Community Wildfire Protection Plan

District of Sooke

Considerations for Wildland Urban Interface Management

DISTRICT OF SOOKE

COMMUNITY WILDFIRE PROTECTION PLAN

Considerations for Wildland Urban Interface Management for Sooke, British Columbia

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1.0 Introduction

In 2010 B.A. Blackwell & Associates Ltd. were retained by the Capital Regional District (CRD) and the District of Sooke to develop Community Wildfire Protection Plans (CWPPs) for Sooke, the Juan de Fuca Electoral Area communities and Piers Island. 'FireSmart – Protecting Your Community from Wildfire'[1] was used to guide the protection planning process. For the District of Sooke, the assessment considered important elements of community wildfire protection including communication and education, structure protection, emergency response and vegetation management.

The social, economic and environmental losses associated with the 2003 and 2009 fire seasons emphasized the need for greater consideration and due diligence in regard to wildfire risk in the wildland urban interface (WUI). In considering wildfire risk in the WUI, it is important to understand the specific risk profile of a given community, which can be defined by the probability and the associated consequence of wildfire to the community. While the probability of fire in coastal communities is substantially lower when compared to the interior of British Columbia (BC), the consequences of a large fire are likely to be very significant in these communities given access and evacuation constraints, population size (especially during summer months), values at risk, topography and environmental considerations.

This CWPP will provide Sooke with a framework to assess the District's fire risk. Additionally, the information contained in this report will help to guide the mitigation strategies that will best address wildfire risk in the community.

The scope of this project included three distinct phases of work:

- **Phase I** –Assess fire risk and develop a Wildfire Risk Management System (WRMS) to spatially quantify the probability and consequence of fire.
- **Phase II –** Conduct a structured decision making workshop to define each community's most important objectives for wildfire protection, and to develop the mitigation strategy alternatives that would best meet community needs.
- **Phase III –** Develop the Plan, which outlines measures to mitigate the identified risk through communication and education, structure protection, emergency response and vegetation management.

[1] Partners in Protection. 2004. FireSmart Protecting your Community from Wildfire. http://www.partnersinprotection.ab.ca/downloads/index.php

2.0 District of Sooke

2.1 Study Area

The District of Sooke is located on the southern tip of Vancouver Island and is approximately 40 km west of Victoria, on Highway 14 (Figure 1). Highway 14 is the only major route in and out of the District. The District is approximately 50 km^2 and has a population density estimated at 194/km^2. The total area within municipal boundary is 5,800 ha.

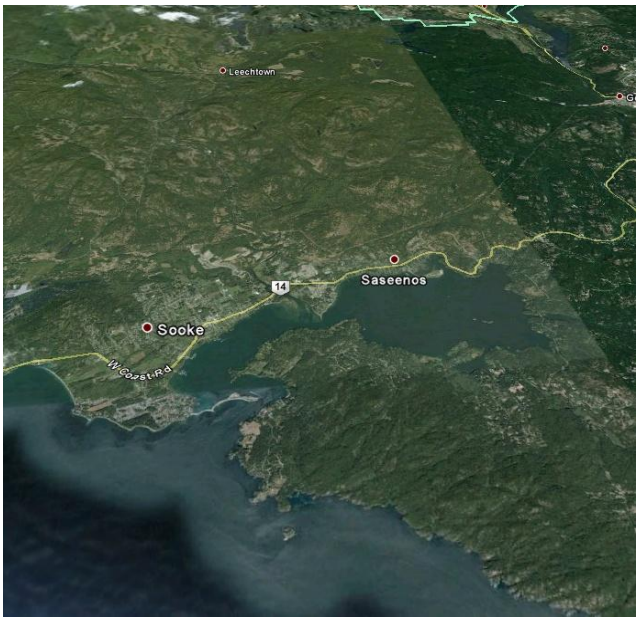


Figure 1. Google Map image of Sooke and surrounding areas.

2.2 Population

The District has been an incorporated community for close to 10 years and is the second fastest growing community in BC (after Kelowna). Sooke is expected to approximately double its current population of 10,000 by 2020[2]. The majority of the population is within the 30-45 years and 45-60 years age groups. As of 1996, most people in the District were employed in the retail trade, health and social services, and educational services sectors. The economy of the area was generally resource based (forestry and fishing); however, in recent years there has been a downturn in these industries and an increase in tourism. The population of the District includes the T'sou-ke Nation who have two reserves within the community. There are 4,122 private dwellings and it is estimated that approximately 3,859 of the total residences are occupied by permanent population[3].

2.3 Infrastructure

Emergency services within the District of Sooke include a fire department (Figure 2), R.C.M.P. detachment and ambulance service. Critical infrastructure is shown in Map 1. The District Fire Department has two fire stations of approximately 50 volunteer crew members, and 5 paid staff

[2] District of Sooke Bylaw No. 400. Official Community Plan, 2010. http://www.sooke.ca/assets/Documents~and~Forms/Bylaws/400%20OCP%20ADOPTED%20MAY%2017%2010.pdf

[3] http://www.city-data.com/canada/District-District-municipality.html

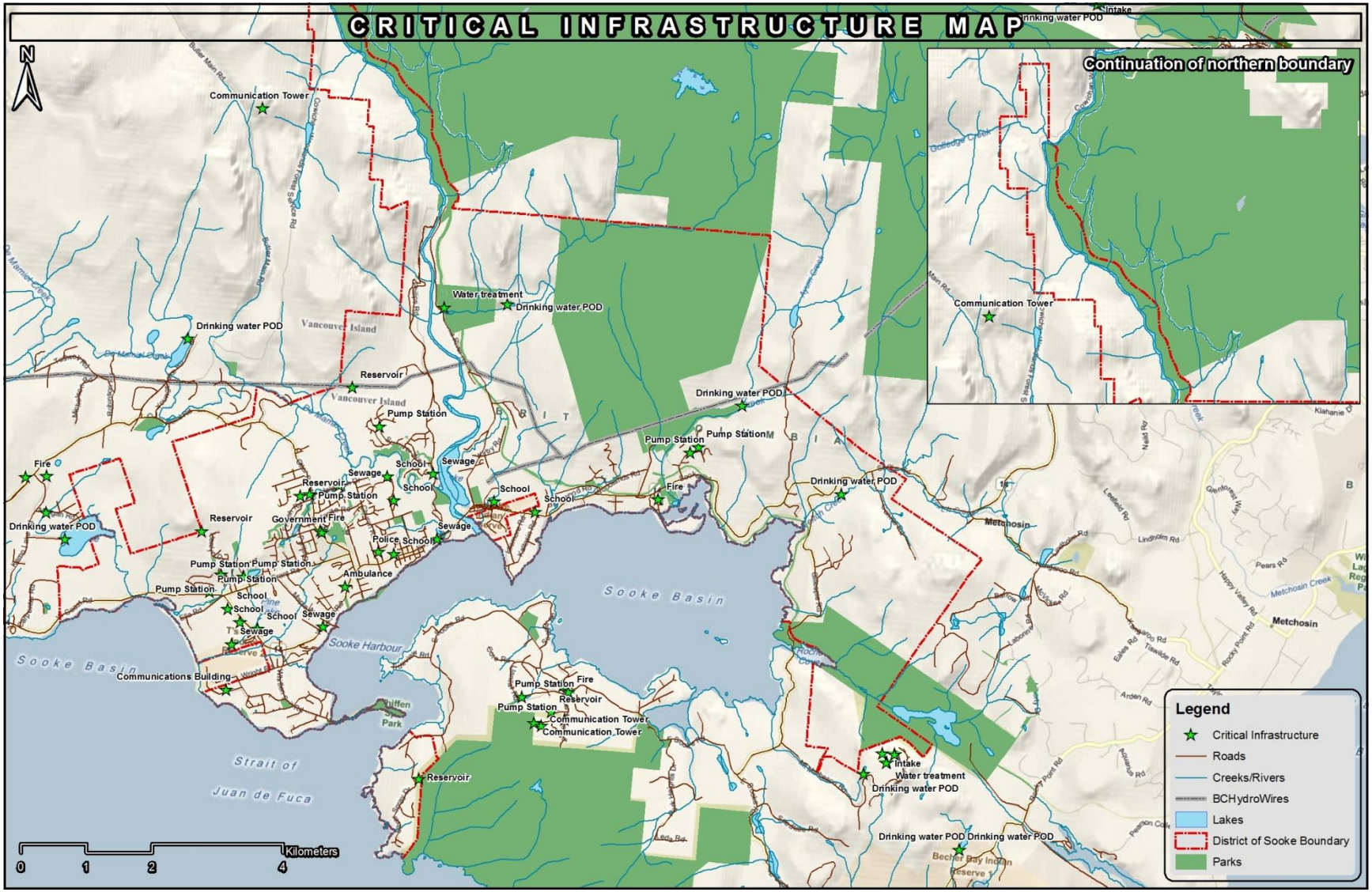
members. The Department has interface fire fighting experience and has received coordinated training with the CRD. The District's R.C.M.P. detachment includes 14 officers and Auxillary Police. There are no hospitals in the study area however BC ambulance provides service from Sooke to hospitals in Victoria (35 km). Additional critical infrastructure includes six schools (four elementary, one middle and one high school) and government offices (local and regional)[4].

Water infrastructure and water supply are relatively good for residents that live in the District's core. There is a water main to most homes and a recently installed sewage system with capacity to spare. Some outlying parts of the community rely on wells, septic tanks and on-site sewage treatment.

Figure 2. Sooke Firehall #1 (left) and Sooke Firehall #2 (right)

Electrical service is received through a network of metal and wood pole transmission and distribution infrastructure supplied by BC Hydro/BC Transmission Corporation. Southern Vancouver Island west of Victoria is supplied power by a single 138 kV circuit that connects Colwood Substation, Sooke Substation and Jordan River Generating Station. The Jordan River Generating Station has traditionally been able to supply the combined load of Colwood, Sooke and Jordan River when power has been out on this transmission line. The ability to supply power from either Jordan River or from the north means that, while fire could cause a disruption in power services either due to heat from the flames or fallen trees associated with a fire event, an extended power disruption is unlikely. Wood pole distribution lines (the small street-side poles) connecting homes and subdivisions would be vulnerable to fire, which could disrupt service to portions of the community.

[4] http://advantageDistrict.ca/facts-stats.html



Map 1. Critical infrastructure in and around East Sooke.

2.4 Environmental and Cultural Values

The Biogeoclimatic Ecosystem Classification (BEC) system describes zones by vegetation, soils and climate. Regional subzones are derived from relative precipitation and temperature. The study area is defined by the regional climate of the Coastal Western Hemlock very dry maritime (CWHxm). The CWH is the most productive forest region in Canada and in the drier portion of this zone many conifers exhibit their best growth.

Environmental values are moderate to high in the study area as there are 33 listed species identified within the District. Of these species six are red-listed. The study area is home to the Sooke Potholes Provincial Park and the Galloping Goose Regional Trail runs adjacent to Sooke River Road. The streambank lupine occurs within the Sooke Potholes Park and hence has received some protection within the Park. The blue-grey taildropper slug and other species occur adjacent to the Galloping Goose Trail and are threatened by habitat loss from recreational use and urban development.

Some of the red-listed species include:

- Pacific waterleaf;
- Roemer's fescue – junegrass;
- Keen's myotis;
- Fleshy jaumea;
- Blue-grey taildropper; and
- Nevada marsh fern (Figure 3).

Figure 3. Nevada marsh fern

Great blue herons are listed as a special concern by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are known to use habitat within the District, however no nesting and roosting site data is currently available[5]. It is worthy to note that Sensitive Ecosystem Inventory data is not complete for the study area.

Encroaching urban development throughout the study area and invasive species such as Scotch broom are threats to biodiversity within the District of Sooke.

Cultural values exist throughout the district. The T'Sou-ke Nation's traditional lands include important fish bearing habitat and salmon spawning streams throughout the study area, and sites of cultural significance. Also, there are buildings and artifacts from early European immigration and the gold rush era located within the District.

[5] http://www.District.ca/EN/main/government/environment/species_risk.html

3.0 Fire Environment

3.1 Fire Weather

The Canadian Forestry Service developed the Canadian Forest Fire Danger Rating System (CFFDRS) to assess fire danger and potential fire behaviour. A network of fire weather stations during the fire season are maintained by the Ministry of Forests and Range (MOFR) and are used to determine fire danger on forestlands within a community. The information can be obtained from the MOFR Protection Branch and is most commonly utilized by municipalities and regional districts to monitor fire weather, and to determine hazard ratings, associated fire bans and closures. Fifteen years of data from the now archived Chemainus, Barnard and Mesachie fire weather stations were used to summarize fire weather for the District of Sooke. The key fire weather parameters summarized are:

- Drought Code: The Drought Code represents the moisture in deep, compact organic matter with a nominal depth of about 18 cm and a dry fuel load of 25 kg/m^2. It is a measure of long-term drought as it relates to fire behaviour.

- Danger Class: The Danger Class Rating is derived from fire weather indices and has 5 classes: 1) Very Low Danger; 2) Low Danger; 3) Moderate Danger; 4) High Danger; and 5) Extreme Danger.

The drought code provides some indication of seasonal drought effects on forest fuels. The higher the drought code, the drier the duff (layer of decomposing organic materials below the litter layer), indicating a prolonged period without adequate moisture input to wet the duff layer. This code also provides some indication of potential fire severity in terms of duff consumption; the drier the duff is, the more it will be consumed by fire. The depth of burn can result in greater tree mortality and seed bank consumption due to soil heating. Soil heating can also result in soil hydrophobicity, meaning the soil repels water, and this has been linked with increased erosion post-fire due to increased water run-off. Figure 4 shows that the drought code tends to shift over the summer months and in to the fall from being predominantly low in June, to high in July and then extreme in August and September.

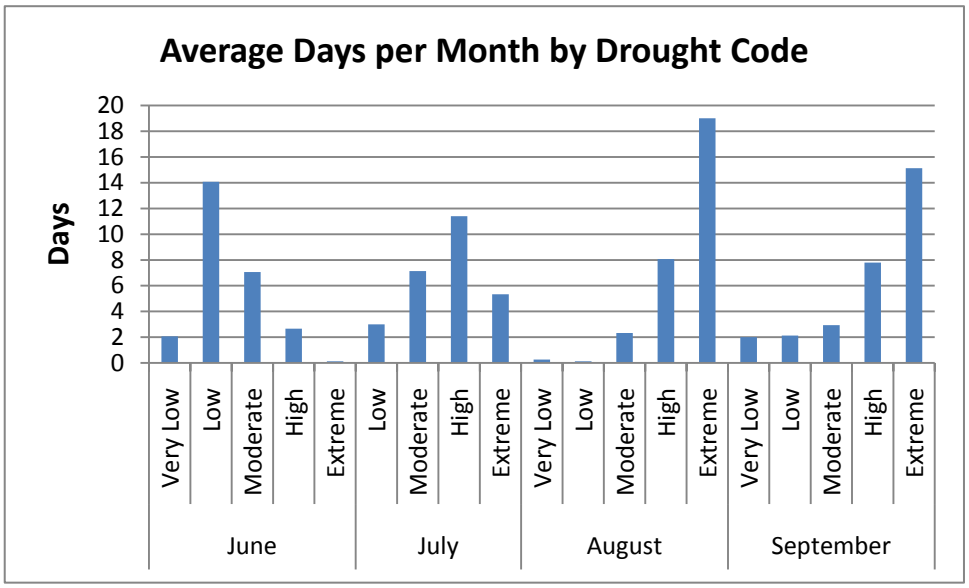


Figure 4. Drought code averaged for each month over a 15 year period from the Chemainus, Barnard and Mesachie weather stations (Very low = 0-79; Low = 80-189; Moderate = 190-299; High = 300-424, Extreme = >425).

The Fire Danger classes provide a relative index of how easy it is to ignite a fire and how difficult control is likely to be. The BC *Wildfire Act* [SBC 2004] and *Wildfire Regulation* [B.C. Reg. 38/2005], which specify responsibilities and obligations with respect to fire use, prevention, control and rehabilitation, restrict high risk activities based on these classes. Fire Danger Classes are defined as follows:

Class 1 (Low) – Fires likely to be self-extinguishing and new ignitions unlikely. Any existing fires limited to smouldering in deep, drier layers.

Class 2 (Moderate) – Creeping or gentle surface fires. Fires easily contained by ground crews with pumps and hand tools.

Class 3 (High) – Moderate to vigorous surface fire with intermittent crown involvement. Challenging for ground crews to handle; heavy equipment (bulldozers, tanker trucks, aircraft) often required to contain fire.

Class 4 (Very High) – High-intensity fire with partial to full crown involvement. Head fire conditions beyond the ability of ground crews; air attack with retardant required to effectively attack fire's head.

Class 5 (Extreme) – Fast-spreading, high-intensity crown fire. Very difficult to control. Suppression actions limited to flanks, with only indirect actions possible against the fire's head.

Figure 5 shows that the number of danger class days on average for each month of the fire season is highly variable but that the number of high, very high and extreme danger class days

tends to be highest from July through to September. August has the highest number of extreme danger class days.

