAPID	VERY HIGH
MIXED WOOD STANDS	LOW TO MODERATE	MODERATE	LOW TO MODERATE
SLASH AND DOWNED WOODY DEBRIS	MODERATE TO HIGH	MODERATE TO RAPID	MODERATE TO HIGH
GRASS-DOMINATED ECOSYSTEMS	MODERATE TO HIGH	MODERATE TO RAPID	HIGH

Severity of wildfire hazard is measured using the following key components:

a. Fire behaviour
b. Risk of ignition
c. Structures at risk
d. Suppression constraints


Photo. Combustible natural fuels.

Risk of Ignition

The risk of ignition at Gabriola Island is primarily from human activity. Common human-caused ignition sources include: discarded cigarettes and matches from smoking, campfires, motorised machinery, motorised recreational vehicles (i.e., dirt bikes), and fires started at homes, businesses, and yards adjacent to woodland areas.

In the last decade, over ninety nine percent of the wildfires started on Vancouver Island and the Gulf Islands were human-caused.

Table. 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/ resorts/ commercial	High
Areas frequented by party goers	High

Photo. 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.

A range of structure types on Gabriola Island encompasses old and new construction: residences, businesses, institutions (i.e., school, community centre, senior's centre), and resort accommodations.

Table. 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). -A high proportion of chimneys on Gabriola Island do not have spark arrestors. -Many structures in high-risk interface areas are surrounded by combustible vegetation.	In interface areas, safety of buildings should be a high priority.
Affect on fire behaviour:	-Difficult-to-access structures with inadequate fireflow have highest risk. -Remote structures constructed with combustible 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.	Residents and communities will be more likely to take action to reduce the hazard posed by wildfire if they are aware of the conditions of their own buildings, site, and area.

Photos. Construction and design exhibits a variable range on Gabriola Island. Combustible v egetation surrounds many structures on the island.

Photo. Interface fire (FireSmart, 2003).

Suppression Constraints

Suppression constraints are based on the availability of:

- suppression resources
- access restrictions
- topographical features

A wide variation in suppression response is found in British Columbia. Suppression response to flat, well-roaded urban 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 located outside fire protection boundaries.

The Gabriola Fire Protection Improvement District is not supplied with community piped water. Recent accreditation with "Superior Tanker Shuttle" (STS) rating from the Underwriters Survey (FUS) enables the Gabriola Volunteer Fire Department to flow at least 200 imperial gallons per minutes (Igpm) uninterrupted for a total of two hours. (The STS rating is designed to provide island residents with a fire protection insurance rating equivalent to that of a residential hydrant-protected community.)

Table. 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. Fire hydrant near ferry terminal.

SECTION 7: COMMUNITY RISK ASSESSMENT (HIRV MODEL)

Hazard-Impact-Risk-Vulnerability (HIRV) modeling was developed to explore the potential impact of interface fire at various locations on Gabriola Island. Two examples are presented: resort area in the southeastern end of the island (High risk); and residential/commercial area on Berry Point Road at the north end of island (High risk). Impact factors are outlined below.

Table. 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 - Resort Area at SE end of island	**High**	**Data is well established**	**High**	**Data is well establish'd**	**Env=2-3 Soc=2 Econ=2 Pol=2**	**Data is well established**	**Risk= High Vulnerability= High**

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

Table. 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 - Residential/ commercial - Berry Point Road at N end of island	**High**	**Data is well established**	**High**	**Data is well establish'd**	**Env=2-3 Soc=2-3 Econ=1-2 Pol=2**	**Data is well established**	**Risk=High Vulnerability= High**

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

Table. 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

HIRV modeling indicates risk management (mitigation) is required in areas with a High to Extreme interface fire hazard rating.

SECTION 8. 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. Hazard mapping criteria were reviewed with the local Fire Department.

TABLE. 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 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; low 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 97% of the Gabriola Fire Protection Improvement District is assessed with a high to extreme hazard interface fire hazard rating.


Photo. Wildfire.

Areas with a **Low** interface fire hazard typically 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 also include well-maintained urban parklands, irrigated golf courses and agricultural lands, and natural wetlands.

Local Examples: The small proportion of Gabriola Island classified as having a Low Interface fire hazard rating is generally limited to riparian and wetland areas.

