Community Wildfire Protection Plan

Horne Lake Community, BC

November 2006

Developed through a grant from the Union of British Columbia Municipalities to:
The Horne Lake Strata Corporation

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

CfBC Member

Digital Mapping by:
Horne Lake Strata Corporation

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- Ministry of Forests and Range

- Union of British Columbia Municipalities

- Regional District of Nanaimo

- The Horne Lake Strata Corporation

- Ministry of Environment BC Parks

- Department of Fisheries and Oceans

- Horne Lake Adventures

Horne Lake

From the perspective of fire prevention, the intermix environment is often the worst of all worlds.... There is little zoning for fire control. There are few building codes to reduce hazards such as wooden roofs. There is scant pressure to reduce wildland fuels around dwellings. Open spaces that serve as buffer zones shrink as houses and woodlands expand.... Narrow roads to sheltered homesites, rustic wooden houses with shake-shingle roofs, lush vegetation dripping over walls and roofs, distance from prying officials.... – all this is why the exurban communities were created. To render them fireproof is to recreate the environments from which the residents fled in the first place.

World Fire, Stephen Pyne, 2005

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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 (ecosystems) into categories of a hierarchical classification system that combines three major classifications: climate, vegetation, and site.

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

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

CDFmm: moist maritime Coastal Douglas-fir biogeoclimatic unit.

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

CWPP: Community Wildfire Protection Plan

CWHxm: Very Dry maritime Coastal Western Hemlock Subzone

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

Development Permits / Development Permit Areas: The Local Government Act provides for the designation of Development Permit Areas for wildfires.

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

Field mapping: mapping of physical features and key resources

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.

Fire Season: officially April 1 to October 31

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

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

Fuel treatment: manipulation of vegetative (and structural) fuels through 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 – a numerical rating of the fire intensity - combines ISI and BUI.

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.

Hazard: the product of risk, vulnerability, exposure, and the capacity of human 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 factors, environmental factors, and political factors.

Interface Hazard Ratings: a relative scale of interface fire hazard: Low (not directly adjacent to or cannot be directly impacted by wildfire); Moderate (suppression success likely); High (suppression success unlikely); Extreme (suppression will not be successful).

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

MOFR: Ministry of Forests and Range

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

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

Podzol: Soil Great Group characterised by podzolic B horizon

Priority Zones: See Fuel Modified Zones

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

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

RDN: Regional District of Nanaimo

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

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

UBCM: Union of British Columbia Municipalities.

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

Wildland urban interface: the zone where structures, businesses, and other human activities and pursuits are situated among trees and other combustible vegetation.

Wildfire on the front ranges of the Rockies.

COMMUNITY WILDFIRE PROTECTION PLAN

HORNE LAKE COMMUNITY

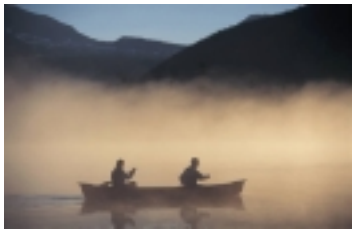
(Horne Lake Strata Corporation, Ministry of Environment - BC Parks, Regional District of Nanaimo, Department of Fisheries and Oceans)

SYNOPSIS

1. Wildfire poses a significant risk to Horne Lake. The Horne Lake Community – a loosely knit association of cottagers and forest land owners, facility operators, and various levels of government – is concerned about the threat of wildfire. As an "unprotected area", Horne Lake is located beyond the boundaries of fire protection coverage. During fire season, the population of Horne Lake swells with summer visitors.

2. In 2006, the Horne Lake Strata Corporation, on behalf of the Horne Lake Community, received a grant from the Union of British Columbia Municipalities to develop a Community Wildfire Community Plan –
   1) to define risk areas for interface fires,
   2) to identify measures necessary to mitigate risks; and
   3) to outline an action plan (see Executive Summary) for improving fire protection and prevention in the interface.

3. If implemented over the next several years, the actions identified in the Community Wildfire Protection Plan will help the Horne Lake Community clarify and refine priorities for the protection of life, property, and essential infrastructure and resources in the interface zone.



SECTION 1: INTRODUCTION AND PLANNING PROCESS

BACKGROUND

The interface zone is commonly described as the area where structures, facilities, and human activities are situated among trees and other combustible vegetation (FireSmart, 2nd Edition, 2003). Interface areas range from sharp geographical edges (i.e., residential subdivision 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 actual extent of the interface zone varies widely. In the United States, the Healthy Forests Restoration Act (HFRA, 2003) defines the interface as an area extending approximately 1.1 km from the boundary of an at-risk community, or an area within 2.2 km of the boundary of an at-risk community if a sustained steep slope or geographic feature increases the potential for wildfire behaviour endangering the at-risk community.

At Logan Lake, in BC's interior, a 5-km interface zone has been delineated around the community, based on the distance windborne sparks can travel in front of fierce wildfires (Millennium Forest Management Inc., 2006).

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

Human encroachment onto forested lands exacerbates the threat of wildfire in the interface. 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. Increased fuel loading combined with warmer, drier summers in recent years places many areas of the province at extreme risk from wildfire. At risk are loss of life, property, infrastructure, and resources. Fire suppression in the interface zone entails one of the most dangerous operations for fire fighters.

COMMUNITY WILDFIRE PROTECTION PLAN PROGRAM

For decades, the Ministry of Forests and Range Protection Branch has advocated community-based interface planning. After serious interface fires at Penticton and Salmon Arm in the 1990's, the Auditor General urged BC communities to take action. Public awareness of the danger of interface fires peaked in the hot dry summer of 2003, when unprecedented wildfires ravaged BC'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, and resulted in the loss of lives of three fire fighting airmen.

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

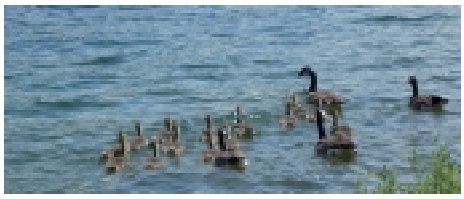
Provincial Review" provided necessary impetus for BC communities to participate in strategic interface planning.

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 CWPP 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 intent of the CWPP 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.

Photos 1 / 2 / 3.
The Horne Lake Community contains human and natural resources at risk from interface fire.



SECTION 2: THE HORNE LAKE COMMUNITY

(Horne Lake Strata Corporation, Ministry of Environment - BC Parks, Regional District of Nanaimo, Department of Fisheries and Oceans)

2. 1 THE HORNE LAKE COMMUNITY TAKES A STANCE AGAINST FIRE

Horne Lake is located in the heart of a forested wilderness. The Horne Lake Community, a loosely-knit association of cottagers and land owners, facility operators, and various levels of government, is engaged in an informal, cooperative effort to improve fire protection and prevention. Stakeholders in the Horne Lake Community include:

- The Horne Lake Strata Corporation (Strata Plan VIS 5160)
  - The Strata (lakeside cottage owners) ~112 ha
  - ResortCo (Private Managed Forest) ~1200 ha
- BC Parks – Horne Lake Caves Provincial Park ~123 ha
- The Regional District of Nanaimo - Horne Lake Regional Park ~105 ha
- Horne Lake Adventures (manages recreational programs at the parks)
- Department of Fisheries and Oceans
  - Horne Lake Dam and Spillway ~16 ha

  app. 1500 ha

Photo 4. The Horne Lake Community includes key stakeholders in the area.

Spider Lake Provincial Park lies two kilometres to the east of Horne Lake. Forested residential acreages surround Spider Lake. Privately owned industrial forest lands extend around Horne Lake westward towards the interior of Vancouver Island.