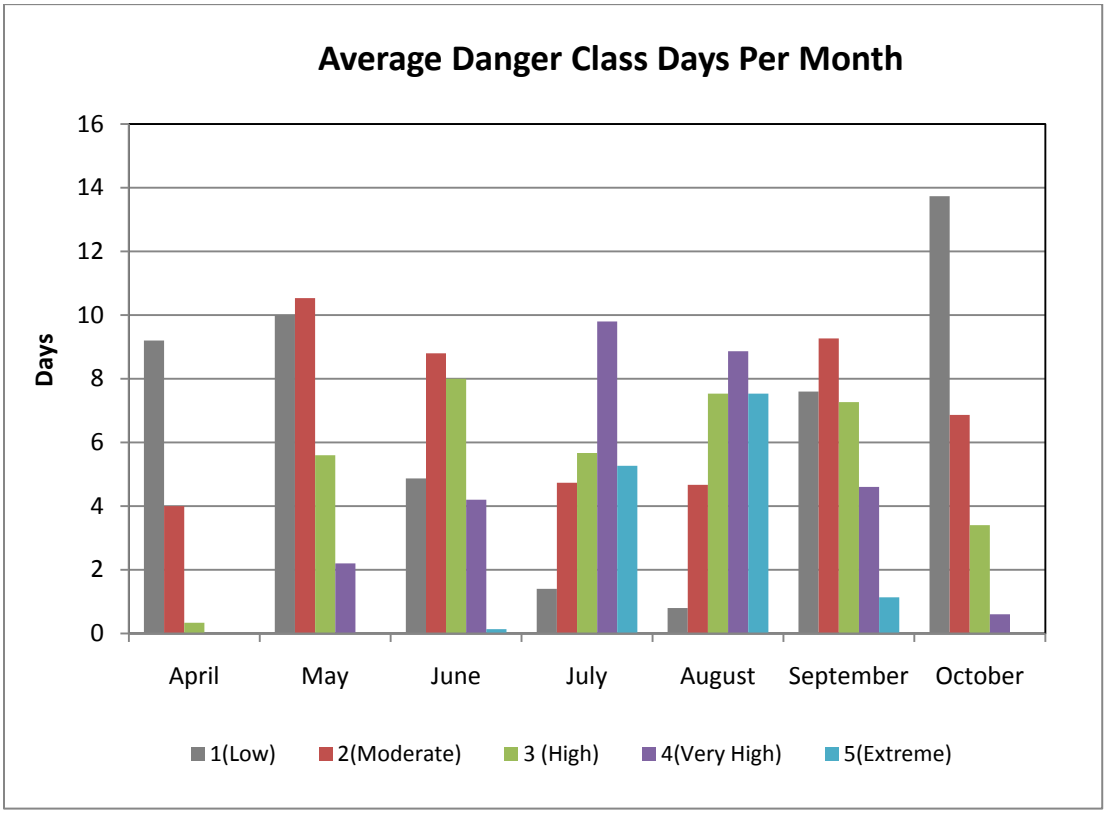


Figure 5. Fire Danger Class averaged for each month from 15 years of data from the Chemainus, Barnard and Mesachie weather stations.

3.1.1 Future Climate Considerations

Potential impacts of climate changes based on several general long-term trends and patterns identified for mid and high latitudes of the Northern Hemisphere continents are discussed in the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC 2007[6]). For North America, these are:

- Projected warming of 1˚ - 3˚C, with warming greatest in winter at high latitudes.

[6] Parry, M.L.; Canziani, O.F.; Palutikof, J.P.; van der Linden, P.J.; Hanson, C.E. (eds). 2007. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. Cambridge University Press, Cambridge, UK and New York, USA. http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html

- Potentially increased precipitation in Canada, with more of that precipitation increase occurring in the winter, and more of it occurring during extreme precipitation events.
- Precipitation more often occurring in extreme events with greater risk of flooding and, conversely, greater risk of drought due to the temporal variation between these extreme precipitation events.

Implications for wildfire under this scenario are that drought events could result in extended wildfire seasons with more days of fire weather supporting difficult to control wildfires (i.e., more high and extreme danger class days than shown in Figure 5) and drought conditions supporting more severe fire effects (i.e., more high and extreme drought code days than shown in Figure 4). Severe wildfires occurring under drought conditions may consume more of the duff layers and heat the mineral soil, leaving those soils more prone to erosion. Extreme rainfall events that occur before those soils have been re-colonised by vegetation would likely result in substantial erosion.

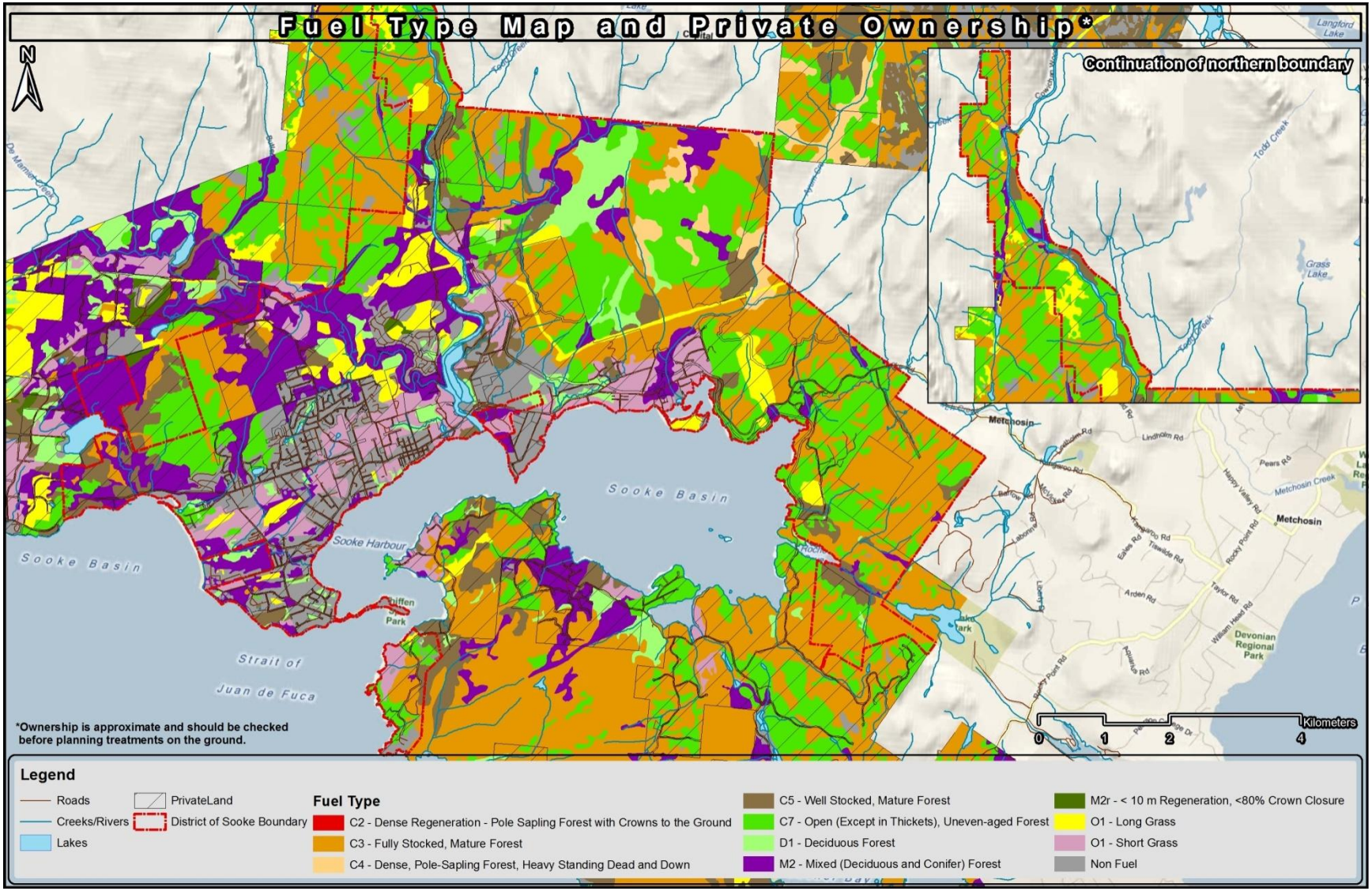
3.2 **Fuels**

The fuel typing used to develop the Provincial Strategic Threat analysis is not accurate at a local scale, therefore fuel types are generated spatially for the study area using an algorithm that assigns CFFDRS fuel types based on Vegetation Resource Inventory (VRI) data. The fuel types within the study area and the composition for each fuel type are outlined in Table 1. The algorithm uses BEC, species mix, crown closure, age, and non-forest descriptors to assign fuel type. Typically, the outputs require refinement and do not adequately describe the variation in fuels present within a given area, due to errors in VRI and adjustments required in the algorithm. For this reason, it is important to ground-truth fuel types in order to modify the algorithm and improve fuel type accuracy. The VRI-based fuel typing was improved upon and adjusted to incorporate local variation and is illustrated in Map 2.

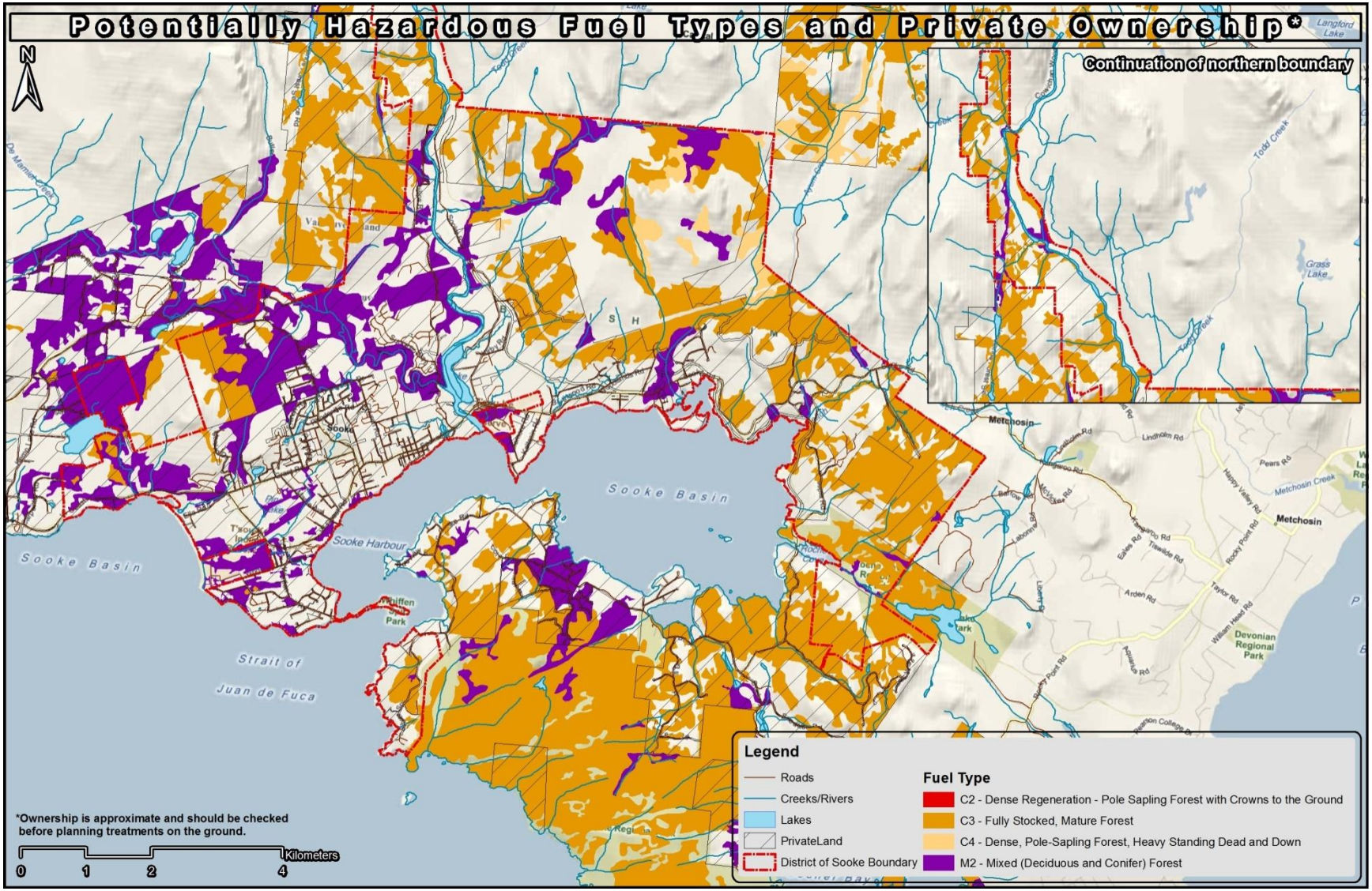
Table 1 summarizes the fuel types by general fire behaviour and total area for the District of Sooke. In general the fuel types considered hazardous in terms of dangerous fire behavior and spotting (lofting burning embers) are C2, C4, and C3. Fuel type M2 can sometimes be hazardous depending on the proportion of conifers within the forest stand. Hazardous fuel types are shown in Map 3.

Table 1. A summary of fuel types, associated hazard and areas within the District of Sooke study area.

Fuel Type	Description	Wildfire Behaviour under High Wildfire Danger Level	Area (ha)	Percent (%)
C2	Dense regeneration to pole-sapling forest with crowns almost to the ground	Almost always **crown fire**, high to very high fire intensity and rate of spread	0	0
C3	Fully stocked, mature forest, crowns separated from ground	**Surface and crown fire**, low to very high fire intensity and rate of spread	1,429.1	28.5
C4	Dense, pole-sapling forest, heavy standing dead and down, dead woody fuel, continuous vertical crown fuel continuity	Almost always **crown fire**, high to very high fire intensity and rate of spread	97.6	1.9
C5	Well stocked, mature forest, crowns well separated from ground	Low to moderately fast spreading, low to moderate intensity **surface fire**	361.1	7.2
C7	Open, uneven-aged forest, crowns separated from ground except in conifer thickets, understory of discontinuous grasses, herbs	**Surface, torching, rarely crowning** (slopes > 30%), moderate to high intensity and rate of spread	1,326.7	26.4
D1	Moderately well-stocked deciduous stands	Always a **surface fire**, low to moderate rate of spread and fire intensity	247.0	4.9
M2	Moderately well-stocked mixed stand of conifers and deciduous species, low to moderate dead, down woody fuels, crowns nearly to the ground	**Surface, torching and crowning**, moderate to very high intensity and spread rate (depending on slope and percent conifer)	868.7	17.3
M2r	Moderately well-stocked mixed stand of conifers and deciduous species regeneration, crowns nearly to the ground	**Surface, torching and crowning**, moderate to very high intensity and spread rate(depending on slope and percent conifer)	4.6	<1
O1 – Long	Continuous standing grass, fuel loading is 0.3 kg/m2, 90% cured	Rapid spreading, moderate to high intensity **surface fire**	301.5	6.0
O1 – Short	Continuous human modified short grass, fuel loading is 0.17 kg/m2, 90% cured	Rapid spreading, low to moderate intensity **surface fire**	383.6	7.6
		Total:	5,019.9	



Map 2. Fuel typing and private ownership for the District of Sooke.



Map 3. Potentially hazardous fuel types within and around the District of Sooke.

3.3 Historic Ignitions

Fire data are summarized by fire cause for the period of 1919 to 2009 with some gaps between years. Fewer than 10% of fire ignitions have been lightning caused and the majority of those ignitions occurred in one year (Figure 6). The number of fires per year is quite low, though data pre-1951 may underestimate the number of fire starts as it only records fire extent for fires that contributed to an area burned, whereas data after that date includes all fires reported to the Ministry of Forests, Lands and Natural Resource Operation's (MFLNRO) Wildfire Protection Branch.

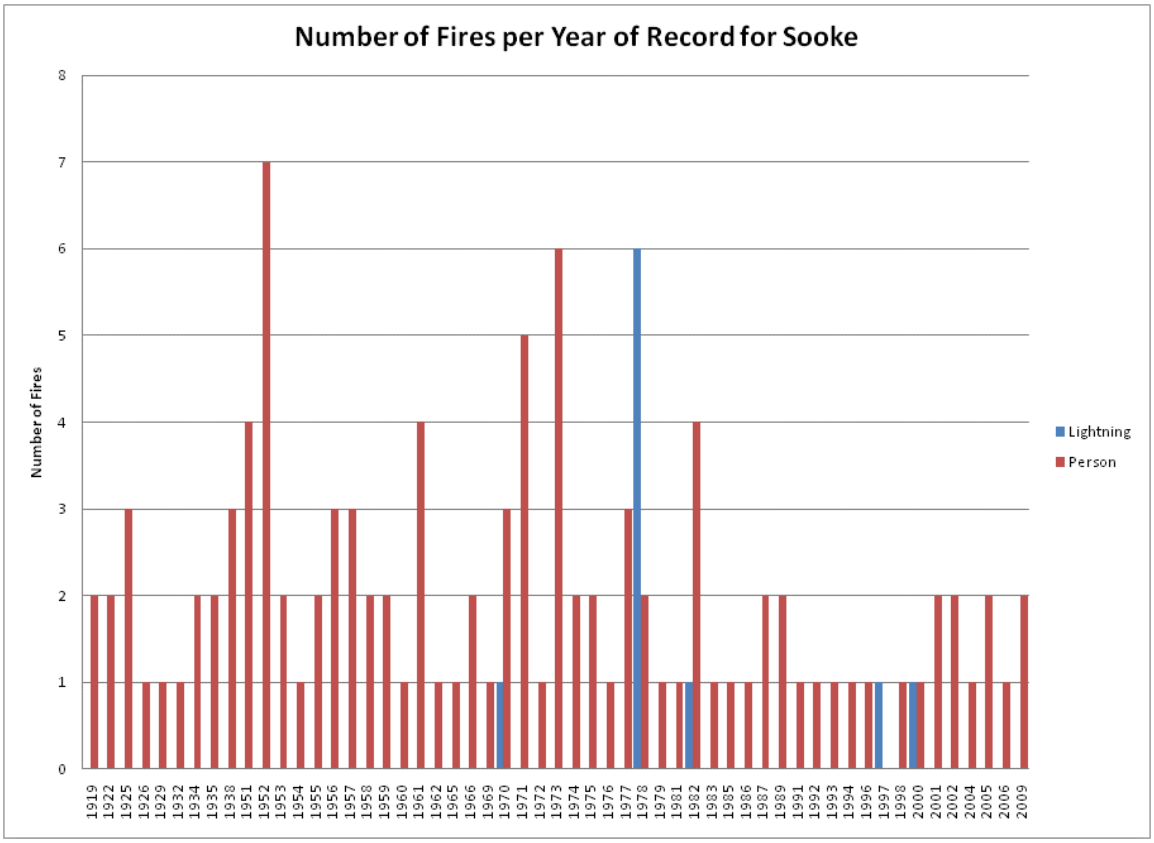


Figure 6. Number of fires per year between 1919 and 2009 within the District of Sooke boundary.