Table. 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.

Photo. Wetlands typically have a low interface fire hazard rating.

Areas with a **MODERATE** interface fire hazard rating at Gabriola Fire Protection Improvement District include small areas of established residential and commercial properties with reasonable to good fire suppression capabilities within close proximity to the fire station. In some instances, areas classified as having a Moderate interface fire hazard rating on Gabriola Island provide fuel buffers (i.e., golf course, maintained agricultural lands with low to moderate fuel loading).

Examples: Folklife Village; open areas of golf course; maintained farmland

Table. General Characteristics of Areas with Moderate WUI Fire Hazard.

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 pose ignition risk.
Structures at Risk	Moderate – moderately fire-resistant construction with varying degrees of natural fuel loading. Modified natural fuels.
Suppression Constraints	Low to Moderate – fireflow adequate (hydrants) to inadequate (limited and/or no hydrants). Good to fair access.
Comments	Surrounding vegetation is often continuous

Photo. Golf courses generally act as fire buffers.

Areas with a **HIGH** interface fire hazard rating at Gabriola Fire Protection Improvement District comprise a significant portion of the island where continuous forest vegetation is located near or adjacent to structures and facilities.

Examples: Majority of Gabriola Island – encompassing "intermix" and "interface" areas up to 300 m or more from established access.

Table. General Characteristics of Areas with High WUI Hazard.

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 to continuous wildland fuels
Structures at Risk	High – established and proposed development located within or adjacent to areas with high fuel loading.
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	Early detection and rapid response key to successful suppression.

Photo from Firestorm

Photos. Rural properties surrounded by combustible vegetation have inferior potential for suppression, resulting in a high interface fire hazard rating.

Areas with an **EXTREME** interface fire hazard rating encompass brush and forested lands with a wide range of suppression constraints.

Examples: Non-roaded, wooded interior and peripheral areas of the island; many areas of sloping terrain with continuous forest cover; includes portions of provincial parks.

Table. General Characteristics of Areas with Extreme WUI Fire Hazard.

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 visitors increases risk of ignition in areas with forest and brush (i.e., cigarettes, campfires) - 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	Hard-to-access interior/peripheral areas with high fuel loading and delayed response times are a cause for concern

Photo. Interface fire.

Photo. BC Parks sign on Gabriola Island.

SECTION 9: THE INTERFACE ZONE: CALL FOR ACTION

Prior to settlement by non Europeans, forest lands on the southeast coast of Vancouver Island and the southern Gulf Islands were periodically razed by wildfires. Infrequent fires reduced underbrush and combustible vegetation. Ecosystems in the area adapted to periodic recurrence of wildfires that recycled nutrients and renewed system functions.

Advanced fire suppression efforts in the last fifty years have resulted in high levels of natural fuel loads in wildland areas. Population growth at the interface is responsible for a growing number of human-caused fires. 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). In the last decade, almost one hundred percent of the wildfires on southeast Vancouver Island and the southern Gulf Islands have been started by humans (MoFR).

Photo. Mars Water Bomber attacks a human-caused fire near Cowichan Lake on Vancouver Island (2006).

Photo. MoFR crew attacks a human-caused fire near Thetis Lake, on southern Vancouver Island (2007).

The fire on Galiano Island in the summer of 2006 heightened awareness of the vulnerability of the Gulf Islands to wildfire. The United Nations Intergovernmental Panel on Climate Change (February 2007) predicts global warming will extend the duration of fire seasons, increasing the frequency of wildfires in fire-prone areas (i.e., southeast Vancouver Island and the southern Gulf Islands). Fires started by human carelessness are on the increase. A wildfire on Gabriola Island at the height of the summer tourist season would exert a severe strain on limited island resources.

The comprehensive Long Range Plan conducted in 1999 for the Gabriola Fire Protection Improvement District examined ways to enhance effectiveness of fire protection on the island. The report focused on efforts to improve the Insurers' Advisory Organisation Fire Underwriters Survey rating of the Fire Department. Recent accreditation with Superior Tanker Shuttle Rating is a remarkable achievement for a small, rural fire department.