THE STAKEHOLDERS:

HORNE LAKE STRATA CORPORATION (STRATA PLAN VIS 5160)

Established in 2002, following the purchase of Horne Lake Lands from the Texada Land Corporation, the Horne Lake Strata Corporation includes cottage owners on 400 lakeside, bare land strata lots (The Strata), approximately 30 lots within the strata development for development and eventual sale, and Private Managed Forest (ResortCo) solely owned by owners of Strata Plan VIS 5160 as a common asset.

The lakeside cottages range from older, modest cabins to newly constructed retreats, some of which are appraised at more than half a million dollars. Lots are clearly numbered on well-labeled strata and public roads.

Photo 5. Cottages on bare land strata lots dot the shoreline of Horne Lake.

Owners of the strata lots are members of the Strata Corporation. A Strata Council is elected annually to manage the strata corporation within restrictions of the Strata Property Act and Regulations, and the Strata's Corporation's bylaws and rules. The Strata Council is responsible for enforcement of the bylaws and rules, and can levy fines if a bylaw is breached.

Various levels of regulations, from the federal to regional level, affect land development, improvements and construction projects at Horne Lake, and on a Strata Lot or common property.

A licensed strata property manager administers The Strata.

MINISTRY OF ENVIRONMENT - BC PARKS - HORNE LAKE CAVES PROVINCIAL PARK

Located at the western end of Horne Lake, Horne Lake Caves Provincial Park protects the Horne Lake Caves (approximately 75 ha) and a small portion of the Qualicum River and surrounding area (approximately 48 ha). A Class A day-use park and internationally recognised caving attraction, the Horne Lake Caves park receives upwards of 30 000 visitors a year from around the world (Regional District of Nanaimo Parks and Rec. stats, 2006). The park offers year-round self-guided cave tours and guided spelunking adventures. In the "off-season" the caves are a popular attraction for school groups. A small nature house operates during the busy summer months.

Photo 6. Guided spelunking adventures are popular at Horne Lake Caves Provincial Park.

There is no campground at Horne Lake Caves Provincial Park. Camping facilities are located nearby at the regional park.

REGIONAL DISTRICT OF NANAIMO (RDN) - HORNE LAKE REGIONAL PARK

Horne Lake Regional Park, a "wilderness waterfront park with campground" (Regional District of Nanaimo website) sits at the western end of the lake, close to Horne Lake Caves Provincial Park. For many years the site was a privately-owned campground. The regional park was created in 2002 when The Strata transferred land to the Regional District of Nanaimo as consideration for allowing the subdivision and creation of The Strata. Prior to 2002, there was no public access to Horne Lake.

Photos 7/8. Horne Lake Regional Park is a lakeside park with camping sites.

The lakeside regional park offers 75 camping sites in three separate areas (for families and groups), a boat launch, picnic sites, and swimming beaches. Structures at the park consist of a small office building, store, storage building, pit toilets, and park house.

HORNE LAKE ADVENTURES

Horne Lake Adventures is a tourism management company contracted to coordinate recreational programs for both Horne Lake Caves Provincial Park and Horne Lake Regional Park. Locally owned and operated, the company has grown from a 1-person cave exploration outfit in the 1980's to a successful business venture employing up to 18 employees. Horne Lake Adventures was recently voted the "Best Natural Outdoor Site in BC" by Attractions Canada.

DEPARTMENT OF FISHERIES AND OCEANS

Horne Lake is a reservoir. Outflow is controlled through a recently revamped dam bypass and tunnel system operated by the Department of Fisheries and Oceans for the Big Qualicum Fish Hatchery, located about 12 km downstream of the lake.

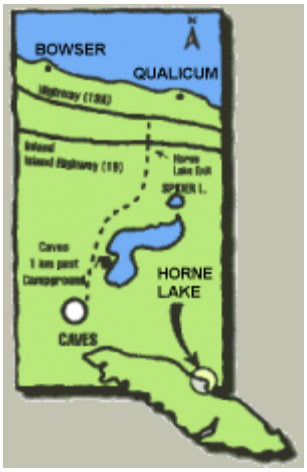
The dam and spillway are located at the outflow of the Big Qualicum River, on the northeastern portion of Horne Lake. Vehicular access is restricted by a gate. A short walking loop and picnic site near the dam are popular with the public.

Photo 9. The DFO dam and spillway at Horne Lake are located at the outflow of the Big Qualicum River.

2.2 PROFILE OF HORNE LAKE

GEOGRAPHY

Horne Lake is situated on central Vancouver Island, roughly midway between Nanaimo and Courtenay. A historical gateway to Vancouver Island's rugged interior, Horne Lake lies between the gently sloping Nanaimo Lowland, and inland mountain ranges that form an imposing backdrop on the lake's western shores.



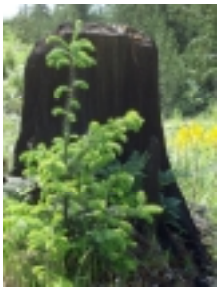
Photos 10/11. Horne Lake.

HISTORY

Prior to European settlement, the land in the Horne Lake area was home of the Pentlatch-speaking aboriginal people. Known to the native peoples as "Enoksasent Lake", Horne Lake derived its present name from an adventurous 19th century explorer. About 125 years ago, Mr. Adam Horne, an employee of the Hudson's Bay Committee, was given the task of ascertaining whether a trail existed across Vancouver Island, from the Big Qualicum River to Barclay Sound.

In May of 1885 or 1886, Adam Horne set out in a Haida canoe from Victoria, accompanied by five companions. Landing the canoe near the mouth of the Big Qualicum River, the group struck out overland through heavy underbrush. The party reached a well-marked trail and followed it to Horne Lake. The area teemed with wolves, owls, elk, deer, black bear, and fish. Horne's party continued westward, ascended the Beaufort Range, finally arriving at Alberni to set up trading relations with the First Nation people there. In the next 15 years, Adam Horne made many more trips to the Alberni from his HBC post in Nanaimo.

In the early part of the 20th Century, timber companies purchased a "billion feet of timber" in the Horne Lake area. Between 1924 and 1937, forest companies built 17 miles of track, connecting the port at Deep Bay with Horne Lake and valleys beyond. All timber within reach of the track was logged. A sawmill operated at the west end of Horne Lake, near where the Regional Park is now located.



Eight logging camps sprung up around Horne Lake. The largest, which stood at the present site of the Regional Park, housed 450 men in 50 bunkhouses and ten family houses.

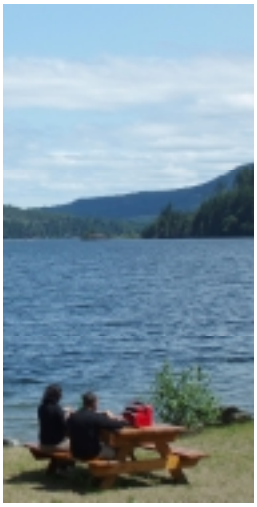
Logging companies at Horne Lake changed ownership numerous times. In 2002, forest lands belonging to the Texada Land Corporation at Horne Lake were sold to a group of cottage licence holders, to become part of Strata Plan VIS 5160.

Second- and third-growth forests surround Horne Lake.

Photo 12. Commercial logging has occurred on the slopes around Horne Lake for over one hundred years.

TO THE PRESENT

Horne Lake has been a recreational retreat since the 1920's, when local families first erected cabins on the lakefront. Until recently, there was limited public access to Horne Lake. Private cottages dotted the lakefront. For many years a privately-operated campground occupied the site of the current regional park.



Since 2002, Horne Lake has gained prominence as one of Vancouver Island's prime recreational sites. Cottages rim the lake, a haven for boating and swimming. A provincial park at the west end of the lake offers world-class caving adventures. The regional park on the lake's western shores provides a popular campground, and caters to family and group adventure camps. Unique geological formations in the cliffs surrounding Horne Lake attract geologists and hikers. Outdoor enthusiasts enjoy a myriad of old logging roads in the area.