The number of hectares burned per year (Figure 7) shows that there were large areas burned in the 1920s (due to just a few fires) and that area burned has been consistently small since the 1950s, which likely coincides with effective fire suppression. Though there were a relatively high number of ignitions in the 1970s, these did not result in an increase in the area burned within the District.

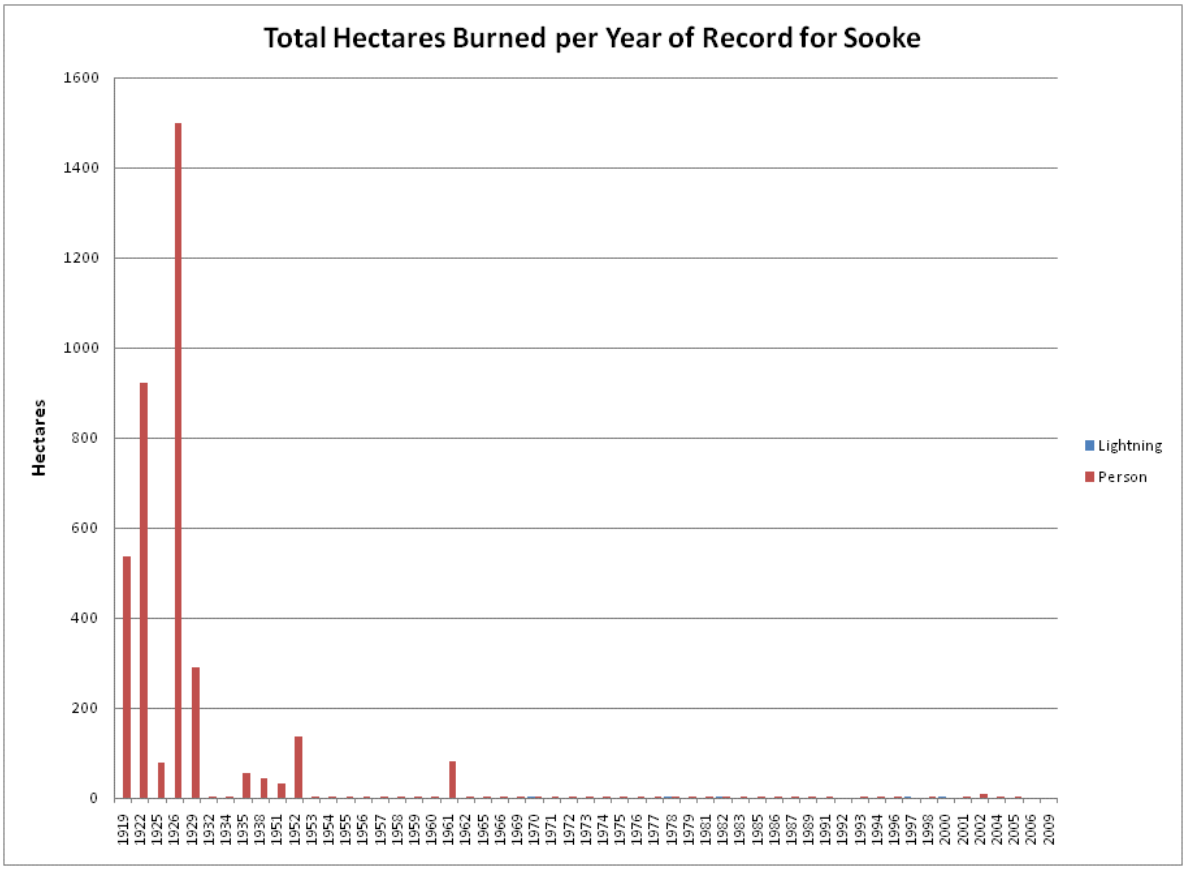
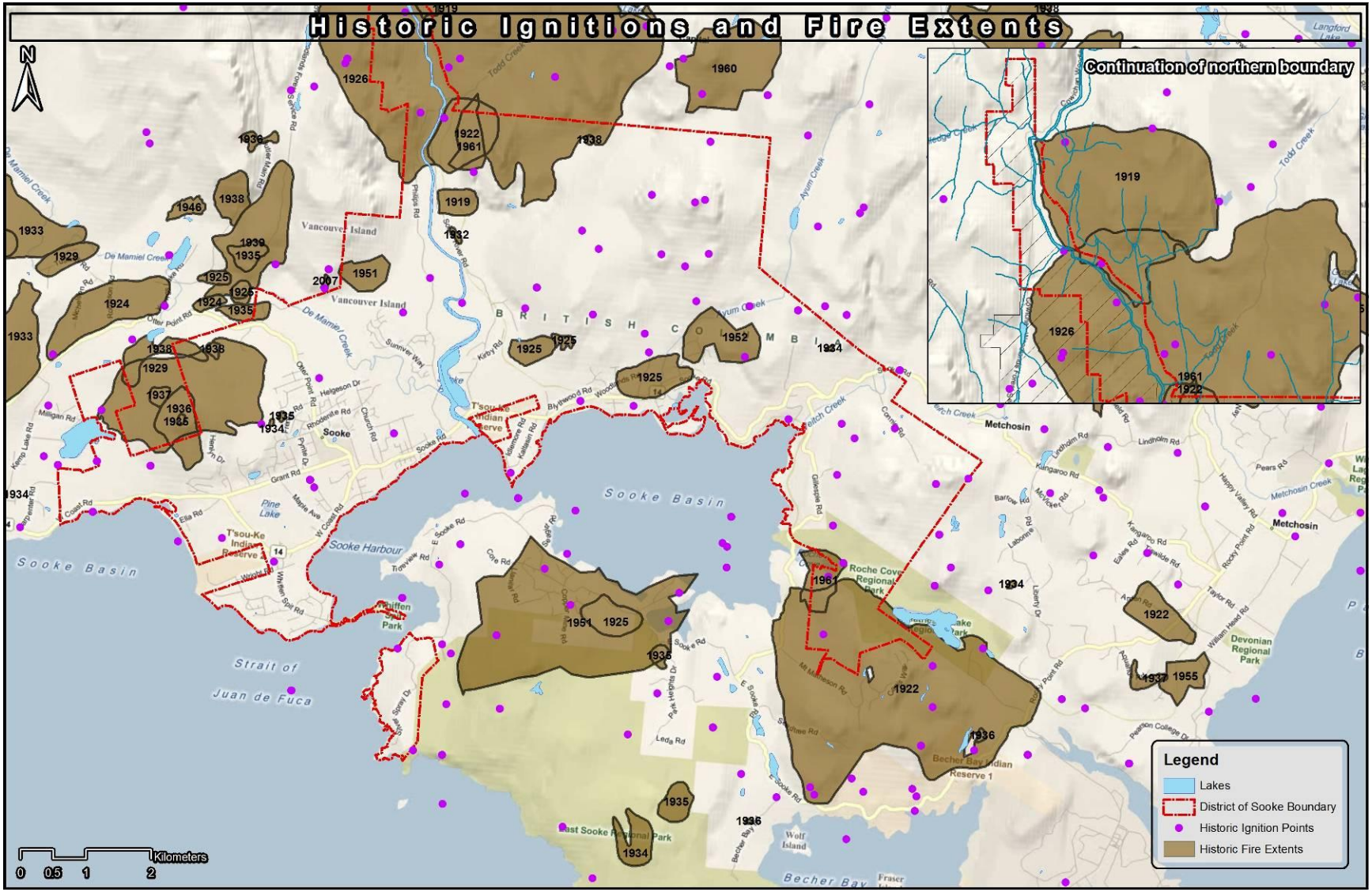


Figure 7. Number of hectares burned per year between 1919 and 2009 within the District of Sooke.

The figures above and the fire history data presented in Map 4 indicate that the District and surrounding areas have experienced large fires in the last 100 years. Most have been human caused but there may be infrequent years, such as 1978, that result in multiple lightning ignitions. Effective fire suppression since the 1950s has likely reduced the extent of fires within the District.

The point ignition data shown in Map 4 represents ignitions located, as per MFLNRO methodology, on a grid rather than the exact ignition location; therefore, some points are located in water and multiple points are often located on top of one another.



Map 4. Historic ignitions and fire extents from 1919 to 2009.

4.0 The Wildland Urban Interface

The classical definition of wildland urban interface (WUI) is the place where the forest meets the community. Other configurations of the WUI can be described as intermixed. Intermixed areas include smaller, more isolated developments that are embedded within the forest. An example of an intermixed interface is shown in Figure 8.

In each of these cases, fire has the ability to spread from the forest into the community or from the community out into the forest. Although these two scenarios are quite different, they are of equal importance when considering interface fire risk. Within the District, the probability of a fire moving out of the community and into the forest is equal or greater to the probability of fire moving from the forest into the community. Regardless of which scenario occurs, there will be consequences for the community and this will have an impact on the way in which the community plans and prepares for interface fires.

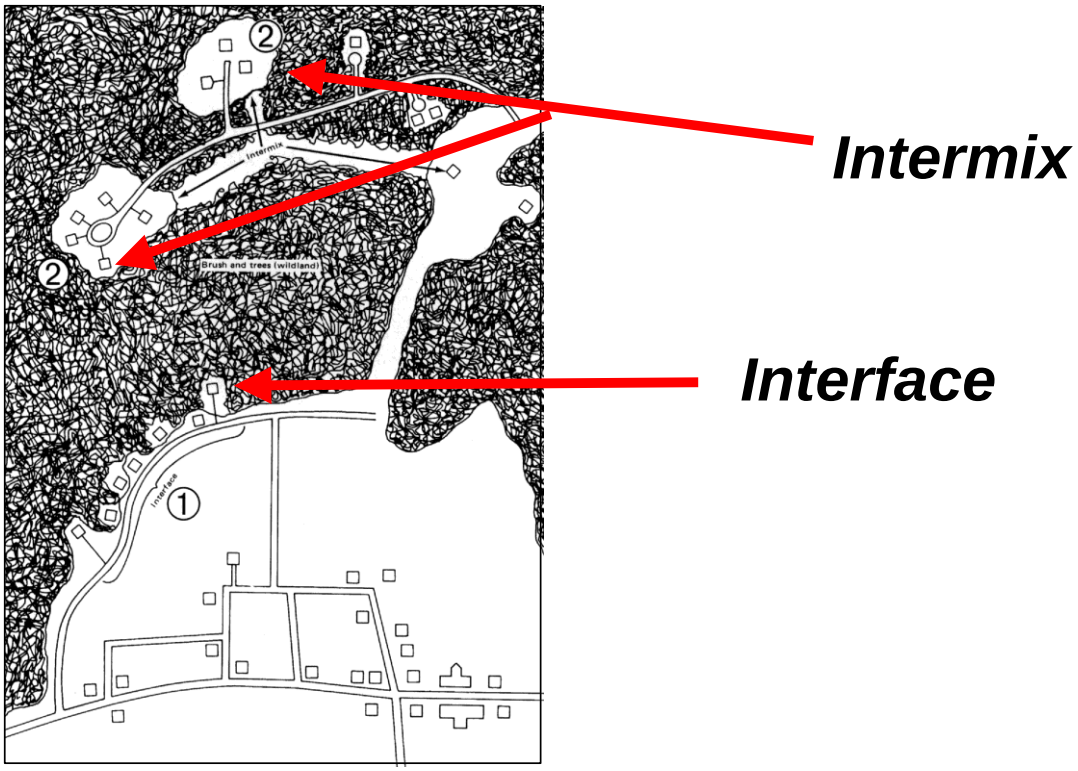
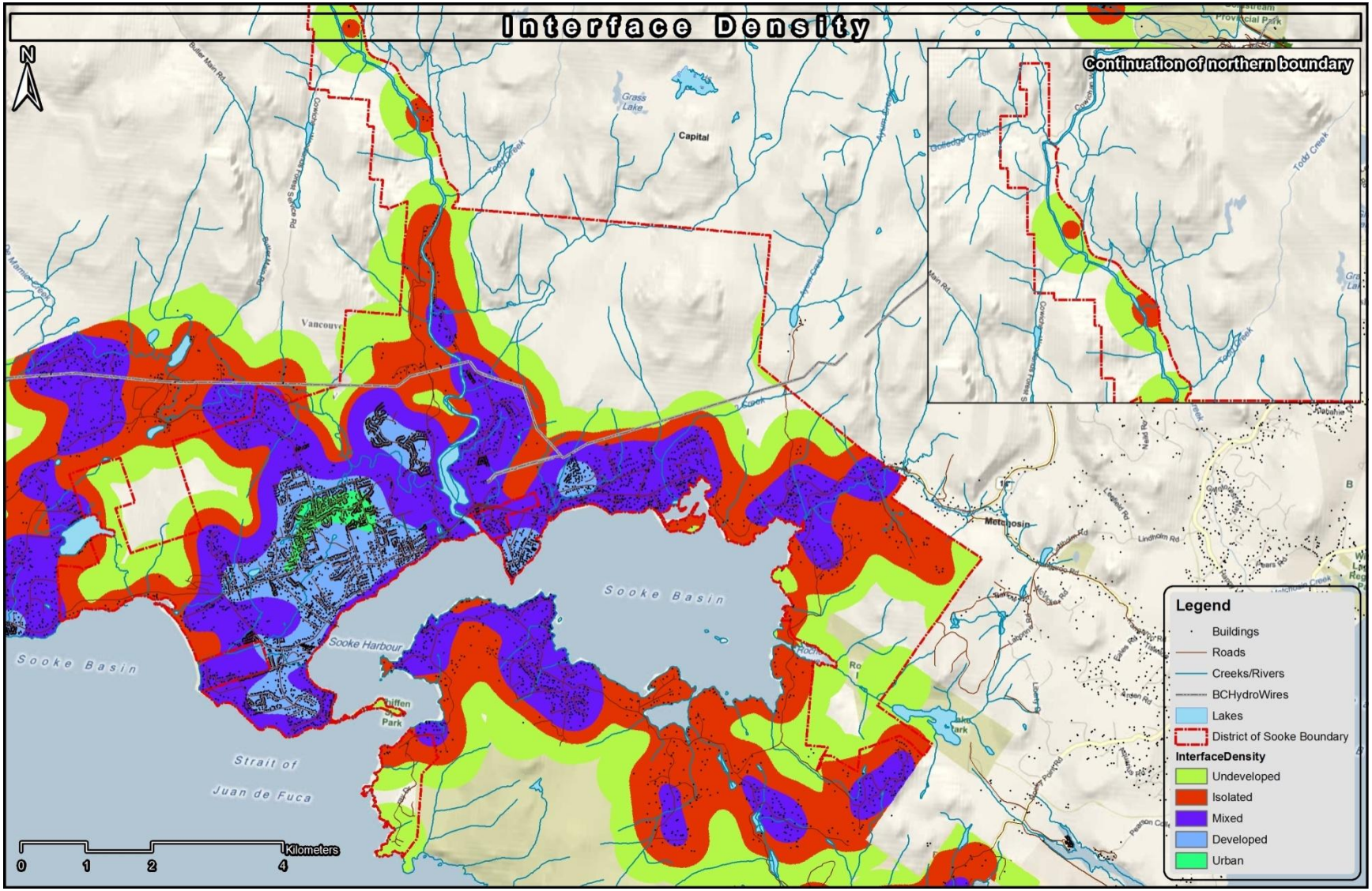


Figure 8. Graphical example showing variation in the definition of interface.

Map 5 shows the interface density classes mapped for the District of Sooke. The area of 'Urban' interface shown in Map 5 is buffered from the wildland by surrounding development. The area of 'Developed' and 'Urban' interface density usually looks like the interface shown in Figure 8, whereas the 'Mixed' and 'Isolated' areas are predominantly intermix as defined in Figure 8.



Map 5. Interface density classes within the District of Sooke and surrounding areas.

4.1 Vulnerability of the Wildland Urban Interface to Fire

Fires spreading into the WUI from the forest can impact homes in two distinct ways:

1) From sparks or burning embers getting carried by the wind, or convection that starts new fires beyond the zone of direct ignition (main advancing fire front), and alight on vulnerable construction materials (*i.e.* roofing, siding, decks etc.) (Figure 9).

2) From direct flame contact, convective heating, conductive heating or radiant heating along the edge of a burning fire front (burning forest), or through structure-to-structure contact. Fire can ignite a vulnerable structure when the structure is in close proximity (within 10 meters of the flame) to either the forest edge or a burning house (Figure 10).

Figure 9. Firebrand caused ignitions: burning embers are carried ahead of the fire front and alight on vulnerable building surfaces.

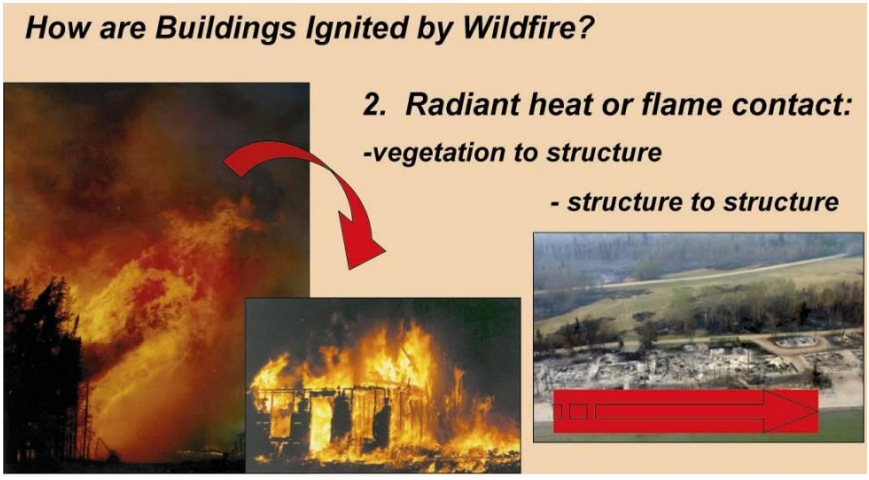


Figure 10. Radiant heat and flame contact allows fire to spread from vegetation to structure or from structure to structure.