The 1999 Long Range Plan contained additional recommendations to improve fire protection and prevention:

- regularly scheduled equipment maintenance and upgrades to replace deteriorating equipment
- improvements in access at certain areas of the island (to improve response times)
- replacement of Fire Hall #1
- implementation of regulations and enforcement to ensure new development and existing properties achieve the goal of a Low to Moderate interface hazard rating by "about the year 2010"
- recruitment of additional volunteer firefighters
- Pre-Fire Planning (written Operating Guidelines for specific fire/emergency sites (including the island's three shopping centres, federal government wharf at Degnen Bay, marinas that serve as fuel dealers, Surf Lodge, BC Ferries lineup – particularly for "Dangerous Cargo" sailings
- public education

As a result of the dedication and commitment of fire officials on Gabriola Island, fire protection and prevention have made significant advances since the Long Range Plan was introduced in 1999. Fire fighting equipment has been upgraded on a consistent basis, Superior Tanker Shuttle accreditation has been achieved, and the fire department has maintained a relatively stable quota of firefighters. Ongoing efforts by the Gabriola Fire Protection Improvement District, in conjunction with local governments, are encouraged to address key issues related to the interface zone. The Long Range Plan noted that "a good, publicized look at how fire can spread into wildland from developed areas, and what preventative measures are responsible behaviours can be a special, if not unique component of the Gabriola fire prevention education plan". Development of Gabriola Island's Community Wildfire Protection Plan is intended to focus islanders' attention on the interface zone.

Mitigative measures to improve fire protection and prevention in the interface zone are outlined in the next section.

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

Mitigative Measures

Mitigative measures to reduce the wildfire hazard must target:

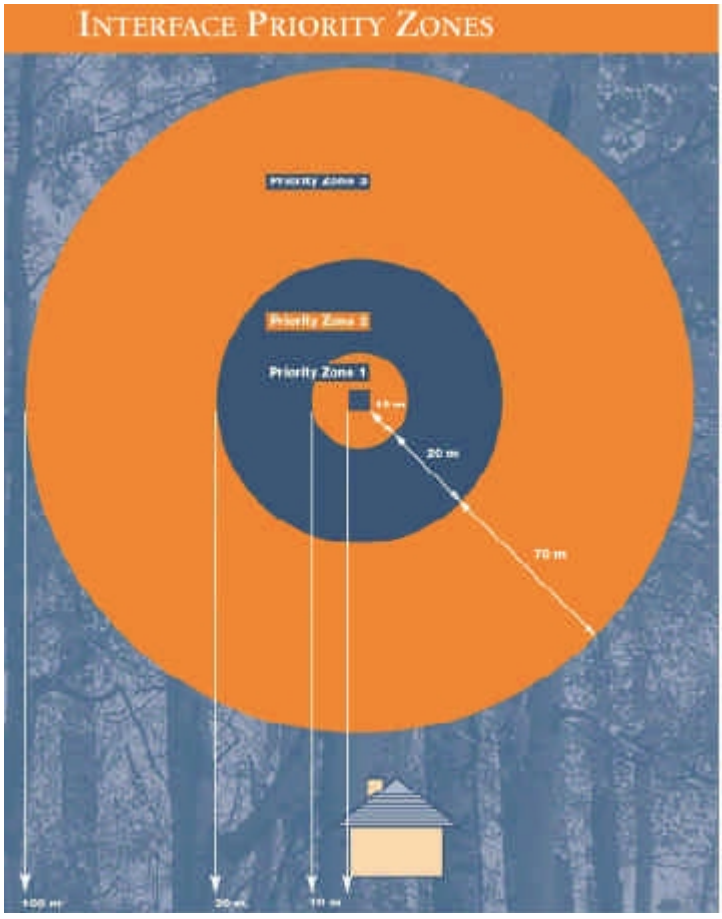
- Vegetation/Site Management
- Structural Options (Building Construction and Design)
- Infrastructure (Planning)

Education and public awareness are integral components of wildfire risk reduction.

Vegetation Management

Combustible fuels are a concern when development occurs in the interface zone. The primary premise of the FireSmart program is management of combustible fuels (vegetation) to reduce hazard ratings to acceptable levels.

Vegetation (fuel) management in interface areas involves the removal, reduction, or conversion of on-site fuels.