Commensurate with new-found popularity at Horne Lake is the risk of wildfire. The Horne Lake Community is located "off the Grid" – it has no electricity service (BC Hydro), no landline telephone, nor cable service. Cellphone coverage is erratic. The Horne Lake Community is also an "unprotected area" – it is located outside fire protection boundaries.

The threat of fire poses a serious concern to the Horne Lake Community.

POPULATION

The Horne Lake Community does not have a permanent population. Zoning and strata bylaws restrict long-term occupancy at lakeside cottages. In summer, the population at Horne Lake swells with cottage owners, campers, and park visitors.

At the height of summer, several thousand people likely frequent Horne Lake. Tallies of the summer population are not available. Visitor statistics for the "summer" (May-Sept.) camping season at Horne Lake Regional Park attest to the popularity of the lake as a summer holiday retreat (Table 1):

Table 1. Horne Lake Regional Park – User Visits – 2005	
Facility	**Users**
Public campground	1218 "camping units" (1 to 8 people) (May long weekend to Labour Day weekend)
Group campground	1168 groups (most in April, May, June)

Nanaimo Regional District

User visits at Horne Lake Regional Park have steadily increased since the park was created in 2002 (park stats, Nanaimo Regional District).

ACCESS

Horne Lake is located about 10 km west of Vancouver Island's main inland island highway (at exit #75). Access to the lake is via the Horne Lake Road, which is initially paved, and then turns to gravel about 2 km east of the lake. Northeast of the lake, the road forks at a log sort yard. The Horne Lake Main (Cave Road) extends approximately 6 kilometres westward along the northern shore of the lake (past a rock slide area), to Horne Lake Regional Park, and a further kilometre west to Horne Lake Caves Provincial Park. A sign at the eastern approach to the lake warns the public that logging trucks may be encountered at any time.

Due to active logging, public access is limited west of Horne Lake Caves Provincial Park. In an emergency, egress could exit from Horne Lake to Port Alberni or Bowser. A locked gate at the Cherry Creek Water District restricts access to Port Alberni via logging road. Several steep inclines on the logging roads northeast from Horne Lake to Bowser reduce usage by logging traffic and public vehicles, but the route could provide feasible emergency access.

Photo 13. The Horne Lake Main on the west side of the lake traverses a slide area.

The South Lake Road runs the southern extent of Horne Lake for about 7 km (a gate restricts access at the last cottage).

Access for cottage owners is provided by a series of well-marked strata roads branching from the lake's main perimeter roads (Photos 14/15). Strata roads are narrower (app. 5 m width) than the perimeter roads (minimum 7 m width). While the strata roads generally do not have turnouts, driveways generally serve as functional pullouts. Turnarounds have recently been installed at dead end strata roads. Access between some adjoining dead end strata roads could be used in an emergency.

Photos 14/15. Strata roads are clearly signed.

In the event of cottage fire, cottage owners would attend by vehicle or recreational boat to provide assistance. A recent brush fire at the DFO site was spotted by cottagers across the lake, who attended to provide assistance to MOFR crews.

Various stakeholders in the Horne Lake Community expressed a concern about the lack of 2-way public access at the northwestern end of the lake. The provincial and regional parks attract the highest concentration of summer visitors to the area.

FIRE RISK

The stakeholders at the Horne Lake Community have posted signs at many locations around the lake to warn visitors about the threat of fire (Photos 16/17/18). Most of the signs are maintained in good condition. At the regional park, some signs are faded and partially obscured by brush.

Photos 16/17/18. Signs warning the public about the threat of fire are posted throughout the Horne Lake Community.

2.3 BIOPHYSICAL ATTRIBUTES

CLIMATE AND BIOGEOCLIMATIC CLASSIFICATION

Climate affects vegetation structure, historical wildfires, and on a shorter time frame, fire danger.

Forest ecosystems are classified using biogeoclimatic units, which reflect the role of macroclimate on vegetation and soil development. Horne Lake is located in the very dry Maritime Coastal Western Hemlock biogeoclimatic subzone (CWHxm), which is characterised by warm dry summers and moist mild winters, with relatively little snowfall. Common tree species include Douglas-fir, western redcedar, western hemlock, bigleaf maple, and red alder. Sitka spruce is found in moister locales (Horne Lake Caves Provincial Park).

Warm west-facing aspects along the eastern slopes of Horne Lake are transitional to the moist maritime Coastal Douglas-fir subzone (CDFmm), which extends along the southeast coast of Vancouver Island, inland to approximately 150 – 200 m above sea level (asl). Forests of the CDFmm feature Douglas-fir, together with western redcedar, and may include arbutus, Garry oak, and various deciduous species (i.e., broadleaf maple, red alder). The CDFmm represents the mildest climate in Canada.

Prevailing Pacific Coast weather systems at Horne Lake 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, and moisture deficits are common in summer.

FIRE HISTORY

For thousands of years prior to European settlement, infrequent fires swept through the forests of the Pacific Northwest (Table 2). Lightning sparked the majority of fires; others were set by aboriginal people cultivating plants for food and medicine. The result was a varied mosaic of forest stands and habitats. Periodic low intensity surface fires reduced natural fuel loading and recycled nutrients.

Table 2. 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
CWHxm	100-150	150-350	350-500	0.1-5	50-500	>500

(BC Ministry of Forests and Range)

In the last century, the demise of traditional aboriginal cultural land management practices, and the advance of modern fire suppression have produced a dramatic increase in natural fuel loading.

Records of historical fires in the last century at Horne Lake are not available. Accidental fires were a common occurrence in the days of steam-powered logging. Concerned at the growing number of slash fires in the 1930's, the provincial government mandated the practice of slashburning after harvesting. Slash fires often escaped into standing timber.

The presence of snowbrush (*Ceanothus sangineus*) in cutover (recently logged) areas on warm aspects of Horne Lake is indicative of fire history in the area. A yellow-listed species (at risk-COSEC), snowbrush is not common on the southeast coast. Adapted to colonise areas after fire, the heat-resistant seed of *Ceanothus* species may remain dormant in the soil for more than 200 years. Fire stimulates the seed to germinate.

Photo 19. Snowbrush, seen above in a recent clearcut on the southern side of Horne Lake, is known to colonise disturbed areas after fire.

Information pertaining to recent fires was provided by The Strata, Regional District of Nanaimo, Department of Fisheries and Oceans, BC Parks, and Horne Lake Adventures. Fire history in the last decade at Horne Lake includes three cottage fires (two were accidentally started from generators); one small brush fire at Horne Lake Regional Park (fire was extinguished by campground staff); and one small brush fire at the DFO property on the lake (started by local teens; extinguished by MOFR with assistance from cottage owners). In the last 15 years there are no records of escaped fires at Horne Lake Caves Provincial Park.

PHYSIOGRAPHY AND SOILS

Landforms and soils affect fire behaviour by affecting the type and growth rate of fuels (vegetation).

The eastern rim of the lake sits on the edge of the Nanaimo Lowland, part of the Georgia Depression, a structurally controlled, topographically low-lying area largely underlain by sedimentary rocks of Upper Cretaceous age. The bulk of the lake is situated in the midst of the Insular belt (Vancouver Island Mountain Ranges). The geological strata consist of several volcano-sedimentary cycles, overlapped by Cretaceous Nanaimo Group sedimentary rock, and intruded by numerous granitic batholiths of the Jurassic Island Plutonic Suite. Glaciation during the Pleistocene sculptured high peaks and deepened lower valleys.

Photo 20. Overlapping geological strata are exposed on the slopes of Mt. Mark, on the lake's northwestern shores.

The most common soil type at Horne Lake is a Dystric Brunisol (associated with high moisture deficits). Around the western reaches of the lake, where the climate is somewhat wetter and cooler, podzolic soils are found.