5.0 Community Wildfire Protection Planning Process

The WUI continuum summarizes the main options available for addressing WUI fire risk in the CWPP process (Figure 11).

Figure 11. Wildland urban interface continuum summarizing the different options for addressing fire risk during the Community Wildfire Protection Plan process.

The recommended management response to a given wildfire risk profile is based on determining the appropriate combination and level of emphasis of the key elements shown in Figure 11:

- Communication and public education (e.g., signage, websites, advertising, communication planning, private owner structure protection and vegetation management)
- Structure protection (e.g., FireSmart principles for construction and vegetation management, National Fire Protection Association standards, subdivision design)
- Vegetation management (e.g., identifying hazardous fuel types, reducing crown and ladder fuels, landscape level fuel breaks)
- Emergency response (e.g., evacuation and access routes, firefighting capability, training, emergency response planning, post-fire rehabilitation planning)

Determining where effort for wildfire mitigation should be focused is based on an assessment

of risk, defined as the factors that contribute to the probability of fire and the values at risk (consequence) in the community. A variety of management responses are appropriate within a given community based on the Community Risk Profile presented in Section 6.0.

6.0 Community Risk Profile

Two parallel approaches were used to develop the risk profile for each community within the study area.

6.1 Stakeholder Workshop

The first part of the approach involved a workshop with participation from Fire Chiefs, emergency program coordinators and representatives, regional and municipal staff (planning, engineering, parks, water and building) and a representative from the MFLNRO (formerly the Ministry of Forests and Range) Protection Branch . The workshop used a Structured Decision Making approach as defined in Hammond *et al.* (1999)[7]. The decision problem was defined as:

> **In order to adequately improve community protection against a large wildfire event, which mitigation strategies make the most sense for implementation in CRD communities and Sooke?**

Prior to the workshop, key objectives were elicited from participants via an email questionnaire. At the workshops, participants went through a process of weighting those objectives and defining the 'best' alternatives for each community. We then used this information to look at the consequences and tradeoffs of each alternative on the defined objectives. This process enabled us to determine which mitigation strategies had the biggest impact on the objectives that matter to communities. Those objectives that we could not influence through our mitigation alternatives were removed from the analysis because they do not affect our decision.

Across all stakeholders, regardless of community representation, means objectives that supported the fundamental objective of protecting human life and well-being were consistently rated at the top. There was a lot more variability across the group on the fundamental objectives of protecting economic values and protecting environmental values. It is our interpretation that this variation is explained both by the stakeholder's perception of:

1. The impacts of wildfire on these objectives in the context of these specific communities; and,
2. The stakeholder's ability to influence the impact on objectives through their decision.

[7] Hammond, J., Keeney, R. And H. Raffia. 1999. Smart Choices: A Practical Guide to Making Better Decisions. Harvard Business School Press, Boston, Ma, USA.

In other words, the ranking of objectives is not necessarily a reflection of the objective's inherent value or importance, but a reflection of the objective's importance in relation to this specific decision.

Representatives of the District of Sooke generally agreed with the consistently moderate and high objectives shown in Table 2. However, cost of implementation and maintaining air quality were rated slightly higher than in most other areas. This may be due to the fact that the District of Sooke is its own municipality with a substantially larger population than the other areas assessed for this study. This larger population and constituency may result in a greater awareness or concern about air quality complaints, potential health impacts and cost considerations at the municipal level.

Objectives were assigned measurable metrics which were used to compare alternatives relative to the status-quo (i.e., current practices). For the District of Sooke, a comparison of possible mitigation alternatives against objectives determined that the objectives most benefited by mitigation strategies were:

1. Improving suppression response;
2. Improved public understanding of fire risk and personal responsibility;
3. Improving evacuation ease;
4. Reducing ignitions;
5. Protecting critical infrastructure;
6. Protecting homes/structures;
7. Maintaining recreation quality/opportunity; and,
8. Minimizing fire behaviour.

The order of the objectives in the list above reflects how much the mitigation alternatives defined in the workshop were able to impact our objective (i.e., 1. on the list was the objective most impacted by the mitigation alternative).

The metrics used to measure impacts on objectives were not exhaustive and so were not the sole factor used to determine recommendations for each community. For example, there is more to improving suppression response than just improving response time and so we still considered other elements of suppression response. What this analysis does is provide direction on where we should focus our efforts in wildfire mitigation by highlighting what is most important to consider and where we can likely make the biggest improvements.

Table 2. Fundamental and means objectives considered in the workshop, and colour coded objectives that were ranked consistently across groups. The objectives in unshaded cells were ranked low to moderate but varied between groups.

Fundamental Objectives	Means Objectives #1	Means Objectives #2
Human Life and Social Benefit/Well-Being	**Reduce Wildfire Threat**	**Ignitions**
		Suppression Response
		Fire Behaviour
	Protect Community Infrastructure	**Critical infrastructure**
		Homes /Structures
	Maximize Safety	**Evacuation Ease (Egress)**
	Minimize Health Impacts	Drinking water
		Air quality
	Maintain Recreation Quality/ Opportunity	**Maintain Park/Trail Recreation**
	Enable Effective Implementation	Cost of Implementation (incl. additional res.)
		Maximize Public Understanding of Fire Risk and Personal Responsibility
		Political acceptability
Economic	Commercial Assets	Timber Assets
	Residential Land Value	Visual Quality
Natural Environment	Biodiversity	Minimize Invasive Species Spread
		Minimize Habitat Loss for Fire Vulnerable Species
Consistently High		Consistently Moderate

6.2 Modelling Wildfire Risk

The second approach to developing the community risk profile was to use a geospatial wildfire risk model called the 'Wildfire Risk Management System' (WRMS). Individual polygons are weighted for each subcomponent (Figure 12). Using algorithms, the subcomponents are combined to produce component weightings which are then further processed to derive probability and consequence ratings.

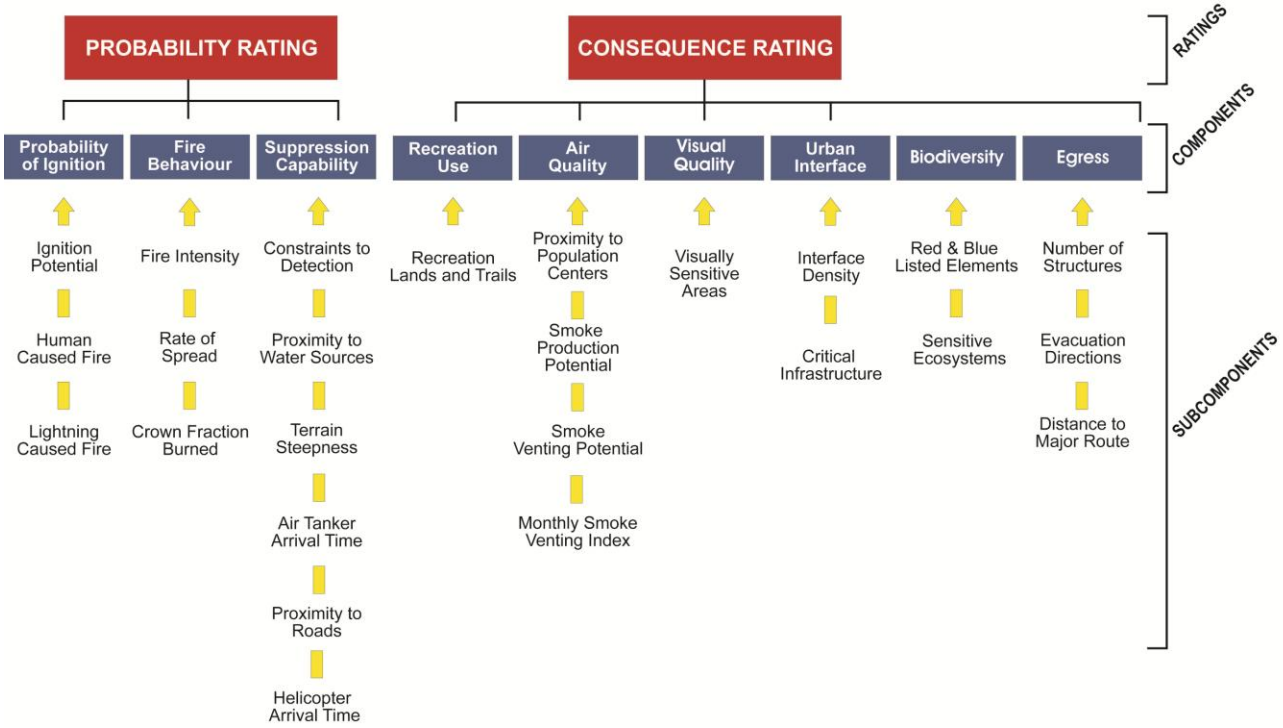


Figure 12. Illustration of the sub-components and components used to calculate the final probability and consequence ratings within the Wildfire Risk Management Structure for the CRD and Sooke. Note: Sensitive Ecosystems was excluded for Sooke because the inventory is incomplete.

The weightings used for the CRD and Sooke communities WRMS were determined using the ranking of objectives derived during the stakeholder workshop. Component weightings were as follows:

- Probability Rating
  - Probability of Ignition: 35%
  - Potential Fire Behaviour: 30%
  - Suppression Capability: 35%
- Consequence Rating
  - Urban Interface: 49%
  - Egress (Evacuation Ease): 20%
  - Recreation: 10%
  - Biodiversity: 7%
  - Visual Quality: 7%
  - Air Quality: 7%

6.2.1 The Base Case

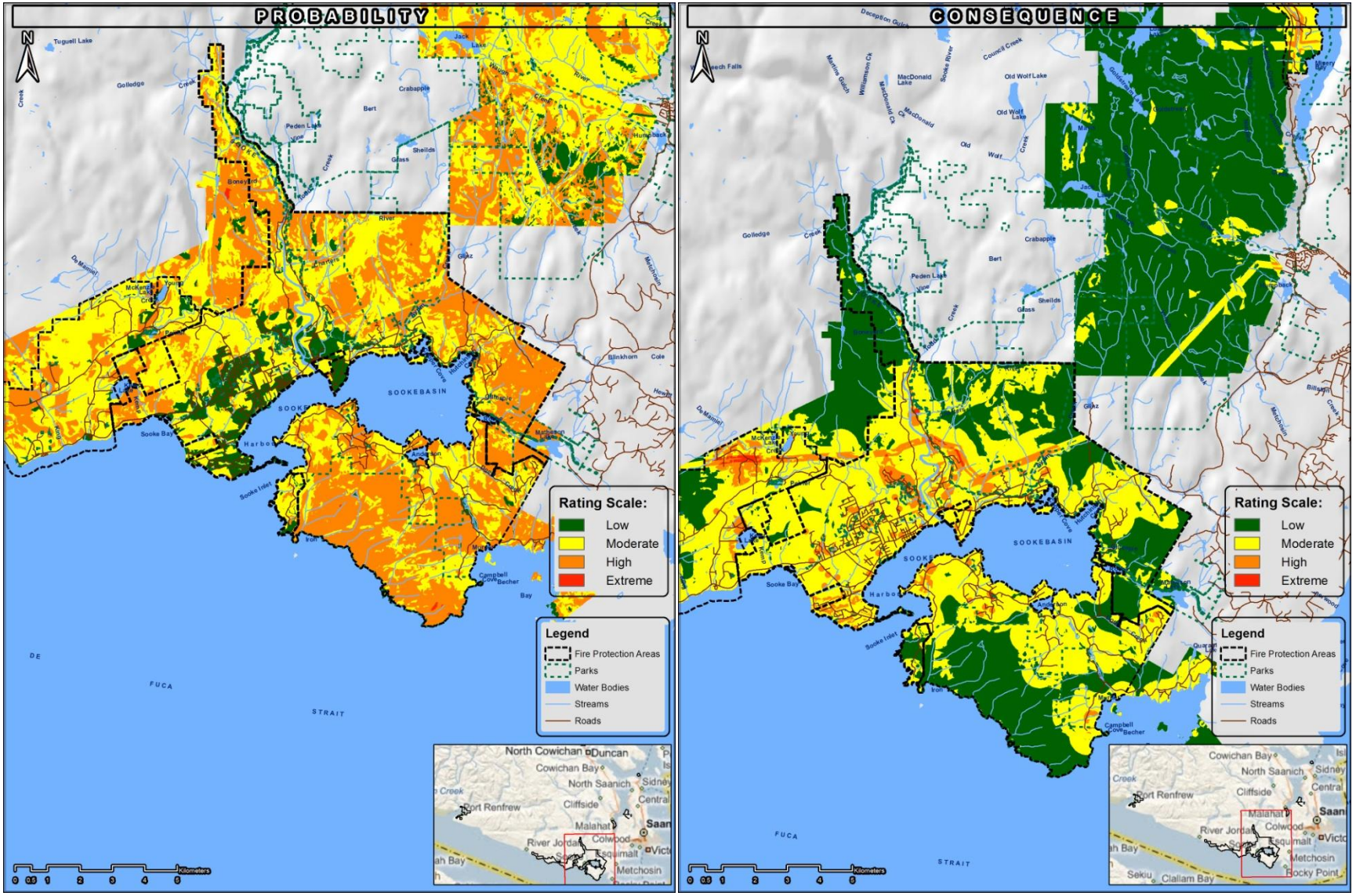
The base case WRMS reflects current conditions for each of the subcomponents, components and ratings shown in Figure 12 according using data available from the Province, the CRD, the District of Sooke and data collected in the field. All map outputs for the WRMS are provided in Appendix 1.

The probability of fire within the District of Sooke is predominantly moderate to high based on expected fire behaviour, ignition and suppression (Map 6). The consequence of wildfire is predominantly moderate with areas of high and extreme (Map 6) driven primarily by critical infrastructure, interface density and evacuation.

Fire risk (Map 7) represents the overall fire risk as a combination of probability and consequence defined as follows:

Fire Risk Matrix

		PROBABILITY>>>>			
		Low	**Moderate**	**High**	**Extreme**
CONSEQUENCE>>>>	**Low**	Low	Low	Low	Moderate
	Moderate	Low	Moderate	High	High
	High	Moderate	High	High	Extreme
	Extreme	Moderate	High	Extreme	Extreme



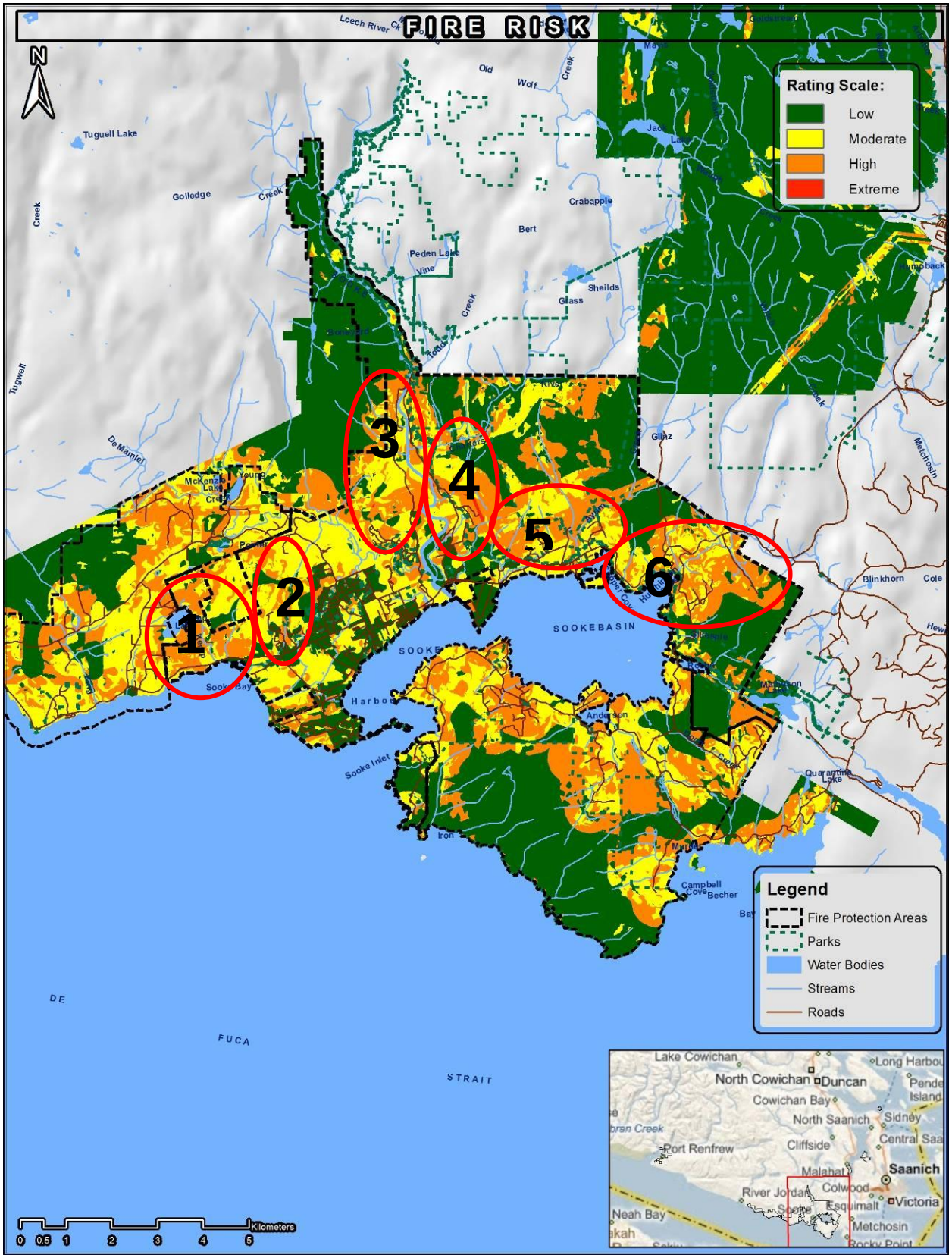
Map 6. Probability of wildfire (left) and consequence of wildfire (right) from the Wildfire Risk Management System.