Vegetation management strategies are directed at three concentric FireSmart Fuel Modification Zones (or Priority Zones) around structures in the interface.

The interface fire hazard potential considers the fire threat in three concentric Fuel Modification Zones between structures and a potential wildland fire.

Figure. Fuel Modified Zones are concentric zones around structures. Fuel modification zone distances should be increased where residences are located on sloping ground, tops of slopes, warm aspects, (i.e., south and west aspects), and/or border areas with continuous vegetation.

Fuel ModificationPriority Zone 1 - PZ 1 (Fuel Removal / Conversion) This area, immediately adjacent to the building, and extending outward in all directions for a recommended minimum of 10 m in flat terrain, is the most critical zone because combustible vegetation within it will allow a wildfire to come within close proximity to, or direct contact with, the structure.

Photo. Fuel removal & conversion in PZ 1.

The prime primary objective of vegetation management in PZ 1 is to create a fuel-free environment that will not support a fire of any kind. Fuel management is essential to reduction of fire danger.

Fuel ModificationPriority Zone 2 - PZ 2 (Fuel Reduction) This zone commences 10 m from the building and extends to 30 m from the building on flat ground, and further on sloping terrain.

Photo. Fuel reduction in PZ 2.

Fuel management focuses on creating an environment that will only support fires of lower intensity and rate of spread.

Fuel ModificationPriority Zone 3 - PZ 3 (Fuel Reduction and/or Conversion) This area begins 30 m from the building, extending to 100 m or farther, depending on topography.

Fuel management is required when high hazard levels are not sufficiently reduced by techniques used in PZ 2.

Photo. Vegetation management may be necessary in PZ 3 if fuel treatments in PZ 1 and 2 are insufficient to reduce hazard levels.

Building Construction and Design Fire mitigation strategies must consider the vulnerability of buildings in the interface zone. FireSmart design standards must be incorporated in the construction or retrofit of interface buildings. The design, construction, and maintenance of interface residences or communities must reflect FireSmart guidelines for roofing, siding, stovepipes or chimneys (i.e., spark arrestors), windows and door glazing, eaves and vents, decks and porches, and on-site firefighting equipment.

Photo. New residences feature FireSmart landscaping and fire retardant construction.

Infrastructure Infrastructure consists of the network of roadways and communications, utilities, services, and local planning tools that define a community. Key features of FireSmart infrastructure include safe access routes and an adequate water supply for firefighting (fireflow).

FireSmart infrastructure will increase resident and firefighter safety, and facilitate quick response by firefighters.

FOLLOW THEFIRESMARTGUIDELINES

Fire in the interface without fuel modification.

Diagrams. Vegetation management strategies in the interface zone should be directed at the establishment and maintenance of Fuel Modification Zones.