2.4 FIRE PROTECTION AND PREVENTION

The Horne Lake Community is located beyond fire protection boundaries. The nearest fire-fighting unit to Horne Lake, the Bow Horn Bay volunteer fire department, is located 20 km away on the coast, and cannot be called out, but may choose to provide assistance. (The Department of Fisheries and Oceans Big Qualicum Hatchery is situated within the coverage area of the Bow Horn Bay Fire Department, but DFO facilities at Horne Lake are beyond the range of fire protection services.)

The Ministry of Forests and Range Coastal Fire Centre (responsible for mid-Vancouver Island) admits that Horne Lake and the surrounding area have a "high" to "extreme" fire risk. The Fire Centre at Errington will respond to forest fires, but not to structural or campground fires. The Coastal Fire Centre has actively encouraged the various stakeholders of the Horne Lake Community to adopt a proactive stance against fire. At the request of various stakeholders, staff from the Coastal Fire Centre have provided site visits at the lake to advise on fire suppression capabilities.

While stakeholders in the Horne Lake Community are committed to fire prevention and protection the lake, a wide range of policies and fire protection capabilities prevails:

THE STRATA CORPORATION:

Horne Lake Community Vision Statement

"The Horne Lake Community is committed to a safe, pristine/natural, family oriented, recreational area that embraces sustainable environmental stewardship."

A comprehensive management plan for Strata Plan VIS 5160 covers a wide spectrum of issues related to the Strata – from dock specifications and sewage to forest land management. Fire protection is a key component of the strata management.

The Strata Corporation has worked diligently to provide fire fighting equipment at strategic locations around the lake, for Owners' use in the event of fire (Photos 21-26):

- 11 fire stations – on strata roads around the lake (equipped with hose, pump, axe, shovel, fuel, etc.)
- 2 fire trailers (log sort yard; junction of South Lake Road and Sandy Beach Lane)
- 3 water tenders (log sort yard; junction of South Lake Road and Sandy Beach Lane; and at Lot 20)

The Strata has distributed fire keys to all Owners (bare land strata cottage owners) to access the fire fighting equipment. The Strata encourages the Owners to become familiar with the location of the fire fighting equipment, and to hold practices with family members and neighbours. The Strata also recommends that Owners equip their cottages with personal fire equipment: fire extinguishers, water source, pump, hoses, etc.

Photos 21/22/23. The Strata Corporation has installed fire fighting equipment at strategic locations at Horne Lake.

Photos 25/26. Each fire station is well equipped with equipment for initial response.

Most of the Strata Corporation's private managed forest lands, which stretch around the lake on the slopes above the cottages, were harvested prior to the purchase from the Texada Land Corporation. The majority of "blocks" (forest land units), which were logged about 5 years ago, have since "greened up" (replanted with conifers, and re-vegetated by natural and invasive species), and do not pose a significant fire hazard.

Several dense, older immature coniferous forest stands within close proximity to groups of cottages have high fuel loading ("surface fuels": downed branches and dead stems; and "ladder fuels": elevated live and dead vegetation that can act like a ladder for fire to spread from the forest floor to the crowns of trees). In the late fall of 2005, the Strata Corporation contracted an experienced silviculture company to conduct a first entry thinning (subsequent thinning treatments scheduled in the future) of a selected stand beside cabins along Bay Road, in the northeastern corner of the lake (Photos 27, 28). Specifications of the fuel reduction work were:

- to open the stand to 1000 stems, and prune to 18' (2 lifts) in order to
  - allow less contact with the crown
  - provide more light to the forest floor (increasing wildlife forage), and
  - provide firewood for Owners' use

Photo 27. In 2005, the Strata Corporation undertook fuel reduction in selected stands adjacent to the cottage lots.

Photo 28. Cottage owners stroll past the newly thinned forest.

Research plots conducted by Strathcona Forestry Consulting in the treated stand and adjacent untreated forest indicate that fuel treatment resulted in:

- on average, a 10% reduction in stand density (# stems/ha)
- a significant reduction in ladder fuels (height to live crown increased from <1m to app. 6 m)

- short-term increase in surface fuel loading (expected to decompose rapidly within 1 year of treatment)
- increased light on the forest floor (expected to encourage ingress of fire-resistive native shrubs – salal, sword fern, and Oregon grape)
- an effective "fuel-reduced" corridor (approximately 20-30 m wide strip of forest was thinned between the strata road and greened-up cutover area upslope)

Downed branches were physically removed away from a 5-m corridor along the road, reducing the risk of fire from a tossed cigarette.

Dense coniferous stands near cottages along the lake should be targeted for future fuel treatment (Photo 29).

Photo 29. Densely stocked coniferous stands within close proximity to cabins and high-use recreational areas should be targeted for fuel reduction.

The Strata Corporation's proactive approach to flammable fuel reduction involves broom removal and yard waste. Broom removal is being undertaken along various strata roads. The Strata Corporation encourages cottage owners to dispose of vegetative yard debris (branches, stumps) at the "log sort" yard (Photo 30). Debris piles are burned under supervised conditions.

Photo 30. The Strata Corporation encourages cottage owners to dispose of yard debris at the "log sort" yard.

HORNE LAKE CAVES PROVINCIAL PARK

The BC Parks Conservation Program Policies guide the management of natural values in BC parks and protected areas.

A prominent sign at the entrance to Horne Lake Caves Provincial Park provides visitors with emergency contact information (Photo 31). An emergency plan outlines procedures for park staff and contractors to follow in the event of various emergencies – including fire. Where wildfire threatens provincial parks or other wild land values, the Ministry of Forests and Range is responsible for appropriate fire suppression. Beyond initial response, current park policy is not to fight fire. Cutbacks in recent years to provincial park budgets have severely reduced staffing and equipment levels – should a large fire occur, initial response could be challenging.

Photo 31. A prominent sign at the entrance to Horne Lake Caves Provincial Park advises visitors about emergency contact information.

BC Parks emergency response procedures for park and contract staff are based on the size of the fire:

- Fire bigger than 2 x 2 m in area and spreading
  → **Option 1 - external fire suppression**
  -structural fire → call 911 – follow Dispatcher's directions
  -forest fire → call 1 800 663-5555
  - contact key personnel
  - arrange for safe evacuation of park

- Fire smaller than 2 x 2 m
  → **Option 2 - internal fire response**
  -send minimum of 2 staff to suppress fire with hand tools, backpack pumps
  -ensure fire suppression party has radios, first aid kits

According to Horne Lake Adventures, the company contracted to manage recreational programs at Horne Lake Caves Provincial Park, limited fire fighting apparatus is available at the park. Horne Lake Adventures commended the superior communication equipment (hand-held walkie talkies and VHF radios) used by park staff and contractors.

A BC Parks spokesperson recalls that the parking lot at the provincial park was once a popular site for partying teens from Bowser and nearby communities. The park employee noted that while there have been no fires in over 15 years at Horne Lake Caves Provincial Park, there is a greater likelihood of fire at nearby Spider Lake Provincial Park. The Spider Lake area, with its "intermix" of flammable pine/Douglas-fir forest and forested acreages, has a dangerously high interface fire hazard rating.

HORNE LAKE REGIONAL PARK

Safety and Security Goal: *To minimize natural and man-made hazards; to create and operate a park that is secure and provides an enjoyable and safe experience for visitors.*

Horne Lake Regional Park 2005 Management Plan – Regional District of Nanaimo

Horne Lake Regional Park (HLRP) is one of eight regional parks in the Regional District of Nanaimo, and one of only two campground parks. In 2005, HLRP was the first regional park in RDN to undergo a comprehensive management plan. The *Horne Lake Regional Park 2005 Management Plan* guides the management, development, and operations of Horne Lake Regional Park.

A uniform set of standards covers the use of all RDN parks (Park Use Regulation Bylaw 1399). The Byaw sets out standards for human behaviour and interaction with the park land itself. Section 5.12 (Damages and Interference) of the bylaw specifically addresses campfires and incendiaries (i.e., campfires are only allowed in designated areas).