Map 7 shows the wildfire risk mapping result. The areas circled in red on Map 7 are numbered corresponding to areas with concentrated high wildfire risk, identified as follows:

1. Area west of Erinan Boulevard extending to the municipal boundary;
2. Area east of Henlyn Drive and extending north to Sellars Road;
3. Immediately north of Sunriver Estates and adjacent to Phillips Road;
4. Milnes Landing and north adjacent to Sooke River Road;
5. Saseenos and north; and,
6. Area including Sooke Road, Gillespie Road, Connie Road and Glinz Lake Road.

Two areas are not circled on the map but may be rated high for wildfire risk in the future due to an increased consequence rating once planned developments are completed include Silver Spray and Gillespie Road south of Area 6 (Map 7).

Any out of control wildfire occurring within these high risk areas would, depending on wind direction, also be expected to impact adjacent developed areas primarily due to spotting.



Map 7. District of Sooke Fire Risk from the Wildfire Risk Management System.

6.2.2 WRMS Re-Runs

Based on the objectives rated as consistently high from the stakeholder workshop, we identified four hypothetical mitigation scenarios. These were used to re-run the WRMS in order to see their impact spatially on overall wildfire risk. The four scenarios were:

1. Reducing human ignitions by 50% (reducing ignitions objective).
2. Improving suppression capability by adding water sources in locations that were poorly serviced (improving suppression response objective).
3. Modifying fuels in priority areas across the study area (i.e., 100 m around homes, critical infrastructure and several select fuel treatment areas on Crown land adjacent to structures) (reducing fire behavior, protecting critical infrastructure and homes/structures).
4. Improving egress (evacuation ease) by adding 2-way access in specific subdivisions across the study area (evacuation ease objective).

The following maps show the comparison of the relevant component of the WRMS from the base-case to the re-runs described in points 1 - 4 above.

Map 8 shows the comparison from the base case to re-run 1, a 50% reduction in ignition. Though there is a noticeable change in the ignition maps, there is very little change in the probability component overall. This is because of the localized impact of reducing human ignitions based on historic data. The Wildfire Ignition Probability Predictor and lightning ignitions still contribute to a predominantly moderate ignition probability. The limited sensitivity of the model to a change in human ignition supports our professional judgment that reducing human ignitions, while an important objective, is only part of the answer for improving wildfire protection across the landscape. Ignitions across the District of Sooke are relatively low annually (approximately 17), probably due to the burn regulations, enforcement and public education already in place. It is noted that ignition risk could increase as access to the wildland increases with further trail development. A further reduction would be beneficial and would further reduce the probability of a wildfire occurring but it is not possible to prevent all ignitions, or fires burning into the District, and it only takes one ignition under extreme weather conditions and delayed suppression to create a wildfire emergency.

Map 9 shows the comparison from the base case to re-run 2, additional water sources to improve suppression capability. There is very little change to suppression capability from strategically adding water sources within the District of Sooke. This is because Sooke has already addressed water limitations in most areas. There are, however, other elements of suppression capability that could be improved.

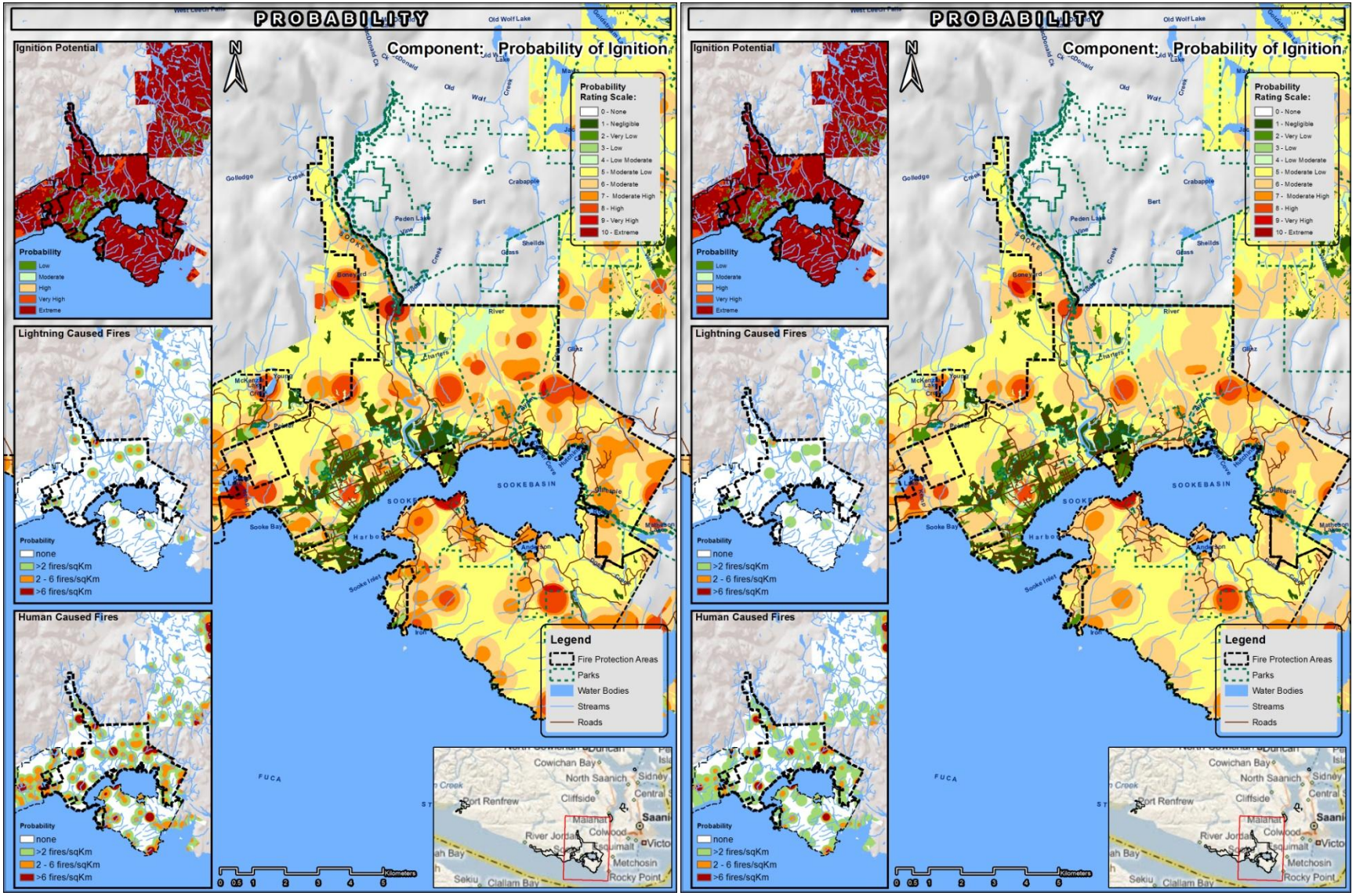
Map 10 shows the comparison from the base case to re-run 3, FireSmarting around homes and critical infrastructure to reduce fire behaviour. Similar to re-run 1, there is little difference in fire probability due to the localized nature of these treatments. However, while fire behavior is not changed extensively, there are other impacts of FireSmarting, including improved protection of

homes and critical infrastructure that would provide substantial value not captured in the WRMS model. Within the District of Sooke it is not appropriate to implement the large fuel treatments necessary to show a substantial change in the fire behavior layer of the model. This is primarily because ecosystems in the CWH biogeoclimatic zone do not generally require restoration due to fire exclusion and forests are adapted to infrequent, stand-replacing or mixed severity fire so fuel treatments would have limited effectiveness over time and would not usually meet broader ecosystem management objectives. Therefore, the focus of any fuel modification should be to improve structure protection and to reduce fire severity in developed areas.

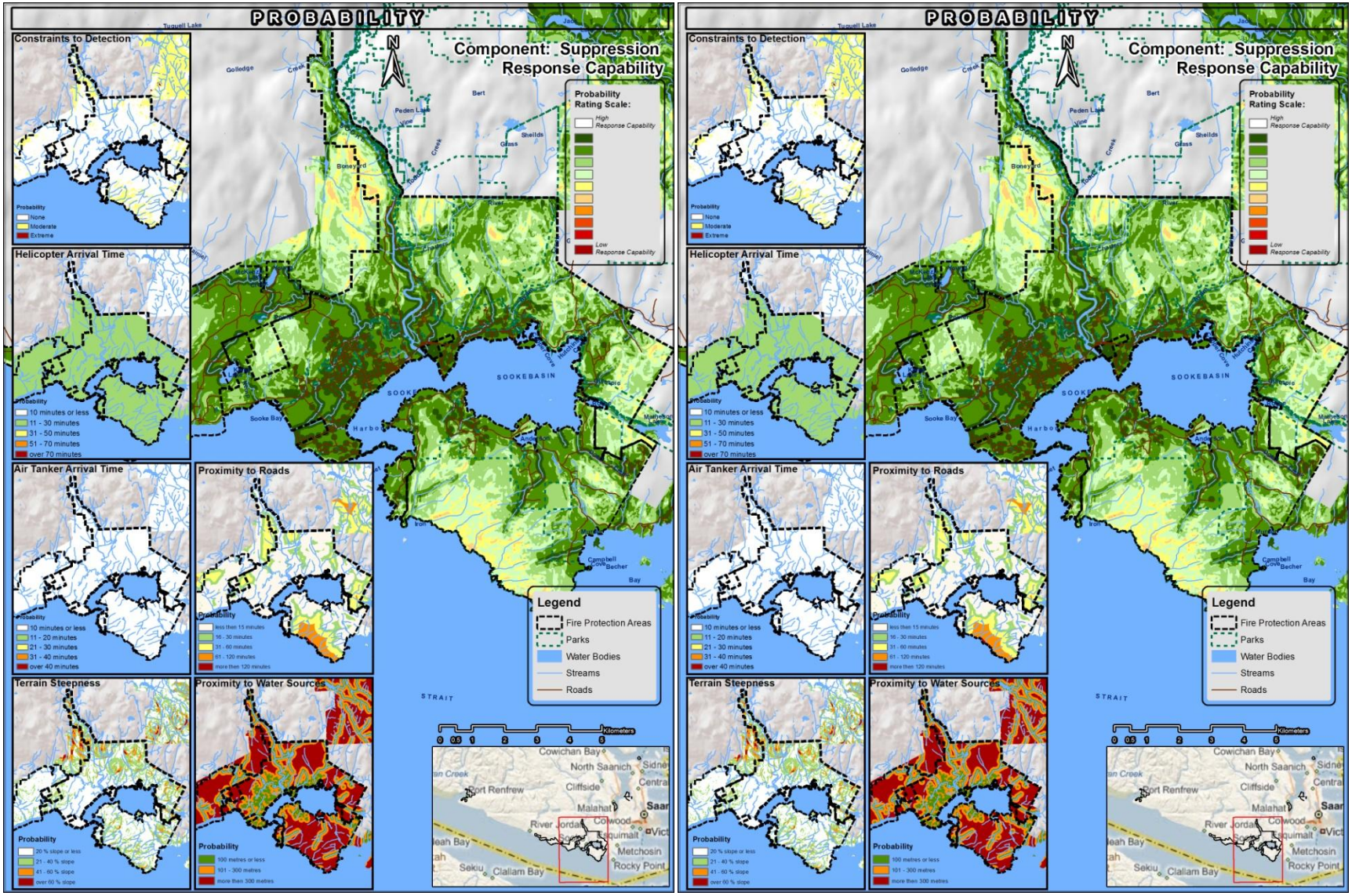
Map 11 shows a comparison of the base case to re-run 4, adding 2-way access routes to selected areas that are currently 1-way. This change has a notable impact on the evacuation ease layer and on the consequence of wildfire component.

In summary, the mitigation alternatives modeled in the WRMS show that the largest spatial impact is achieved by implementing a mitigation alternative that improves access in subdivisions where it is currently limited. Localized impacts are seen by reducing human ignitions and FireSmarting homes and critical infrastructure. There were limited areas to add water access because the District has already put water storage in most areas.

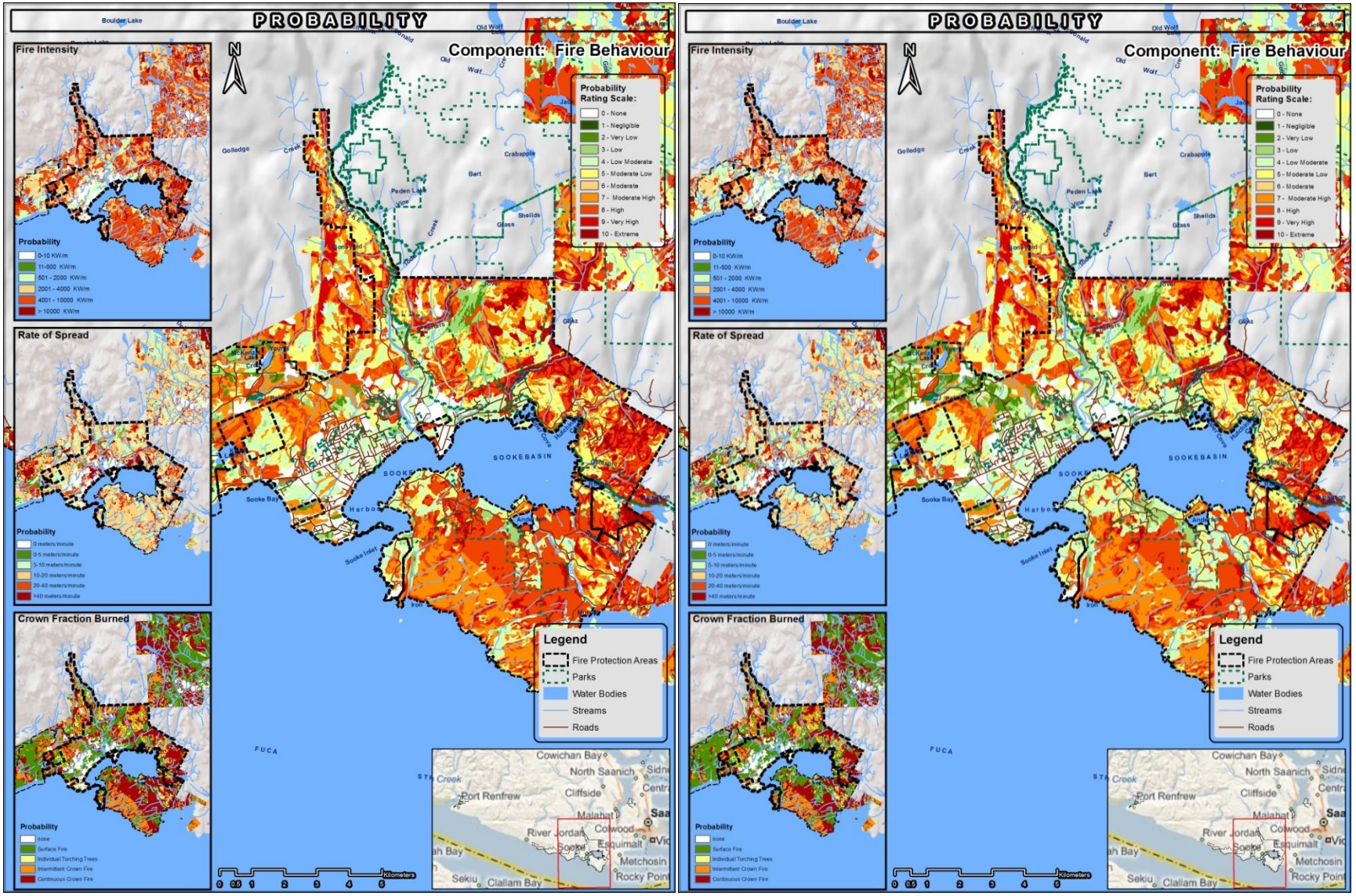
As with the stakeholder workshop analysis, the metrics used to measure changes in these alternatives are not exhaustive and so are not the sole factors we use when determining recommendations for each community. For example, there is more to improving suppression response than just improving access to water and so we still consider other elements of suppression response. The WRMS does show which of our alternatives has the largest spatial impact. We can use this information to further prioritize objectives and to explicitly identify the locations where changes would be most beneficial.