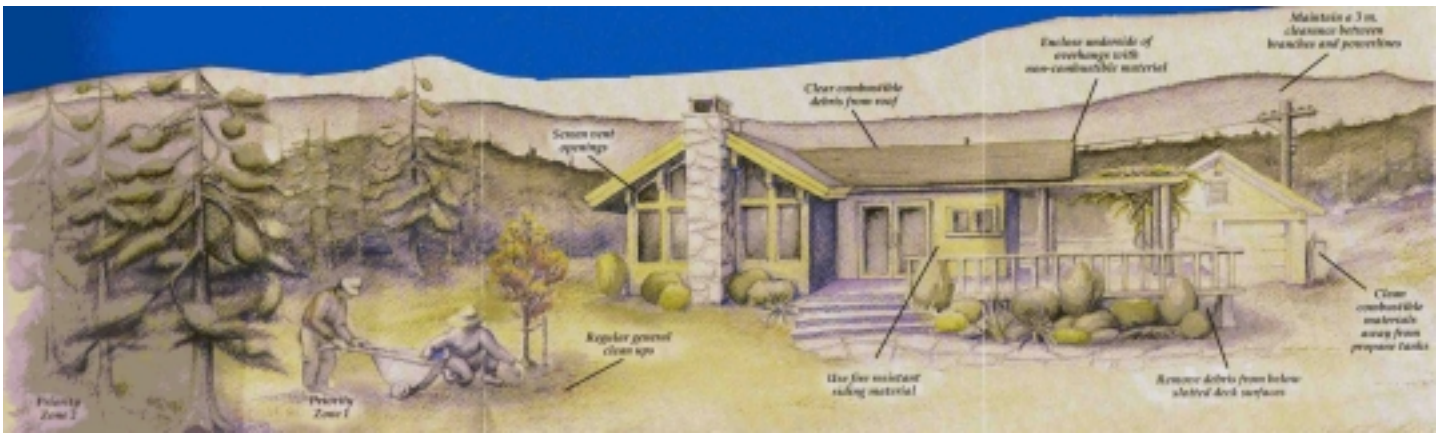


Diagram. FireSmart homes and properties feature fuel modification zones and fire-retardant construction.

SECTION 10: 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 governments, in concert with local and provincial fire officials, must take the lead in development and implementation of risk reduction strategies and policies. Cooperation between local governments is necessary to:

- Raise public awareness and preparedness
- Oversee risk assessment and mitigation techniques
- Establish guidelines for land use and development
- Establish and maintain an integrated emergency response and management system

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

The following recommendations are aimed at reducing the risk of interface fire at the Gabriola Fire Protection Improvement District:

Education and Community Involvement:

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

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

- **Cooperate with the Ministry of Forests and Range and Regional District of Nanaimo to create a condensed version (i.e., informative pamphlet) of the FireSmart Manual.**

- **Promote FireSmart principles at community events (i.e., Dancing Man Festival, Concert on the Green, Salmon Barbecue and Pam Am Golf Tournament, Gabriola Islander Day, Art Studio Tour).**

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

- **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 and other Gulf Islands that have completed WUI hazard mapping and/or 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.**

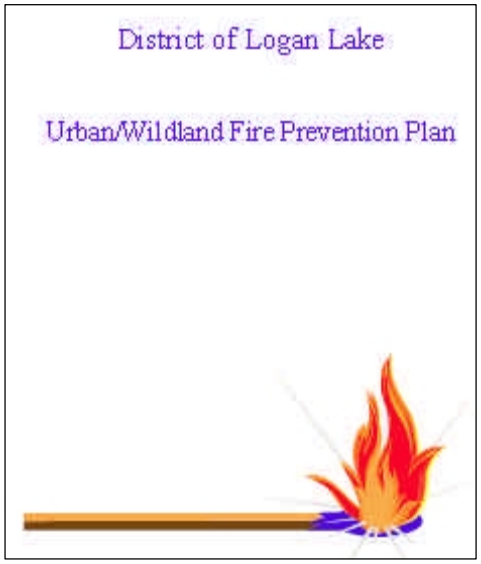


Photo. Fuel reduction at Logan Lake.

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

Vegetation Management:

Fuel Modified Zones –

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

Fuel Reduction Pilot Projects –

- **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 for UBCM Pilot Projects include public lands with high-use trail corridors, hard-to-access sites with recent fire history, and disturbed sites (potential sites for ecosystem rehabilitation).**
  Suitable sites for fuel treatment pilot projects include Provincial, Regional and Community Parks
  -Sandwell Provincial Park (fuel reduction along key trail corridors)
  -Drumbeg Provincial Park (fuel reduction, ecosystem restoration on grassy bluffs to remove flammable broom)
  -new RDN Community Park (fuel reduction, trail marking, and access improvement)

Slash Abatement –

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

Photo. Slash fire. MoFR.

Roadside Fuels –

- **Continue to cooperate with BC Hydro to ensure regularly scheduled vegetation maintenance work along road rights-of-way.**

Fire-resistive Landscaping –

- **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 a community-wide program of managing yard wastes by collecting or composting, or converting such wastes into renewable energy.**

Building Construction and Design:

- **Require all new construction/retrofits to follow RDN building permit process.**

- **Use fire-retardant roof covering assembly rated Class A, B, or C (i.e., metal, tile, ULC-rated asphalt).**

- **Use non-combustible siding material (i.e., stucco, metal siding, brick, cement shingles or cementitious materials, poured concrete, or ULC-rated wood siding).**

- **Investigate the feasibility of mandating spark arrestors on chimneys/stovepipes on new construction.**

- **Follow FireSmart guidelines for design, construction and maintenance of chimneys, window and door glazing, eaves and vents, and decking.** http://www.partnersinprotection.ab.ca

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 local government that development permit areas be applied to existing developed/subdivided areas in high or extreme interface hazard areas**

Photo. Interface fire.