The Regional District of Nanaimo is in the process of developing an emergency plan for Horne Lake Regional Park.

As outlined in the management plan for HLRP, park management "must include the ability to provide first response by trained personnel to all fires within the campground and operational area". The plan recommends "fire risk management and fire-fighting operations must be pursued in cooperation with park neighbours". In 2005, the RDN provisioned HLRP with basic fire suppression equipment similar to that maintained around the lake by the Horne Lake Strata Corporation. The RDN notes "further cooperation on risk management is planned".

When interviewed, RDN management commented they are "very conscious" of the fire threat at Horne Lake, and are vigilant about "good supervision" at Horne Lake Regional Park (Photos 33, 34). A stable, multi-year agreement with the park operator (of Horne Lake Adventures), "who is very sensitive to safety and fires", is advantageous to long-term fire prevention.

The RDN and park operator work closely with the Coastal Fire Centre. Shortly after HLRP was established in 2002, the Regional District's Parks and Trails Coordinator and the operator of Horne Lake Adventures met officials from the Coastal Fire Centre at Horne Lake to review fire suppression capabilities at the park. The following recommendations from the Coastal Fire Centre staff have been implemented at Horne Lake Regional Park:

- replace slotted fire grills with fire rings
- ensure grass and shrubbery around campsites is regularly trimmed
- install fire equipment on site (trailer and mobile water unit and fire hoses)
- comply with Coastal Fire Centre fire bans


Photos 33/34. Vegetation at camping and picnic sites at Horne Lake Regional Park is well maintained.

During the summer fire season, the RDN monitors fire weather readings from the Coastal Fire Centre. Any campfire bans imposed by the Fire Centre are strictly enforced at HLRP. Immediately following a fire ban, media releases are issued to advise park visitors.

RDN management and the operator of Horne Lake Adventures noted various constraints to fire suppression at the park:

- water for firefighting must be pumped from the lake
- three old "pitcher pump" wells at the park would be totally insufficient in case of fire
- lack of power to pump water
- western end of Horne Lake Main is a bottleneck access with "no truly functioning back door"
- current lack of protocol at Horne Lake Community – who does what in case of fire?
- historical inconsistencies in campfire bans on different land tenures
- lack of template for developing an emergency plan for the regional park

HORNE LAKE ADVENTURES

As the facilitator for recreational programs at both Horne Lake Caves Provincial Park and Horne Lake Regional Park, the operator of Horne Lake Adventures (HLA) is keenly aware of the inherent risk of fire at the parks. While Horne Lake Adventures strictly complies with park-use and safety regulations and procedures developed by RDN and BC Parks, the operator of HLA expressed frustration at the "pretty loose plan" in place to deal with fire. Various issues were noted:

- lack of funding from provincial and regional government sources to train contract staff in basic fire fighting techniques
  (some staff have been exposed to fire fighting;
  1 staff member is required to have S-100 training – must be updated annually)
- insufficient equipment supplied by government for fire fighting
- lengthy delay in developing an emergency plan for HLRP (RDN)
- lack of cohesive emergency planning by various stakeholders at Horne Lake Community

At the height of summer, up to 18 employees work for Horne Lake Adventures. The Horne Lake Adventures' staff actively promote fire protection and prevention at the parks.

> *Fire is the biggest scare – we're adept at hanging kids from ropes in caves – but we don't really have anything in place to deal with fire.*
>
> Horne Lake Adventures (June 2006)

DEPARTMENT OF FISHERIES AND OCEANS

The Department of Fisheries and Oceans operates the dam and spillway at Horne Lake for their fish hatchery downstream on the Big Qualicum River. The dam bypass has recently been revamped. Vehicular access from Horne Lake Main is restricted by a locked yellow gate. DFO authorities noted that the "risk from fire is fairly minimal" at the new facilities (which are relatively fireproof), but acknowledged the ongoing threat of a fire in the surrounding area.

The DFO property is a popular site for teen parties. Despite signage throughout the property prohibiting campfires, campfire pits are common along the shoreline and in a nearby clearing in the forest. The DFO does not have a budget to hire security guards.

Ongoing cutbacks in the federal budget for DFO programs and resources have forced staff to focus on key operations. The Big Qualicum River hatchery employs as many as nine people during the winter, and an average of five during the summer. When the new provincial Wildfire Act came into effect, DFO management advised staff not to fight fire beyond initial response efforts. Due to manpower limitations at the height of summer, hatchery staff are told "not to attempt" fire fighting. If a fire occurred, a DFO official suggested that manpower and equipment would likely be dispatched for initial attack. Should a fire occur at the DFO property at Horne Lake, response time from the hatchery to

the lake would be approximately 10 minutes. Once staff arrive at the lake, at least another half an hour would be required to ensure fire fighting equipment is properly functioning.

DFO staff receive training in emergency preparedness, but do not get instruction in fire fighting. Basic fire fighting equipment - including forestry hoses (1 ¼"), a portable fire trailer with a small tank (approximately 500 gal), and 3 Wajax pumps - has been stored for many years at the hatchery. In order to restore the equipment (especially the Wajax pumps) to good working order, several hundred dollars worth of maintenance is required.

A regional hiking trail winds along the Big Qualicum River between the fish hatchery and Horne Lake. DFO policy encourages public use of the trail. Upgrading is required to repair wooden stairways and eroded trail sections, but no funding is currently available.
The riverside trail is generally moist, even in summer – hatchery staff expressed a reluctance to ban the public from the trail in the case of a backwoods closure .

Staff at the Big Qualicum Hatchery expressed a willingness to collaborate with other stakeholders in the Horne Lake Community, in order to share fire fighting resources.

SECTION 3. PREPARATION OF THE COMMUNITY WILDFIRE PROTECTION PLAN

Development of the Community Wildfire Protection Plan for the Horne Lake Community followed steps outlined in FireSmart (*FireSmart: Protecting Your Community from Wildfire*, Partners in Protection, 2003).

STEP ONE: Plan Overview – Objectives and Goals

Liaison was made with members of the Horne Lake Community: The Horne Lake Strata Corporation, Regional District of Nanaimo, Horne Lake Adventures, BC Parks, and Department of Fisheries and Oceans. The Ministry of Forests and Range encouraged the application to the UBCM for a Community Wildfire Protection Plan.

STEP TWO: Data Acquisition and Information Sharing

Information and data was obtained in order to share perspectives, priorities, and other information relevant to the planning process.
The intent was to integrate information and resources.

Several useful community-planning guides and resources were used:

- *FireSmart – Protecting Your Community from Wildfire* (2nd Edition, Partners in Protection, 2003)
- *Firestorm 2003 Provincial Review*
- *Addressing the Interface Fire Hazard – A Case Study of the District of Langford* (District of Langford, 2002)
- *Water Supply for Public Fire Protection (*Fire Underwriters Survey, 1999*)*
- *S-100 (BC) Basic Fire Suppression and Safety* (MOFR, 2004)
- *National Fire Protection Association (NFPA) Standards* (NFPA, Massachusetts, US*A)*
- *Emergency Plan for Horne Lake Caves Provincial Park* (BC Parks)
- *Horne Lake Regional Park 2005 Management Plan* (RDN)
- *Park Use Regulation Bylaw 1399* (RDN)
- Regulations and Bylaws of Strata Plan VIS 5160

STEP THREE: Hazard - Risk Assessment

A range of factors were considered in the choice of models to evaluate interface hazard and risk:

- Fuel types
- Fire behaviour
- Land uses
- History of wildfire occurrence
- Structures, features, and essential infrastructure at risk
- Other community values at risk
- Local preparedness and firefighting capability

Several hazard-risk models were incorporated in the project:

- Canadian Forest Fire Danger Rating System
- Community Interface Fire Hazard Assessment
- 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: Base Hazard Mapping

Interface hazard mapping was developed in order to identify:

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

The Horne Lake Strata Corporation provided base mapping (topographic, cadastral, and ortho) for field work. Pre-mapping was confirmed with ground truthing of lands in and adjacent to the Horne Lake Community. Strata Plan VIS 5160 converted field mapping data to digital format. Final mapping information is presented in digital format (GIS).