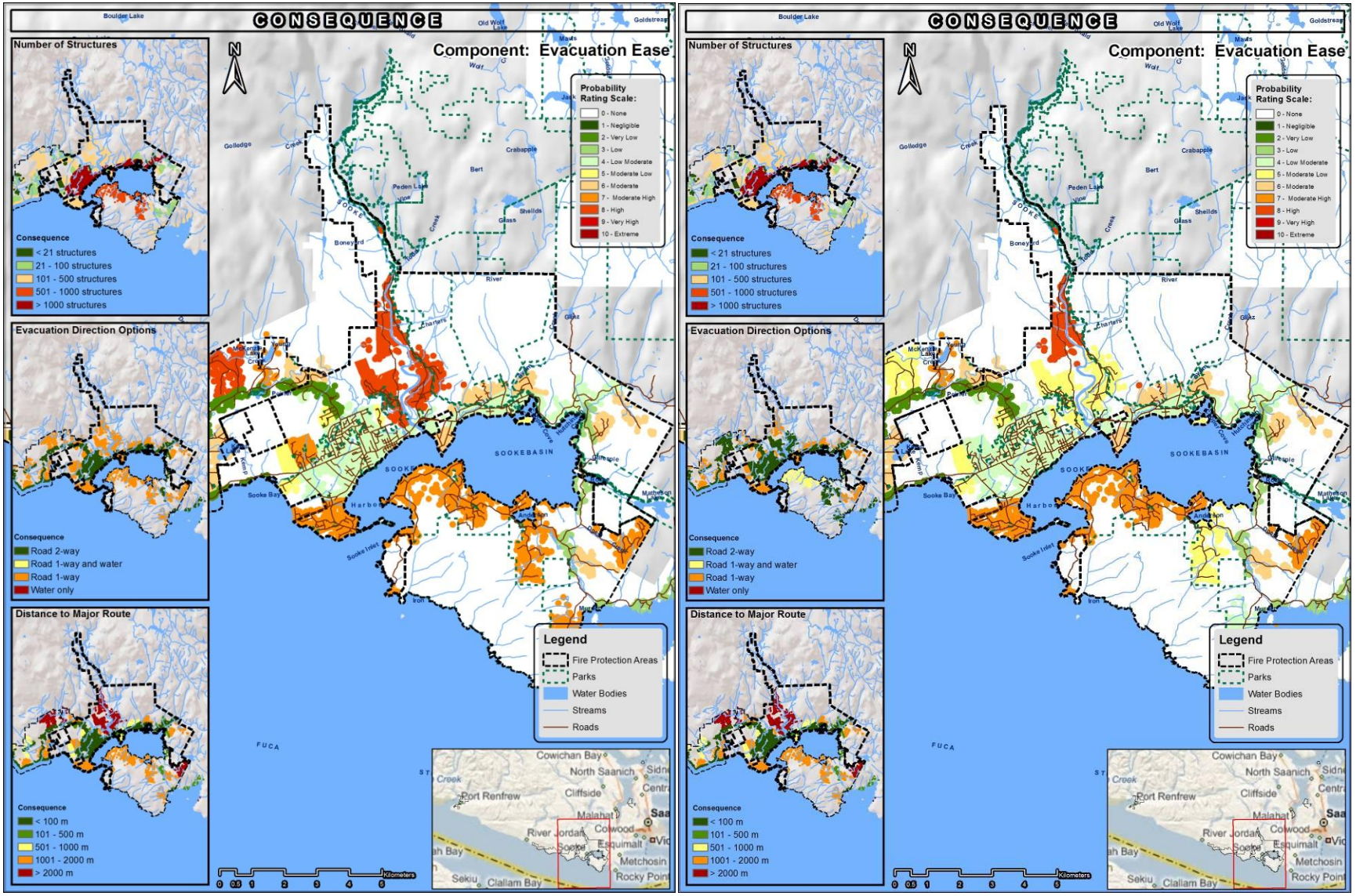
Map 8. Comparison of probability ignition from WRMS base case (left) to reducing ignitions by 50% (Re-Run 1).



Map 9. Comparison of suppression response capability from WRMS base case (left) to improving water access (Re-Run 2).



Map 10. Comparison of fire behaviour from WRMS base case (left) to FireSmarting around homes and critical infrastructure (Re-Run 3).



Map 11. Comparison of evacuation ease from WRMS base case (left) to improving 2-way access in select areas (Re-Run 4).

7.0 Action Plan

The Action Plan consists of the key elements of the WUI continuum and provides recommendations to address each element. In general, recommendations have relevance to more than one key CWPP element (e.g., education recommendations have relevance to structure protection and vegetation management) but we discuss them here under the most applicable topic.

7.1 Communication and Education

7.1.1 Objectives

The communication and education objectives are:

- To improve public understanding of fire risk and personal responsibility by making residents aware that their communities are interface communities and by educating them on actions they can take to reduce fire risk on private property.
- To establish a sense of homeowner responsibility for reducing fire hazards.
- To raise the awareness of elected officials to the resources required and the risk that wildfires pose to communities.
- To continue to work diligently to prevent ignitions during periods of high fire danger.
- To better protect homes and critical infrastructure.
- To educate park and trail users to reduce and report ignitions or reckless activity, and to maintain recreation quality and opportunities.

7.1.2 Current Status

The community within the District of Sooke has some awareness of fire risk, burn bans and local regulations through programs such as the Welcome Wagon, the Fire Chief's regular column in the Sooke Mirror, the Sooke Fire Service's Blog, fridge magnets, home visits and educational outreach undertaken by the Fire Department. Signage on major routes and at the Fire Departments is very good. The community is FireSmart to varying degrees depending on the development style and personal choices but in many of the mixed and isolated interface density areas, individual homeowners could do more to limit the possibility of fire spreading to or from their homes to the forest.

7.1.3 Recommendations

Recommendation 1: The District of Sooke should consider implementing a multi-media education program that maximizes efforts during the wildfire season, and during and after high profile wildfire events, in order to take advantage of heightened public interest during those periods. In addition to those methods already used, the District of Sooke could:
- Upgrade the District of Sooke website to display or link wildfire prevention information more prominently and to display real time information on fire bans and high fire danger (http://www.bcforestfireinfo.gov.bc.ca/), to link FireSmart information and to link to the Sooke Fire Rescue Service blog for real time local information.
- Expand Fire Department media activities to include the new Sooke Voice News publication and, if established, the proposed community radio station (Stickleback FM).
- Review and update wildfire preparedness education in elementary schools.
- Utilize social media such as Facebook and Twitter to communicate fire bans, high fire danger days, wildfire prevention initiatives and other real time information.
- Provide FireSmart education materials at the point of issuing building permits so that people know the fire hazard where they are building and what they can do to reduce those hazards.
- Use fridge magnet lists to communicate evacuation tips and the essentials needed.

High Priority - Estimated cost: see Recommendation 2.

Recommendation 2: The District of Sooke should consider employing a Fire Prevention Officer to deliver education programs.
High Priority - Estimated cost: $70,000 annual.

Recommendation 3: To target visitors and park/trail users, the District of Sooke should consider working with BC Parks and CRD Parks to post signage, pamphlets and posters with details of how to report ignitions (911) and reckless behaviour (e.g., throwing cigarette butts) (monitored reporting line at Fire Department) both on trails and on roadways to encourage reporting. Trail signage should include trail names so that users can identify the location of the report. Notably, high use trails:
- The Galloping Goose
- CRD Regional Parks (Sooke Potholes Regional Park, Sea to Sea Regional Park [trails under development])
- BC Provincial Parks (Sooke Potholes Provincial Park, Sooke Mountain Park [trails under development])

High Priority - Estimated cost: $ 5,000 + maintenance to be borne by managing agencies.

Recommendation 4: The District of Sooke should consider developing a communications plan for emergency administration, community members and the media. The plan should identify who is responsible for delivering reliable and timely information during disasters and how this would be achieved if power and telephone communication were unavailable. The plan should also identify contacts for any local, unofficial individuals or groups that would be helpful during an emergency.
High Priority – Estimated cost to be within current operations.

7.2 Structure Protection

7.2.1 Objectives

The objectives for structure protection are:

- To improve public understanding of fire risk and personal responsibility.
- To protect homes/structures and critical infrastructure.
- To improve evacuation ease and suppression response.
- To develop policy tools to adopt FireSmart standards over the next five years and to encourage private homeowners to voluntarily adopt FireSmart on their properties.

7.2.2 Current Status

Homes and subdivisions within the District of Sooke vary in terms of whether they meet FireSmart standards for construction or vegetation around homes. Most homes in the District do have rated roofs, however homes are often very close to flammable vegetation or constructed with fire vulnerable siding (Figure 13). Fire research indicates that roofing, adjacent burnable materials and landscaping play the greatest role in structure ignitability. There is currently no wildfire vulnerability standard for building materials used in the District of Sooke. In areas of concern, adjacent vegetation is sometimes in contact with roofs, roof surfaces are sometimes covered with litter fall and leaves from nearby trees, open decks are common and combustible materials are sometimes stored within 10 m of residences. Propane tanks and firewood stored within 10 m of homes are considered hazardous from a structure ignition and firefighter safety perspective. Additionally, critical infrastructure such as the water treatment facility, firehall #2, and École Poirier Elementary are close to flammable vegetation. There are two main avenues for FireSmarting a structure: 1) change the vegetation type, density, and setback from the structure (addressed in Section 7.4); and, 2) change the structure to reduce vulnerability to fire and reduce the potential for fire to spread to or from a structure (addressed here).

Figure 13. Home with coniferous vegetation within 10 m (left), structure with flammable siding (right).

The results of fire behaviour modeling under extreme weather conditions indicated that fuel types in and around the District of Sooke could support fire intensities > 4,000 kw/m^2 and, potentially crown fire throwing burning embers, which we can assume would cause major damage to structures in the absence of successful fire suppression. While most homes in the District are constructed from FireSmart materials, there are exceptions and the rapid rate of development means that having FireSmart bylaws and policy in place could provide substantial benefit from a fire protection perspective. The Fire Chief does review subdivision plans prior to their approval, which is a positive step towards enhancing fire protection within new subdivisions but FireSmart and NFPA standards design could be further supported in bylaw.

7.2.3 Recommendations

Recommendation 5: Consider changes to District policy that would improve the FireSmart conditions and suppression access for interface areas. There are several ways in which this can be achieved through different bylaws and guidelines; however it is recommended that NFPA 1142 (Water Supplies for Suburban and Rural Fire Fighting) and 1144 (Protection of Life from Wildfire) standards be used to develop specifications. An example of how such changes could be incorporated is through the:
- **Official Community Plan**: Statement of support for initiatives, Development Permit Exemptions, Wildfire Hazard Development Permit Area Guidelines (with checklist and requirement for a professional report assessing developments for FireSmart vegetation and access/egress).
- Section 219 Covenants in Wildfire DP Areas.
- Subdivision Servicing Specifications: Fire flows/water delivery system, fire protection water storage systems and access/egress. New subdivisions should be developed with multiple access points that are suitable for evacuation and the movement of emergency response equipment based on threshold densities of houses and vehicles within the subdivisions. Gated emergency access roads or trails may be alternatives to developing secondary public access roads where constrained. Consideration should be given to requiring roadways to be placed adjacent to forested lands, rather than homes being adjacent to forest (e.g., ring roads).
- Sprinkler Bylaw: Sprinklers.
- Zoning Bylaw: Siting of structures in Wildfire Hazard DP Areas (including critical infrastructure).
- Building Bylaw: Roofing, building materials in Wildfire Hazard DP Areas.
Moderate-High Priority: Estimated cost to be within current operations.

7.3 Emergency Response

7.3.1 Objectives

The objectives for emergency response are:

- To improve response times to outer areas of the District of Sooke.
- To improve emergency access and evacuation ease throughout the District.
- To further develop communication and cooperation between adjacent fire departments, the Regional District and the MFLNRO.
- To maximize community resilience to a wildfire event.

7.3.2 Current Status

The District of Sooke has a well staffed and trained, primarily volunteer fire department with approximately 50 volunteers and 5 paid staff. The rapid growth in the District suggests that the department may need to transition to a predominantly career department in the future.

The fire department has had interface firefighting experience and experience with the MFLNRO incident command structure. The crew has S100 training and officers have S215. Following the 2003 Kelowna fires (which a Sooke crew attended), the fire department developed their own portable sprinkler kit. In addition the department has adequate interface firefighting equipment for their crew and all trucks have Compressed Air Foam (CAF) systems. Two fire halls service the District and both have back-up power systems to be fully functional during a power outage. Response times within the District's core are within 15 minutes. However, response times to the outer reaches of the District can be as long as 45 minutes (e.g., Silverspray). Currently the East Sooke volunteer fire department is under contract to provide fire protection to Silverspray.

Hydrants supply water for fire protection to approximately 50% of homes in the District. Dry hydrants, drafting ponds and water storage tanks are in place in most populated areas of the District. However, there are some areas where supply is limited (e.g., Sellars Road). The Sooke Fire Department, in cooperation with East Sooke, Otter Point, Shirley/Jordan River and Metchosin Fire Departments, are working towards Superior Tanker Shuttle Service Accreditation, which is a recognized equivalency to hydrant protection by the Fire Underwriters Survey.

Access and evacuation ease within the District is variable. A number of subdivisions only have 1-way in and out access. Some roads are narrow and would be difficult for emergency vehicles to access if private vehicles were evacuating at the same time. Additionally, some properties have gated access. The District of Sooke does not currently have an evacuation plan.

A network of large natural area parks including the Sea to Sea Regional Park, Sooke Mountain Provincial Park, Sooke Potholes Provincial Park and the Sooke Potholes Regional Park will provide extensive access to the wildland once construction of the proposed trail networks is completed. Part of the Galloping Goose Trail is located along the western edge of the Sooke Potholes and Sea to Sea Regional Parks. Emergency access and evacuation planning has not been formalized for these areas.

7.3.3 Recommendations

Recommendation 6: The District of Sooke should consider developing an Evacuation Plan that identifies:
- Evacuation routes to be marked.
- Safe zones.
- Responsibilities and resources for coordinating and policing evacuation.
- Individuals requiring assistance.
- Evacuation of parks.
- The location of any large pets or livestock requiring evacuation and where they can be evacuated to.
- Potential locations of evacuation centres in adjacent communities, and where and how services would be provided to evacuees.
- Volunteers or volunteer organizations such as Citizens on Patrol, Blockwatch or Service Clubs that can assist during and/or after evacuation.

High Priority: Estimated costs to be within current operations.

Recommendation 7: Where applicable to improving emergency response access, the Fire Department should consider acquiring keys to access forestry roads, parks or private property.
Moderate Priority: Estimated cost to be within current operations.

Recommendation 8: The District of Sooke should consider opportunities for improving emergency access using park and trail networks when next reviewing the Parks and Trails Master Plan.
High Priority: Estimated cost to be within current operations.

Recommendation 9: The District of Sooke should consider working with CRD Parks and BC Parks to develop multi-agency emergency access options and agreements, and coordinated evacuation strategies for the large natural area parks (Sea to Sea Regional Park, Sooke Mountain Provincial Park, Sooke Potholes Provincial Park and Sooke Potholes Regional Park). Signage (see Recommendation 3), evacuation warning systems and park staff evacuation training are recommended elements for consideration in planning work.
High Priority: Estimated cost to be within current operations and borne by relevant managing jurisdictions.

Recommendation 10: In those areas developed without 2-way access, the District of Sooke should consider working with developers to improve access as growth continues. Areas where building 2-way access would have the greatest impact according to initial modeling results are Sun River Estates, Spiritwood Estates and the Brule Drive area on the eastern side of Sooke River Road. A second access through Erinan may also be of benefit if the planned development expands north beyond its current road footprint. In developments such as Atwater Landing (formerly Grouse Nest) and Silver Spray, where a second direction of access is likely not possible, it will be critical to have adequate road widths and turnarounds to enable emergency vehicles access while personal vehicles evacuate (implemented through Recommendation 4). Providing a secondary, emergency-only access trail or road that is gated could be an alternative to developing a secondary public access route in smaller or constrained subdivisions.
High Priority: Construction costs borne by external parties.

Recommendation 11: The District of Sooke should consider supporting options for landowners to extend municipal water or install water storage for firefighting at Sellars Rd where there are currently no water sources.
Moderate Priority: Construction costs borne by external parties.

Recommendation 12: The District of Sooke should consider establishing satellite halls staffed by 6-8 volunteers to improve response times in outlying areas such as Silver Spray, Atwater Landing (formerly Grouse Nest) if development proceeds and potentially Sun River Estates. A low cost suite attached to the hall could be provided to one volunteer in exchange for maintenance, security and answering emergency calls.
High Priority: Estimated costs for construction, furnishing and equipment approximately $600,000 per hall.

Recommendation 13: The District of Sooke should consider working with the CRD to establish an integrated 'Wildfire Suppression Group', consisting of representatives from each Juan de Fuca CRD Volunteer Fire Department, the Sooke Fire Department, mutual aid municipal departments, Wildfire Protection Branch, CRD Water and CRD Parks Suppression Crews that meets annually to establish the compatibility of equipment, identify opportunities for sharing resources, establish equipment caches to fill gaps, and to plan joint training exercises.
High Priority: Estimated cost to be within current operations.

Recommendation 14: The District of Sooke should consider developing a post-fire restoration plan for municipal and Crown land within the District to manage the potential spread of weeds, restoration of sensitive ecosystems and restoration of surface water intakes for drinking water. This would require sensitive ecosystem mapping and weed mapping for the District.
Low Priority: Estimated cost of mapping and reporting $30,000 - $70,000 depending on mapping resolution.

7.4 Vegetation (Fuel) Management

Vegetation or fuel management is generally considered a key element of the FireSmart approach. Fuel management is the planned manipulation and/or reduction of living and dead forest fuels for land management objectives (*e.g.,* hazard reduction). The purpose of altering vegetation for fire protection must be evaluated against the other key CWPP elements outlined above to determine its necessity.

Within the District of Sooke, the outcomes of the stakeholder workshop and the WRMS modelling indicate that modifying fire behaviour through vegetation management would be worthwhile where it contributes to home and critical infrastructure protection.

Fuel management can be undertaken with a very minimal negative or even positive impact on the aesthetic or ecological quality of the surrounding forest and does not mean removing most of the trees. The focus for fuel management in the interface is not necessarily to stop fire, but to ensure that fire severity is low enough that the fire's damage is limited. For example, treating around your home may prevent structure ignition due to direct flame contact – then the home's ability to survive the fire would come down to whether construction materials can survive ember attack. Reducing surface and ladder fuels in the forest around your home may mean that some of the larger, more fire-resistant trees can survive the fire. The intent of these fuel modification treatments is not to stop the fire, but to reduce fire severity.

7.4.1 Objectives

The vegetation management objectives are:

- To proactively reduce potential fire behaviour thereby minimizing adverse impacts on structures.
- To protect homes and critical infrastructure.
- To FireSmart vegetation within 100 m of homes and structures.
- To encourage BC Hydro to maintain fuels beneath power lines in a low hazard state.