- **Work closely with local government in the rezoning applications of any undeveloped lands within the District to ensure adequate servicing requirements for fire protection are met**

- **Encourage local government to issue FireSmart pamphlets to development applicants**

Parks –

- **Encourage residents to institute informal "Forest Watch" neighbourhood patrols during fire season (i.e., areas adjacent to provincial, regional, and community parks).**

- **Cooperate with various levels of government to establish regular park patrol systems during extreme fire weather.**

- **Cooperate with RDN to ensure the Management Plan for the island's new Community Park incorporates well marked, mapped trails, a road ed emergency access with more than one exit, and promotes signage with emergency contact numbers at strategic trail accesses.**

- **Cooperate with RDN and BC Parks to ensure vegetation management is regularly carried out at the island's parks. Continue to encourage cooperation between BC Parks and the local elementary school on ecosystem restoration (broom removal) at Drumbeg Provincial Park.**


Photo. Drumbeg Provincial Park.

- **Cooperate with the Islands Trust to develop a fire control plan for the Islands Trust Fund nature reserve on North Road.**

Access –

- **Strive to ensure property accesses (i.e., width, length, turning radii) are integrated as part of the RDN Building Inspection Services mandate, along with properly installed and visible address signs.**

- **Liaise with local governments and the Ministry of Transportation and Highways on improving emergency access by completing or straightening one-way road systems at areas identified by the fire department as having slower or possibly hazard delayed response times (i.e., Whalebone subdivision; Church St.-Spruce Ave; Clarendon Road; Haig Road/Chichester).**

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

Fire Protection

Fireflow –

- **Follow Fire Underwriters Survey (FUS) guidelines for regular testing to ensure ongoing delivery of the Superior Tanker Shuttle (STS) system.**

Photo. Fire suppression.

Firefighters –

In view of a projected island population with increase in older age groups, budget to phase in more full-time firefighters.

Photo. Firefighters.

Pre-fire Planning –

- **As recommended in the Gabriola Fire Protection District Long Range Plan (1999), develop and document pre-fire plans (operating guidelines) for specific fire/emergency sites (including the island's shopping areas, marin that serve as fuel dealers, BC Ferries line-up especially for "Dangerous Cargo" sailings)**

Firefighting at the Grassroots Level –

- **Encourage homeowners bordering areas of extensive forest to equip their homes with personnel fire fighting equipment, including: rooftop access ladder, pump (non-electric power source), shovel, rake, large water barrel, and 10-L pail. Regular practices are recommended to ensure familiarity with the use of fire fighting equipment.**

- **Encourage home and property owners in interface areas to maintain and be versed in the use of on-site fireflow (MoFR recommends a minimum of 7500 L) for initial attack. Fireflow could be stored in cistern or gravity-fed tank connected to standard forestry 3" hose.**

- **During extreme fire weather, encourage residents to use sprinkler systems powered by gas pumps drawing from cisterns to "wet down" FPZ 1 zone around structures.**

SECTION11: IMPLEMENTATION

No plan is complete until it is implemented.

Local governments must take the responsibility for implementation.

The Community Wildfire Protection Plan for the Gabriola Fire Protection Improvement District should be distributed to local governments within three months of the plan's submission. Recommendations in the plan should be reviewed in consideration of official adoption of the plan. An opportunity to review the plan should be provided to local stakeholders (i.e., RCMP – Gabriola Detachment, BC Parks, Ministry of Forests and Range, Ratepayers' Association, and other special interest groups), and other jurisdictions in the Islands Trusts Association and Regional District of Nanaimo. 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 are ongoing processes.

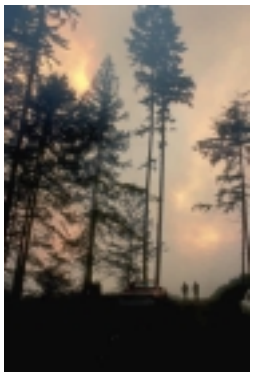


Photo. Wildfire.