STEP FIVE: Community Hazard Reduction Priorities

Once the community assessment and base map were completed, local protection and hazard mitigation needs were analysed. Strategies to improve emergency preparedness and fire response capability were devised.

STEP SIX: Action Plan

Mitigation measures were identified in an action plan.

STEP SEVEN: Education and Awareness

The process of developing a CWPP 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

Stakeholders should reconvene annually to mutually agree on fuels treatment priorities, preferred methods for fuels treatment projects, equipment needs, and other necessary actions. The Regional District of Nanaimo should establish an assessment strategy for the CWPP to ensure the plan maintains its relevance and effectiveness over the long term.

SECTION 4: HAZARD-RISK ASSESSMENT

HAZARD ASSESSMENT METHODOLOGY

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

- The **Canadian Forest Fire Danger Rating System** (CFFDRS) – used to evaluate daily forest fire danger

- **Interface Community Fire Hazard analysis** - provides a quantitative procedure for assessing the interface fire hazard

- **Hazard, Impact, Risk and Vulnerability (HIRV) model** – community risk assessment:
  - Hazard Identification
  - Risk Analysis
  - Vulnerability Assessment
  - Impact Analysis
  - Risk Management

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.

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 behaviour is affected by prevailing weather severity, fuel type, slope steepness, geographic location, elevation, and calendar date. Fire behaviour influences both the extent of resource damage and the success of any suppression action.

Fuel types constitute the basis of fire behaviour predictions. Any substance that will ignite and combust is a fuel. The FBP System provides quantitative outputs of fire behaviour characteristics for natural fuel types (fuel complexes of sufficient homogeneity and extending over an area of sufficient size that equilibrium fire behaviour can be maintained over a considerable time period).

The Ministry of Forests and Range classifies forest fuels into three vertical layers: ground fuels (all combustible materials in the organic duff layer and on the forest floor – i.e., twigs, leaves, dry or cured grasses, shrubs); surface fuels (or ladder fuels = fuels that provide vertical continuity between the ground and the tree canopy, allowing a fire to move up into the tops of trees, where a fire is harder to contain); and crown fuels (standing and supported forest fuels not in contact with the ground – includes leaning deadfall, higher branches).

In the Fire Behaviour Prediction system, daily weather readings are recorded to calculate Fire Danger Class (DGR) (Table 3).

Table 3. 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

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.
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.
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.

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

Interface Community Fire Hazard Analysis: The Ministry of Forests and Range Protection Branch "Interface Community Fire Hazard" analysis (adopted from FireSmart; customised for use on the BC south coast) provides a quantitative procedure for assessing the interface fire hazard. Over twenty five risk factors are rated (i.e., fuel types; potential fire behavior; structures at risk; susceptibility to ignition; suppression constraints; general

location; fire history; type of development; access; above-ground utility corridors; tenure; developed recreation sites; watersheds; wildlife habitat; cultural features).

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

Hazard, Impact, Risk and Vulnerability (HIRV) Process: Risk assessments allow communities to anticipate and reduce the impacts of natural and manmade hazards by using data and information resources.

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 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. Table 4 compares probability of ignition at common locations.

Table 4. Probability 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 50 m of housing	High

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 the use of social factors, environmental factors, and political factors. Impact analysis provides the necessary links between vulnerabilities and hazards.

SECTION 5: FUEL AND ITS IMPACT

FUEL TYPES AND FIRE BEHAVIOUR

The Canadian Forest Fire Danger Rating System and the Interface Community Fire Hazard Analysis were used to identify major fuel types and their potential effects on fire behaviour at Horne Lake (Table 5). It is important to note, that, of the three factors influencing fire behaviour – fuel, weather, and topography – only fuel can be modified.

Table 5. Fuel Types at Horne Lake Community

	Fuel Characteristics			
Layer: / Fuel Type Complex:	**Forest Floor and Organic Layer**	**Surface and Ladder Fuels**	**Stand Structure and Composition**	**Comments --- Distribution Mitigation**
Coniferous (Douglas-fir dominated) 2nd growth (younger planted stands)	*Forest floor composition of fire-carrying fuel:* - needle litter, feather moss cured twigs *Forest floor distribution:* -discontinuous to continuous *Organic (duff) depth:* -shallow to mod. shallow *Relative compaction:* -mod. compacted	*Herbaceous vegetation:* *Spp. composition:* -variety *Distribution/cover:* -scattered to continuous *Shrub vegetation:* Spp. composition: salal/Ore. grape/ Sword fern/R. spp. *Distribution/cover:* -scattered to continuous *Density:* -continuous *Ht. in relation to live tree crown:* -< 50% to >80% *Branches (< 5 m ht):* *Ht. above ground:* -0 to 5 m *Live vs dead:* *-ave. > 50% dead* *CWD:* *Distribution:* -discontinuous to continuous *Size Range:* -small (< 7 cm dbh) to larger *Cedar content:* -low to moderate	*Stand density:* *Overstorey stocking/ Crown closure:* -mod well-spaced to dense -range: 20 - 80% *Overstorey spp. composition:* -Fd (Cw) *Stand height:* -variable: 2 – 15 m *Ht. to live crown:* -< 1 m to > 3 m *Live crown length:* -<1 m to > 5 m *Stand mortality:* -low *Horizontal fuel continuity:* -mod continuous to continuous *Vertical fuel continuity:* -gen. continuous	Generally located a short distance to several hundred metres uphill from cottage clusters. Monitor growth of younger planted stands. Stands closer to cottage clusters, high-use recreation areas, and strategic access routes could be assessed for future fuel reduction.
Affect on fire behaviour:	Moderate to high capability of carrying surface fire	Ladder fuels have high capability of carrying surface fire into low crowns of younger stands	Mod to high surface fuels + high ladder fuels will carry surface fire into low crowns, especially in denser stands.	These stands are mod to highly flammable

Coniferous (Douglas-fir dominated) older immature to mature natural/planted stands	*Forest floor composition of fire-carrying fuel:* -needle litter, feather moss, cured twigs *Forest floor distribution:* -gen. continuous *Organic (duff) depth:* -shallow to mod. shallow *Relative compaction:* -mod. compacted	*Herbaceous vegetation:* *Spp. composition:* -variable *Distribution/cover:* -mod. discontinuous *Shrub vegetation:* *Spp. composition:* -salal, Ore. grape, Sword fern, *Rubus* spp. *Distribution/cover:* *Density:* -discontinuous to continuous *Ht. to live tree crown* -variable *Branches (< 5 m ht):* *Ht. above ground:* -variable range *Live vs dead:* -gen. 50%+ dead *CWD:* *Distribution:* -discontinuous to continuous *Size Range:* -small (< 7 cm dbh) to larger *Cedar content:* -low to moderate	*Stand density:* *Overstorey stocking/ crown closure:* -well-spaced to dense -ave. > 80% *Overstorey spp. composition:* -Fd(CwHw) *Stand height:* -20 m to >45 m *Ht. to live crown:* -*<3 m to > 5 m* *Live crown length:* -ave. range: 5-15 m *Stand mortality:* -low *Horizontal fuel continuity:* -mod. continuous to continuous *Vertical fuel continuity:* -mod. continuous to continuous	Predom-inate forest cover at Horne Lake. Denser stands (with high surface and ladder fuels) located adj. to cottage clusters or along strategic access routes should be targeted for fuel reduction treatment
Affect on fire behaviour:	High capability of carrying surface fire	High capability of carrying surface fire into crowns	Higher likelihood of crown fires developing in denser stands.	High flamm-ability; adj. to many cottages/ facilities/ access routes.
Mixed coniferous (Douglas-fir/pine) stands (varying ages)	*Forest floor composition of fire-carrying fuel:* -needles, small cured twigs, cones *Forest floor distribution:* -discontinuous to continuous *Organic (duff):* *Depth:* -mod shallow *Relative compaction:* -mod.	*Herbaceous vegetation:* *Spp. composition:* -variable *Distribution/cover:* -mod. continuous *Shrub vegetation:* *Spp. composition:* *-salal, Ore. grape* *Distribution/cover:* -mod. to continuous *Density:* -mod. to dense *Ht. vs live tree*	*Stand density:* *Overstorey stocking/ crown closure:* *-gen. dense* -ave. > 85% *Overstorey spp. composition:* -FdPl *Stand height:* -20-35 m *Ht. to live crown:* -<3 m to > 5 m *Live crown length:* -variable *Stand mortality:* -moderate	Mixed FdPl stands are generally found in drier, well-drained sites east of Horne Lake - away from cottage clusters.