7.4.2 Current Status

The developed interface areas within the District of Sooke are predominantly surrounded by M2 (mixed forest), C7 (open forest), and O1 -tall grass fuel types (Map 2 and Table 1). Some of the outer areas of the district are surrounded by the more hazardous C3 fuel type (Map 2 and Table 1). As previously mentioned, landscape level fuel breaks are not likely to be ecologically appropriate or cost effective in the Sooke's Coastal Western Hemlock ecosystems. However, a FireSmart approach to vegetation management within 100 m of structures is considered beneficial in order to improve defensible space around structures, and to reduce the likelihood that a house fire could spread to adjacent forests. In addition, infestation of Scotch broom is prevalent in the area, particularly under BC hydro right-of-ways and on private cleared properties. Broom can burn very rapidly and intensely, therefore it is highly undesirable from a wildfire suppression perspective.

Coniferous (and mixed) forest fuels within 100 m of structures were identified throughout the District and prioritized for FireSmart or fuel treatment. The majority of area identified is on private land. All coniferous and mixed fuels were identified and prioritized regardless of current hazard condition because fuel conditions change over time and FireSmart requires ongoing maintenance. **Given that much of the C7, C5 and M2 stands (Table 1) will already be in a FireSmart condition, the actual area requiring action is likely to be much smaller than that indicated on Map 12. Ground truthing will be required prior to acting on any treatment priority areas.**

Map 12 defines five priority treatments. Each treatment is either a 'C' for Crown, or 'P' for private and priority is defined as follows:

C1: Priority 1 treatments on Crown land to FireSmart around critical infrastructure.

C2: Priority 2 treatments on Crown land to implement fuel breaks in continuous forestland adjacent to structures.

C3: Priority 3 treatments on Crown land to enhance FireSmart treatments adjacent to private land.

P1: Priority 1 treatments on private land to FireSmart around critical infrastructure.

P2: Priority 2 treatments on private land to FireSmart around private structures.

FireSmart proposes the following zones for vegetation modification (Figure 14):

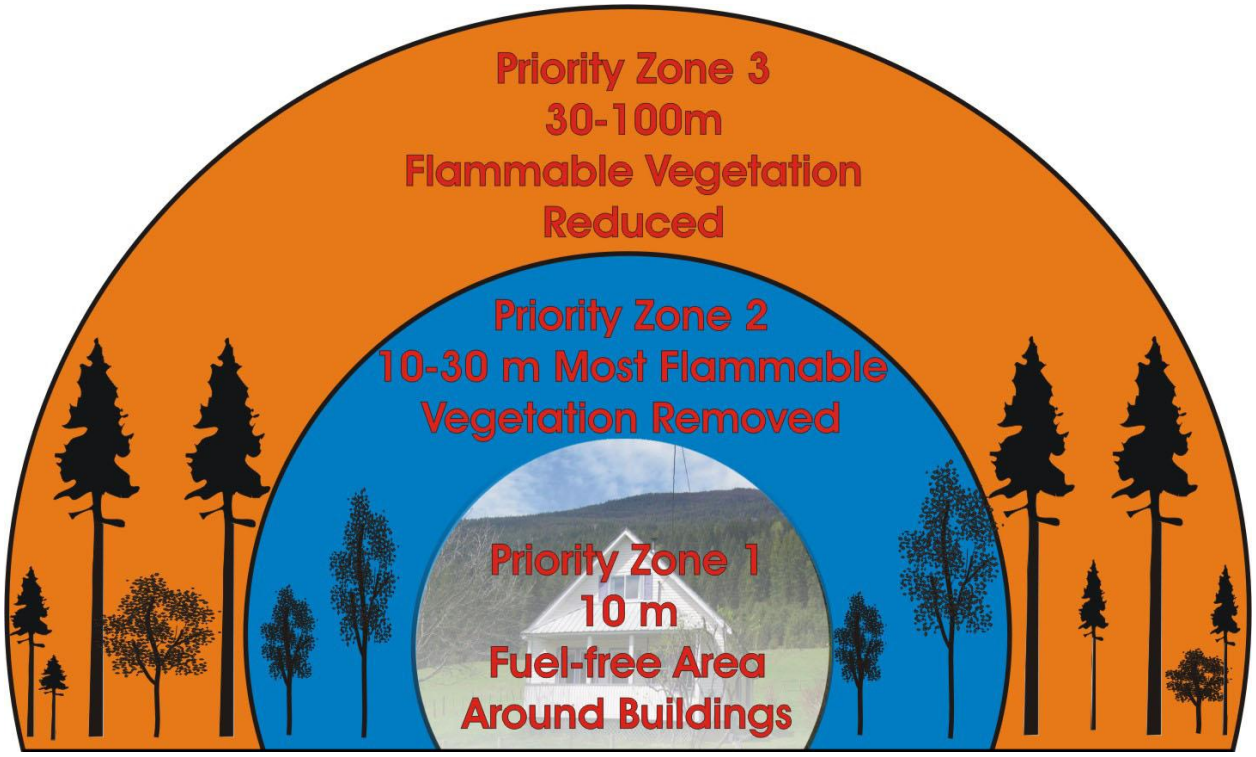
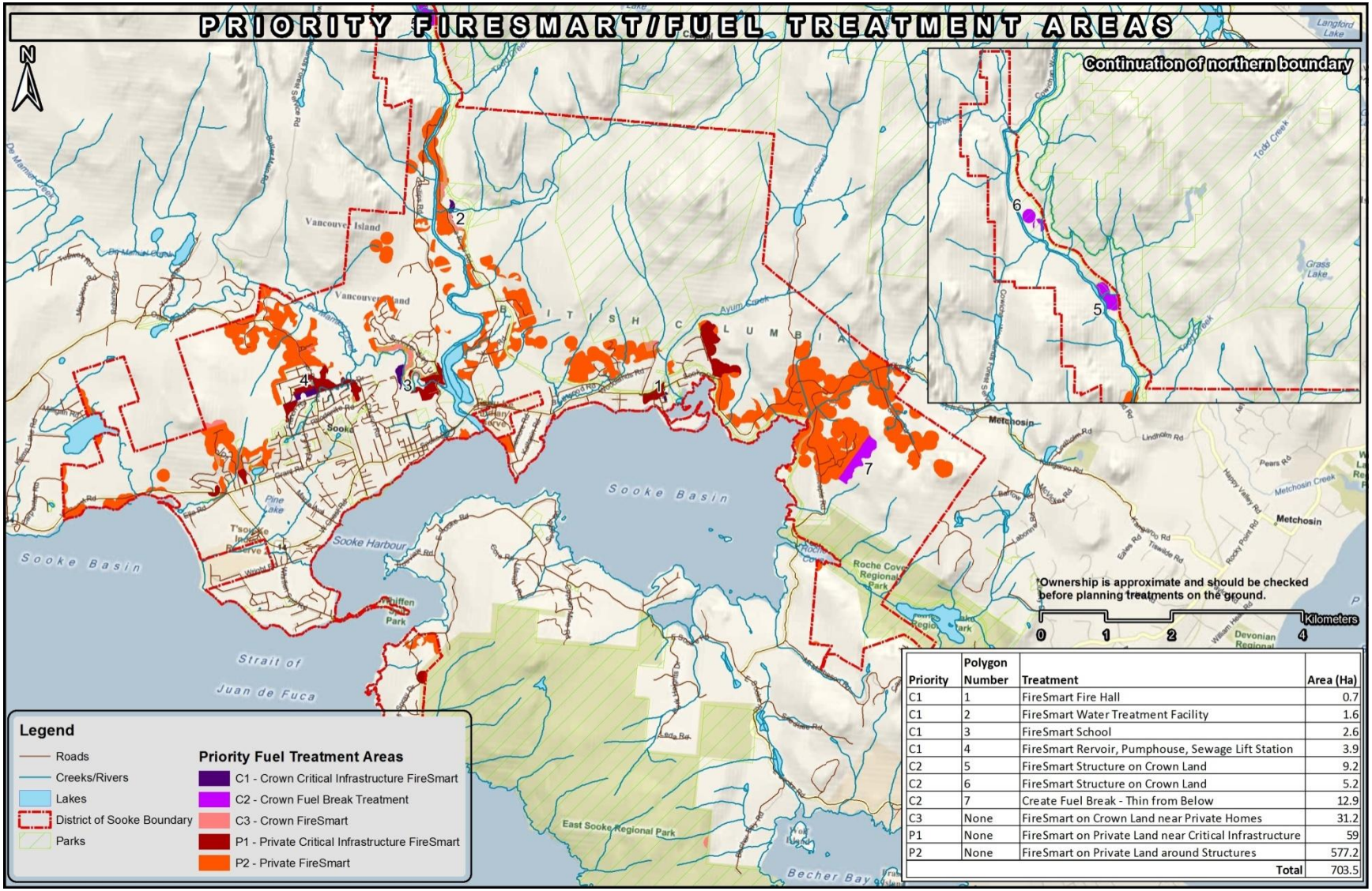


Figure 14. FireSmart Priority Zones

1. **Priority Zone 1** is a 10 m fuel free zone around structures. This ensures that direct flame contact with the building cannot occur and reduces the potential for radiant heat to ignite the building. While creating this zone is not always possible, landscaping choices should reflect the use of less flammable vegetation such as deciduous bushes, herbs and other species with low flammability. Coniferous vegetation such as juniper or cedar bushes and hedges should be avoided, as these are highly flammable. Try to keep any vegetation in this zone widely spaced and well setback from the house.

2. **Priority Zone 2** extends from 10-30 m from the structure. In this zone, trees should be widely spaced 5-10 m apart, depending on size and species. Tree crowns should not touch or overlap. Deciduous trees have much lower volatility than coniferous trees, so where possible deciduous trees should be preferred for retention or planting. Trees in this area should be pruned as high as possible especially where long limbs extend towards buildings. This helps prevent a fire on the ground from moving up into the crown of the tree or spreading to a structure. Any downed wood or other flammable material should also be cleaned up in this zone to reduce fire moving along the ground.

3. **Priority Zone 3** extends from 30-100 meters from the home. The main threat posed by trees in this zone is spotting, the transmission of fire through embers carried aloft and deposited on the building or adjacent flammable vegetation. To reduce the threat, cleanup of surface fuels as well as pruning and spacing of trees should be completed in this zone.



Priority	Polygon Number	Treatment	Area (Ha)
C1	1	FireSmart Fire Hall	0.7
C1	2	FireSmart Water Treatment Facility	1.6
C1	3	FireSmart School	2.6
C1	4	FireSmart Rervoir, Pumphouse, Sewage Lift Station	3.9
C2	5	FireSmart Structure on Crown Land	9.2
C2	6	FireSmart Structure on Crown Land	5.2
C2	7	Create Fuel Break - Thin from Below	12.9
C3	None	FireSmart on Crown Land near Private Homes	31.2
P1	None	FireSmart on Private Land near Critical Infrastructure	59
P2	None	FireSmart on Private Land around Structures	577.2
		Total	703.5

Map 12. Prioritized fuel treatment areas for the District of Sooke.

7.4.3 Recommendations

Recommendation 15: The District of Sooke should consider implementing FireSmart treatments in forest adjacent to critical infrastructure identified as Priority C1 on Map 12. This treatment should be repeated every 10 – 15 years unless forests are converted to a deciduous type.
High Priority: Estimated cost $2,000 – 12,000/ha.

Recommendation 16: The District of Sooke should consider implementing FireSmart Priority Zone 2 treatments in areas identified as Priority C2 on Map 12. This treatment should be repeated every 10 – 15 years unless forests are converted to a deciduous type.
Moderate Priority: Estimated cost $12,000 - $20,000/ha.

Recommendation 17: The District of Sooke should consider implementing FireSmart treatments identified as Priority C3 if private landowners implement FireSmart on adjacent Priority P2 polygons. This treatment should be repeated every 10 – 15 years unless forests are converted to a deciduous type.
Moderate Priority: Estimated cost $2,000 - $12,000/ha.

Recommendation 18: The District of Sooke should consider encouraging residents, through education initiatives outlined in Recommendation 1, to implement FireSmart treatments identified as Priority P1 and P2. This should also incorporate information regarding the location on of firewood storage and propane tanks farther than 10 m from structures.
Moderate Priority: Costs borne by private parties.

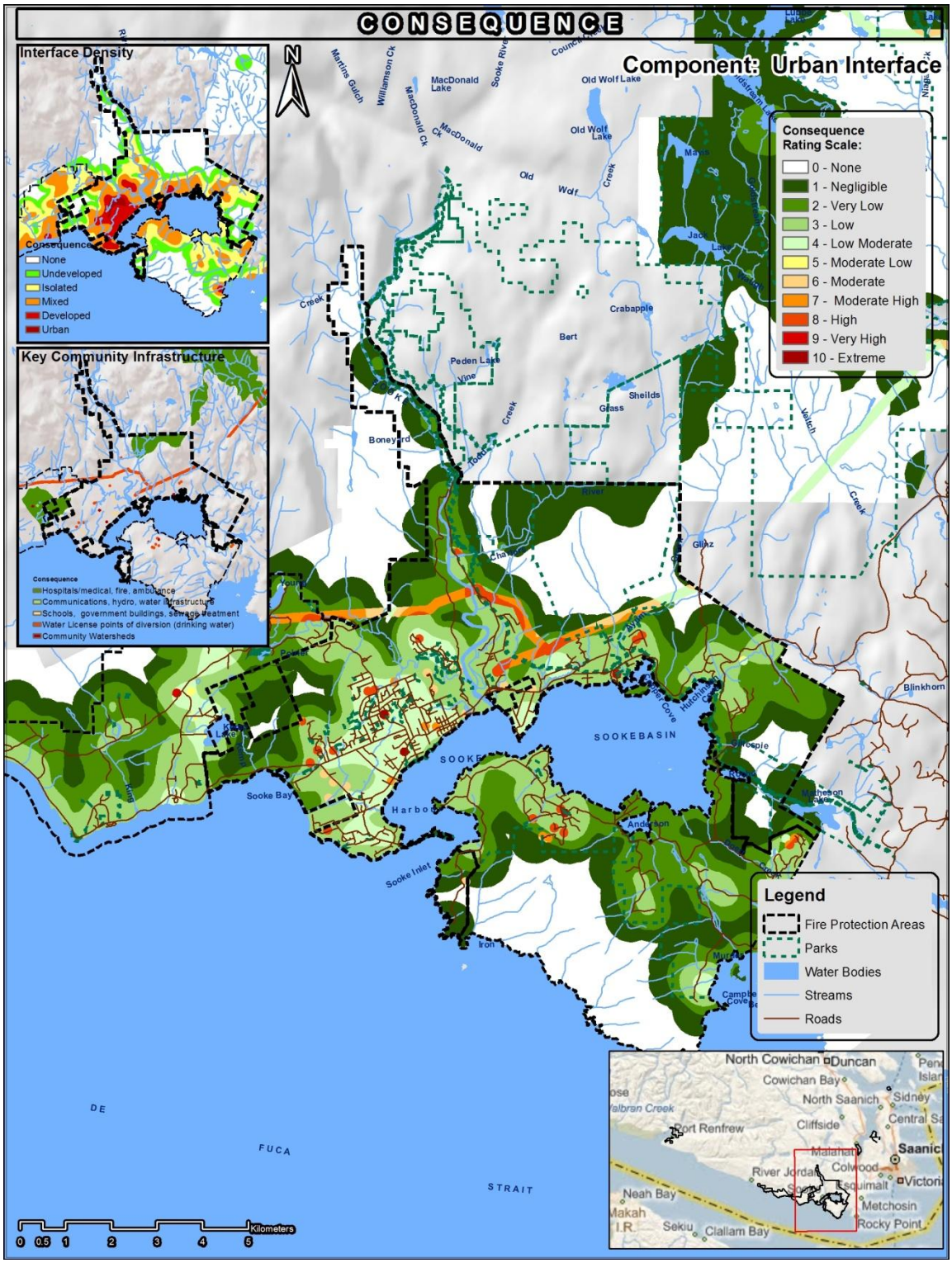
Recommendation 19: The District of Sooke should consider, through initiatives outlined in Recommendation 5, requiring developers to undertake FireSmart vegetation treatments of subdivisions prior to construction, including any forested parcels to be given to the municipality as park or greenspace. FireSmart should not be allowed to be interpreted as cleared land by developers.
Moderate Priority: Costs borne by outside parties.

Recommendation 20: The District of Sooke should consider working with BC Hydro/BC Transmission Corporation to ensure that: 1) transmission infrastructure can be maintained and managed during a wildfire event; and 2) the right-of-way vegetation management strategy considers mowing broom beneath transmission lines that contributes to unacceptable fuel loading and diminishes the ability of the right-of-way to act as a fuel break.
High Priority: Costs borne by outside parties.