	compacted to compacted	*crown:* -often continuous with live crowns *Branches (< 5 m ht):* *Ht. above ground* -0 m to 5 m *Live vs dead:* -gen. 60%+ dead *CWD:* *Distribution:* -discontinuous to continuous *Size Range:* -small (< 7 cm dbh) to larger *Cedar content:* -low	*Horizontal fuel continuity:* -mod. continuous to continuous *Vertical fuel continuity:* -mod. continuous to continuous	
Affect on fire behaviour:	High capability of carrying surface fire	High capability of carrying surface fire into crowns	Crown fires have higher likelihood of developing in denser stands.	Extremely flammable; Generally not near structures.
Mixed wood stands (coniferous/deciduous) – varying ages	*Forest floor composition of fire-carrying fuel:* -litter and leaf litter, small branches *Forest floor distribution:* -mod continuous *Organic (duff) depth:* -mod. shallow *Relative compaction:* -uncompacted to mod. compacted	*Herbaceous vegetation:* *Spp. composition:* -variable *Distribution/cover:* -mod. continuous *Shrub vegetation:* *Spp. composition:* -Sword fern, R. spp. *Distribution/cover:* -mod continuous *Ht. vs live tree crown:* -< 3 to > 10 m *Branches (< 5 m ht):* *Ht. above ground:* -<1 to 5 m *Live vs dead:* -gen. 50% dead	*Stand density:* *Overstorey stocking/ crown closure:* -mod. well-stocked *Overstorey spp. composition:* -FdHwCwMbDr *Stand height:* -range: 15 m to 40 m *Ht. to live crown:* -<5 m to > 20 m *Live crown length:* -variable *Stand mortality:* -low to mod. *Horizontal fuel continuity:* -mod. continuous *Vertical fuel continuity:* -mod. continuous	Scattered distribution at Horne Lake; tend to occupy moister sites; Shading of deciduous component beneficial.
Affect on fire behaviour:	Low to mod. capability of carrying surface fire	Low to mod capability of carrying surface fire into crowns (risk increases during extreme fire weather, when deciduous leaves dry out).	Crown fires are generally unlikely, except during extreme fire weather.	Much less flammable than pure coniferous stands. Deciduous component tends to slow fire spread.
Recent Slash (<1 yr. old)	*Forest floor composition:* -small branches *Forest floor distribution:*	*Herbaceous vegetation:* *Spp. composition:* -variable *Distribution/cover:*	Not applicable	Few areas with fresh slash.

	-continuous Organic (duff) depth: -mod shallow to mod. deep Relative compaction: -mod. compacted	-discontinuous Shrub vegetation: Spp. composition: -Sword fern, R. spp., Ore. grape, salal Distribution/cover: -discontinuous		
Affect on fire behaviour:	High risk of ignition and spread during extreme fire weather			Highly flammable especially if high cedar content.
Older, greened-up slash (1- 5 yrs old) Restocked.	Forest floor composition: -small branches Forest floor distribution: -continuous Organic (duff) depth: -mod shallow to mod. deep Relative compaction: -mod. compacted to compacted	Herbaceous vegetation: Spp. composition: -variable Distribution/cover: -discontinuous Shrub vegetation: Spp. composition: -Sword fern, R. spp., Ore. grape, salal (broom – in disturbed areas) Distribution/cover: -mod. discontinuous to continuous	Not applicable	Areas harvested in last 5 years have tended to "green-up" with planted seedlings and invasive brush species.
Affect on fire behaviour:	Low to mod. risk of ignition and spread	Low to mod. risk of ignition and spread		Low to moderate flammabi-lity.
Unnatural Fuel Types (human structure and facilities)	Cottages and camp facilities – generally concentrated around shoreline of Horne Lake. Construction materials vary from highly combustible (i.e., cedar shake roofing; wood siding) to fire-retardant (metal roofs). Many cottages surrounded by flammable natural fuels.			Use fire retardant materials in new construct-ion.
Affect on fire behaviour:	Remote structures constructed with flammable materials (combustible roof-covering assemblies and non fire-resistant siding), surrounded by forest cover are at greatest risk from interface fire. Extreme fire weather, combined with poor access, may make suppression difficult, or, in some cases, unlikely.			Establish/ maintain FireSmart FMZs around structures.

Photo 34. Mars waterbomber on Vancouver Island.

THE IMPACT - COMMUNITY RISK ASSESSMENT (HIRV MODEL)

A Hazard-Impact-Risk-Vulnerability (HIRV) model was developed to demonstrate the potential impact of interface fire at the Horne Lake Community at the height of occupancy in mid summer (Table 6).

Table 6.

Hazard Impact Risk and Vulnerability Model. Wildfire Hazard – Midsummer High Occupancy.

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

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

The preferred consequence of an undesirable event would be no outcome. In contrast, serious consequences can be anticipated in the case of an interface fire at Horne Lake. Impact analysis criteria are ranked in Table 7.

Table 7. Ranking Criteria

Consequence Criteria – Impact Analysis (consequence)		
Life Safety	**Low**	Injuries limited to the area of effect
	Medium	Serious injuries
	High-Extreme	Critical and serious injuries Multiple fatalities, critical and serious injuries
Property Damage	**Low**	Minimal damages
	Medium	Structural damages evident
	High-Extreme	Loss of structures Large-scale loss of structures
Environmental Damages	**Low**	Minimal impact at area of effect
	Medium	Regional damage
	High-Extreme	Long-term recovery. Requires significant after action Severe long-term effects
Economic Impact	**Low**	Economic impact minimal
	Medium	Loss of business
	High-Extreme	Regional long term loss Chronic long-term economic downturn

A wildfire could occur almost anywhere at the Horne Lake Community. The vast majority of wildfires in BC, particularly on the southeast coast, are caused by humans. The probability of a wildfire is highest at Horne Lake in areas of human habitation and activities (cottage lots, picnic sites, trails, parks, and industrial logging sites).

SECTION 6. WILDLAND URBAN INTERFACE HAZARD RATING

Hazard-risk assessment models were used to stratify areas of the Horne Lake Community into different interface zones. Mapping was based on four standard Ministry of Forests and Range interface hazard mapping classes (see Interface Hazard map - Appendix 1).

Areas at **LOW** risk for interface fire generally have one or more of the following characteristics:

- urban, suburban, and farm areas with modified forest fuels
- superior fire protection coverage with fast response times
- good 2-way access and good fireflow
- low readily combustible natural fuel (i.e., insignificant forest/grassland cover)
- gentle topography
- minimal history of interface fires
- significant area of wetland vegetation
- low risk to adjacent development

(Small [often unmappable] wetland areas at Horne Lake Community constitute very small areas with a low interface fire hazard rating.)

Areas at **MODERATE** risk for interface fire generally have one or more of the following characteristics:

- good fire protection coverage with acceptable response time
- scattered mixed forest in suburban setting
- partially modified forest fuels; moderate fuel loading
- gentle to sloping topography
- periodic fire starts
- 2-way access; moderate to good water availability for fireflow
- homes and structures could be threatened by interface fire

(Horne Lake Community contains insignificant areas with a Moderate interface rating.)

Areas at a **HIGH** risk for interface fire generally have several of the following characteristics:

- delayed fire protection coverage, or no fire protection
- areas with little or no vegetative fuel modification; high fuel loading
- moderately to steeply sloping topography
- some areas hard to access
- moderate to low availability of water for fireflow
- frequent fire starts
- combustible structures
- suppression may be difficult

(Approximately one quarter of the Horne Lake Community has a high interface fire hazard rating.)

Areas at **EXTREME** risk from interface fire generally have several of the following characteristics:

- outside fire protection boundaries
- little or no fuel modification
- continuous ground fuels; high to very high vegetative fuel loading

- rugged topography
- very poor access for conventional fire fighting equipment; some areas inaccessible
- a lack of standard fireflow
- infrequent to frequent fire starts
- significant proportion of highly combustible structures
- may have heavy use areas
- direct threat to homes and structures

(The majority of the Horne Lake Community has an Extreme interface fire hazard rating.)

The interface fire hazard rating at the Horne Lake Community ranges between HIGH (23%) and EXTREME (1200 ha, or 76% of the total area in the Horne Lake Community). Many factors contribute to the elevated hazard ratings:

- area is outside fire protection coverage
- lack of standard fireflow (piped community water system)
- influx of summer visitors
- some lakeside cottages are very combustible
- many cottages are surrounded by flammable vegetation
- access times to and from the lake
- continuous fuel (forest stands) surrounding much of the lake

Photo 35. Some cottages at Horne Lake are highly combustible. Flammable vegetation and ignitable materials should be removed around structures.

SECTION 7: MITIGATIVE ACTIONS – A DISCUSSION

The danger of interface fire is inevitable. Despite determined efforts at fire prevention and protection, interface incidents throughout the province are becoming more common. The majority of fires in BC are human-caused. Fires can be anticipated at Horne Lake at any time of year - the risk rises from early spring to late fall. The risk of interface fire is highest during extended warm dry periods in the summer. Scientists are predicting longer fire seasons as a result of global warming and climate change.

As people continue to seek out natural settings in which to recreate, there is little doubt that one day fire will intrude. It is not a question of "if" fire will occur, but when and where.

Interface mapping of the Horne Lake Community indicates that the interface fire hazard rating at Horne Lake ranges between HIGH and EXTREME. The Ministry of Forests and Range warns that hazard ratings are not acceptable unless the threat can be reduced to Moderate or Low.

The Horne Lake Community should be lauded on taking the first steps - risk recognition; unified approach – towards management of their interface zone. Stakeholders have acknowledged a common commitment to fire protection, but identified a need for a more cohesive approach to interface management. The weak linkage between community stakeholders must be strengthened and solidified. Stakeholders are ready and willing to share various fire fighting services. Means of compensation could be developed. A formal agreement for mutual assistance during a fire (or any emergency) is a priority. Several stakeholders suggested the Regional District of Nanaimo is ideally positioned to coordinate emergency planning (i.e., for interface fire) at Horne Lake.

Mitigative actions to reduce the threat of fire at Horne Lake should focus on:

- Education and Public Awareness – Effective communication is the crucial key to preventing or minimising fire risk in the wildland-urban interface. Community support is dependent upon cooperation from stakeholders, all levels of government, and the public and private sectors.

- Vegetation Management – Establish and maintain FireSmart fuel modified areas around interface structures and facilities (see FireSmart, 2nd Edition, 2003)

- Structural Options – The safety of buildings in the interface zone must be addressed, especially in an area such as Horne Lake, where suppression constraints challenge firefighting capabilities.

- Infrastructure – Infrastructure consists of the various services available in a community. Infrastructure embraces planning tools available to local government to protect life and property in the interface.

SECTION 8: EXECUTIVE SUMMARY – ACTION PLAN

Mitigative action is primarily a responsibility of the community. The Horne Lake Community, in concert with provincial fire protection agencies, can take the lead in development and implementation of risk reduction strategies and policies.

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

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

The following recommendations are aimed at reducing the risk of interface fire at the Horne Lake Community:

Education and Community Involvement:

- **Strive to involve <u>all</u> key stakeholders and the public – including recreational 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. (Develop a condensed version of FireSmart for the Horne Lake Community - as an easy-to-use reference.)**

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

Vegetation Management:

Fuel Modification Areas –

- **Encourage cottage owners to establish and maintain Fuel Modification Zones around structures (in accordance with standards in the Riparian Areas Regulation).**

- **Continue the thinning (fuel reduction) program initiated by the Horne Lake Strata Corporation in selected dense stands adjacent to cabin areas at Horne Lake. In addition, consider fuel reduction in dense immature coniferous stands west of the DFO bridge, and dense older immature stands along the Cave Road in Horne Lake Caves Provincial Park.**

- **Ensure tall grass along main roads is cut during the fire season.**

- **Continue to remove flammable broom along strata roads and other areas in the Horne Lake Community.**

Fire-resistive Vegetation –

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

Fuel Disposal –

- **Continue to encourage cottagers to dispose of vegetative debris at the log sort yard.**

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

- **Experiment with mechanical chippers and other machinery to process slash.**

- **Investigate the feasibility of using an air curtain burner as a viable tool for reducing on-site fuel loading.**

Infrastructure:

Planning Tools –

- **Designate development permit areas (DPAs) for wildfires at Horne Lake.**

- **Encourage the Spider Lake community to adopt interface management planning.**

Regional Park-

- **Pursue funding for Regional District key staff and operators to take basic fire suppression training.**

- **Encourage Regional District to allocate a budget for fire management equipment (including regular maintenance of the equipment.)**

- **Facilitate the completion of an emergency management plan for Horne Lake Regional Park.**

Parks, DFO, Trails

- **Continue regular cleanups of downed woody debris, hazardous tree removal, and surface fuel accumulations in parks and public areas.**

- **Collaborate with various agencies involved in the regional trail between Horne Lake and the Big Qualicum Fish Hatchery, in order to ensure the threat of fire is minimised at all times of the year.**

Forest Watch -

- **Encourage Owners to institute "Forest Watch" patrols. Ensure patrols are in effect during fire season, especially during Extreme fire weather.**

Access -

- **Continue to ensure roads and driveways are regularly maintained.**

Firefighting at the Grassroots Level –

- **Encourage cottage owners to equip cottages with personnel fire fighting equipment, including: rooftop access ladder, shovel, rake, large water barrel, and 10-L pail.**

Strategic Planning -

- **Collaborate on the development of a joint emergency fire plan (coordinated by the Regional District of Nanaimo in consultation with the MOFR Wildland Fire Services). The plan should include: clear instructions for dealing with any emergency (including fire); first response duties; emergency contact numbers; location of fire fighting equipment; escape routes; and location of key infrastructure.**

- **Regularly schedule an annual meeting in late January or early February with all stakeholders in the Horne Lake Community, the Ministry of Forests and Range Protection Branch, and neighbouring forest tenure holders, to review fire protection and prevention strategies.**

Photo 36. Fuel reduction at Horne Lake.

SECTION 9: IMPLEMENTATION

No plan is complete until it is implemented.

Local government must take the responsibility for implementation.

The recommendations contained in this Community Wildfire Protection Plan should be reviewed within three months of the adoption of the plan. Maintenance of the CWPP should include an annual schedule for monitoring and evaluating the programmatic outcomes established in the Plan.

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

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

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