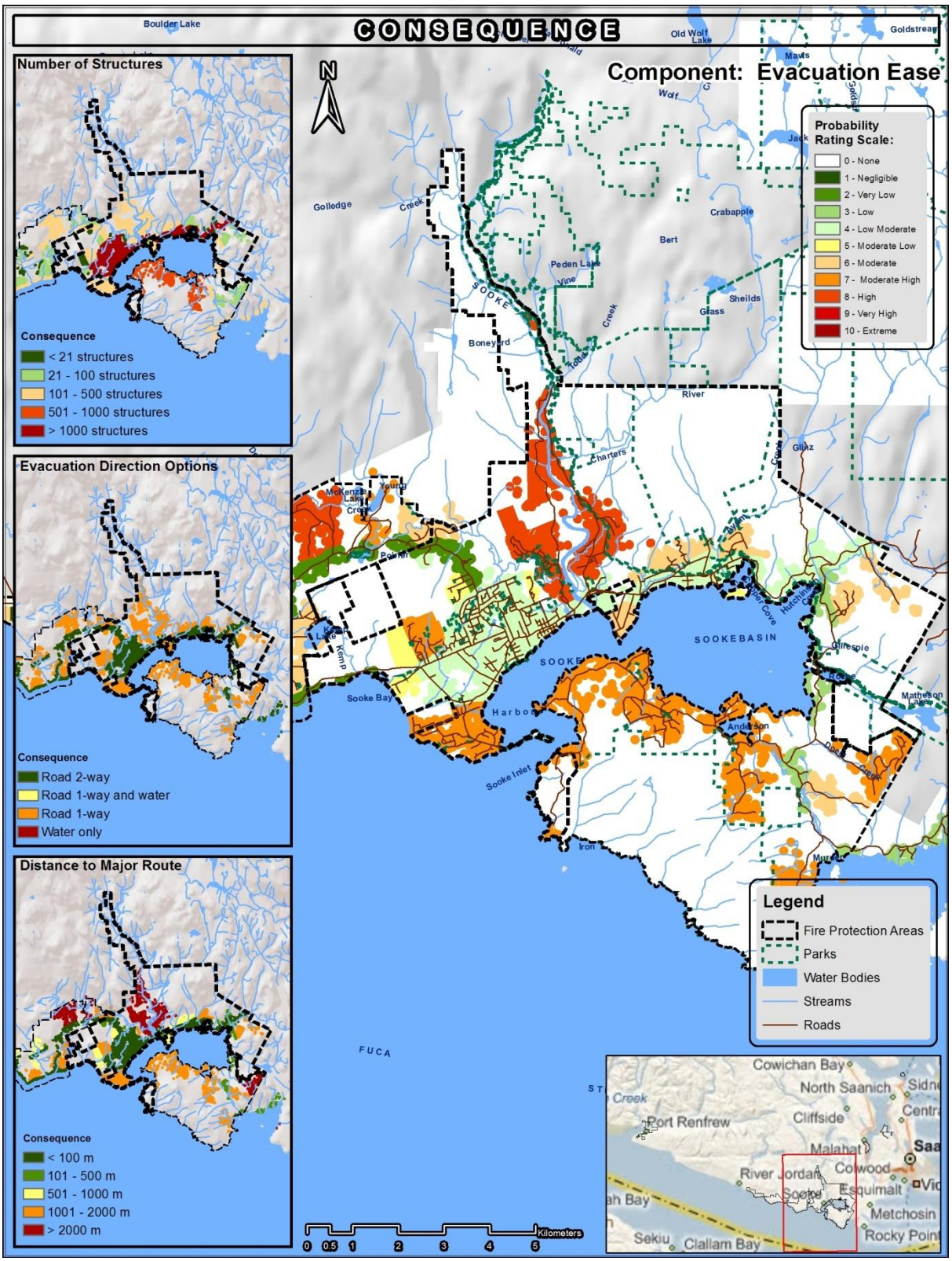
Recommendation 21: The District of Sooke should consider working with BC Parks, CRD Parks and the BC Ministry of Transportation and Infrastructure to maintain vegetation within their right-of-ways/properties adjacent to roads, trails and campsites in a low fuel hazard condition (i.e., mowed, low surface fuel/shrub loads and low coniferous tree density).
High Priority: Costs borne by outside parties.

Appendix 1 – Wildfire Risk Management System Outputs

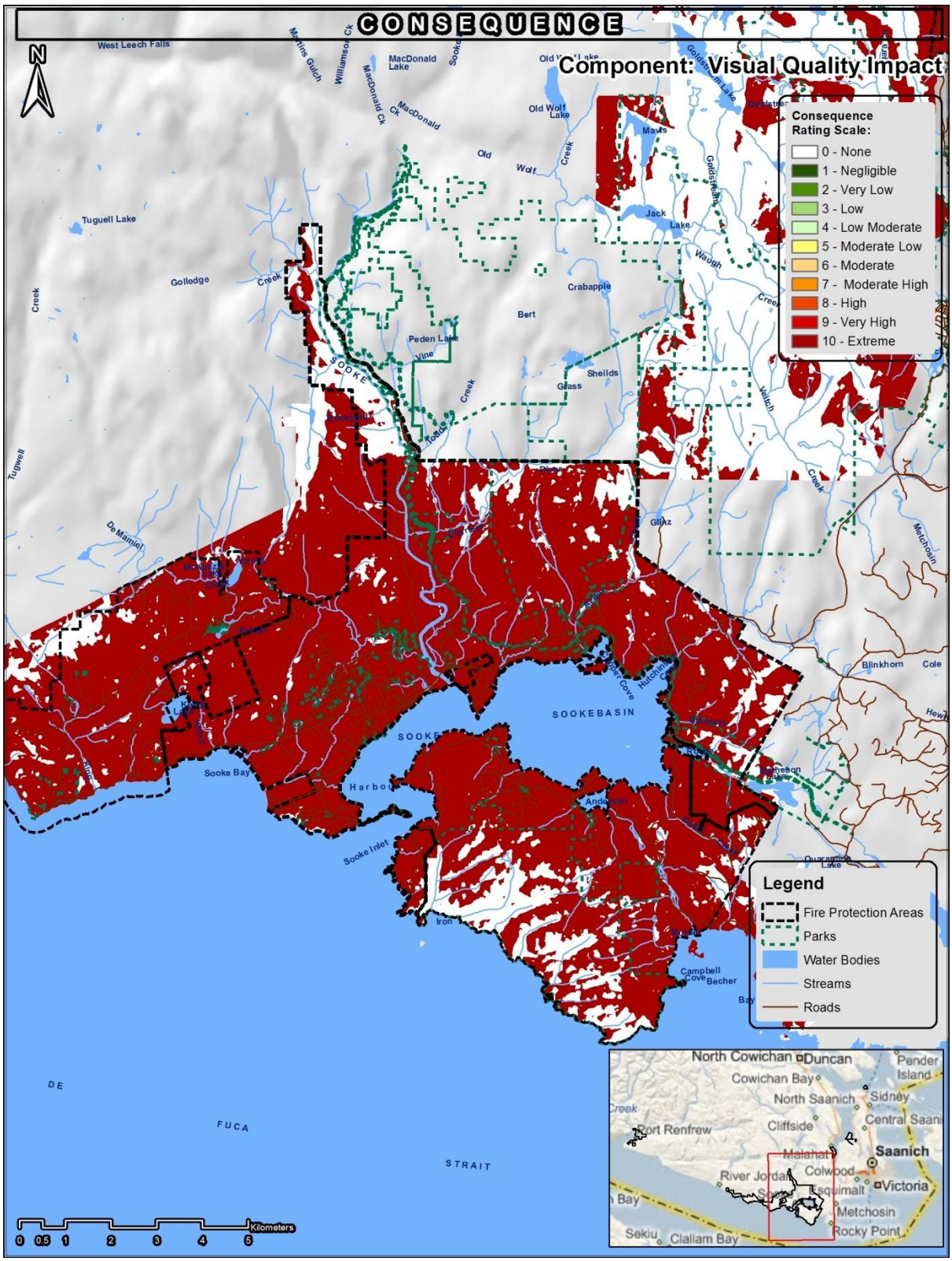
Urban Interface (Consequence)



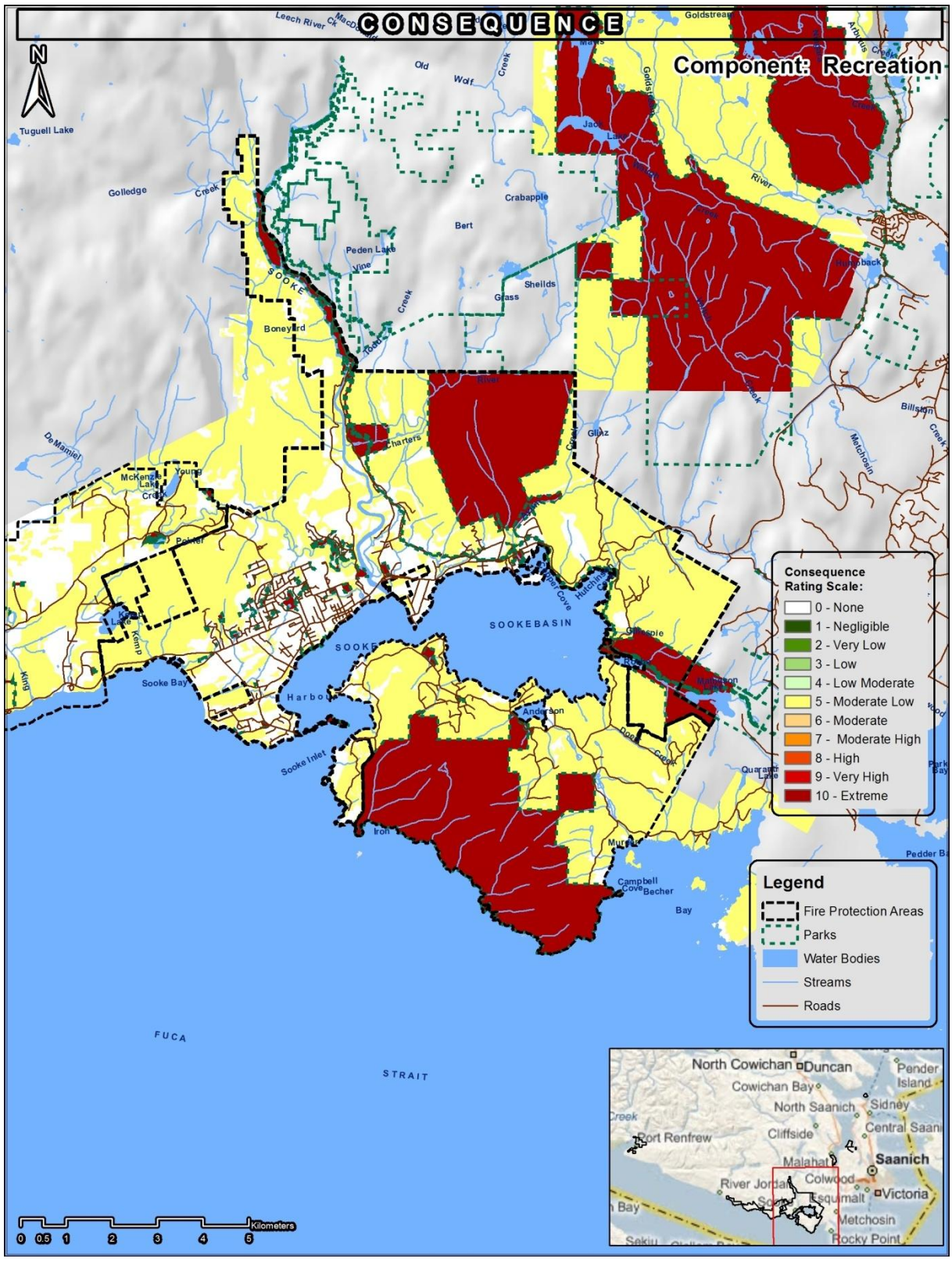
Evacuation Ease (Consequence)



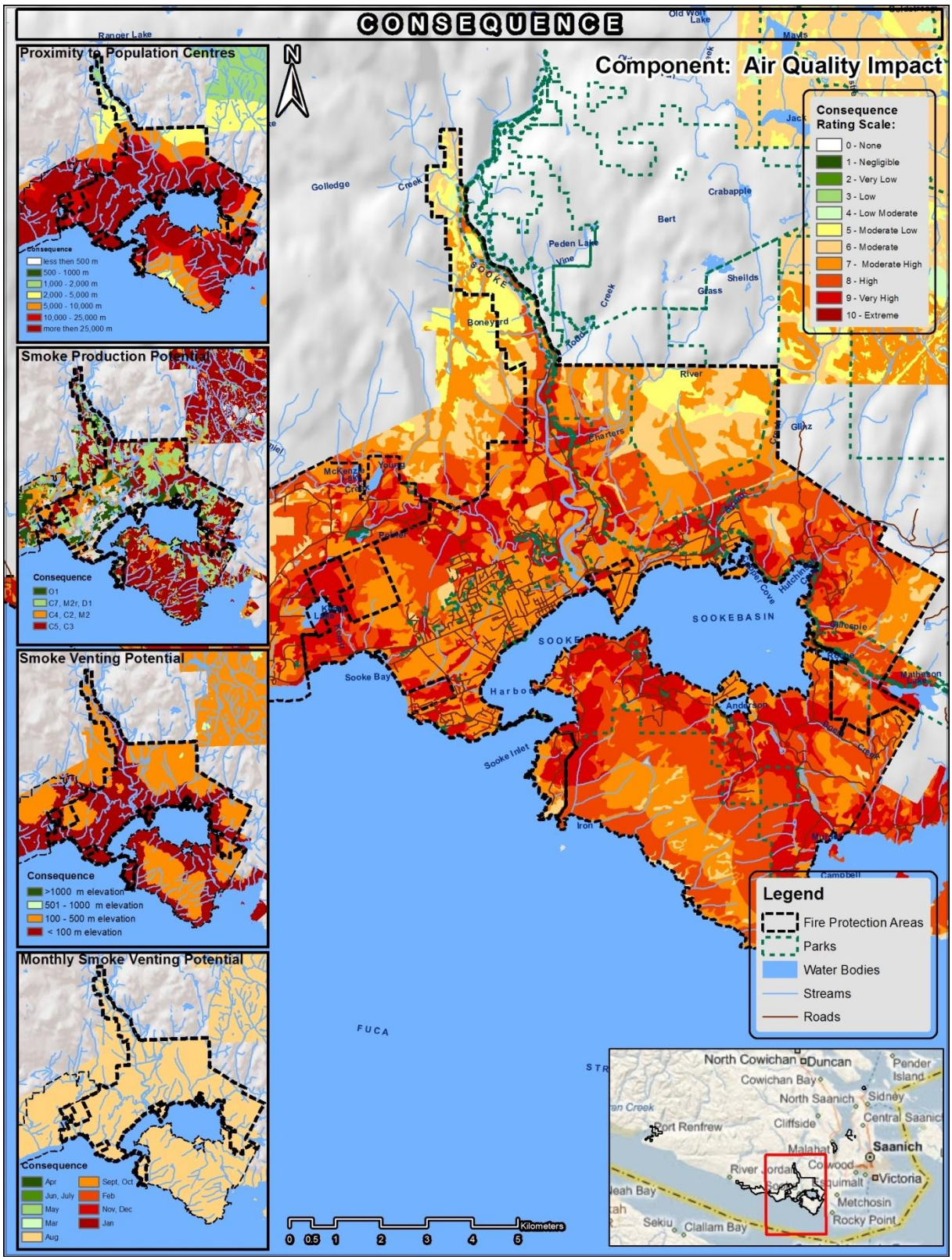
Visual Quality Impact (Consequence)



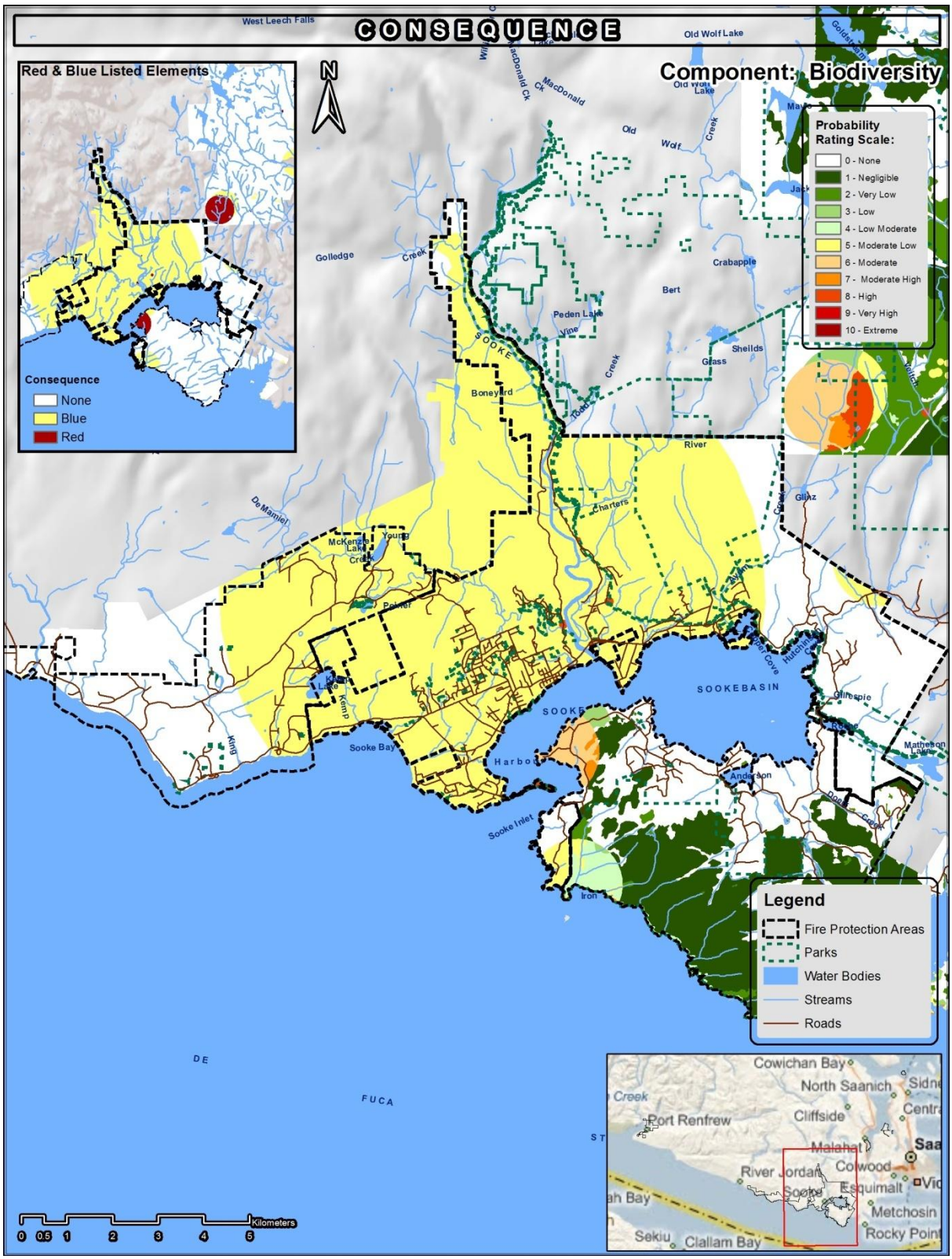
Recreation (Consequence)



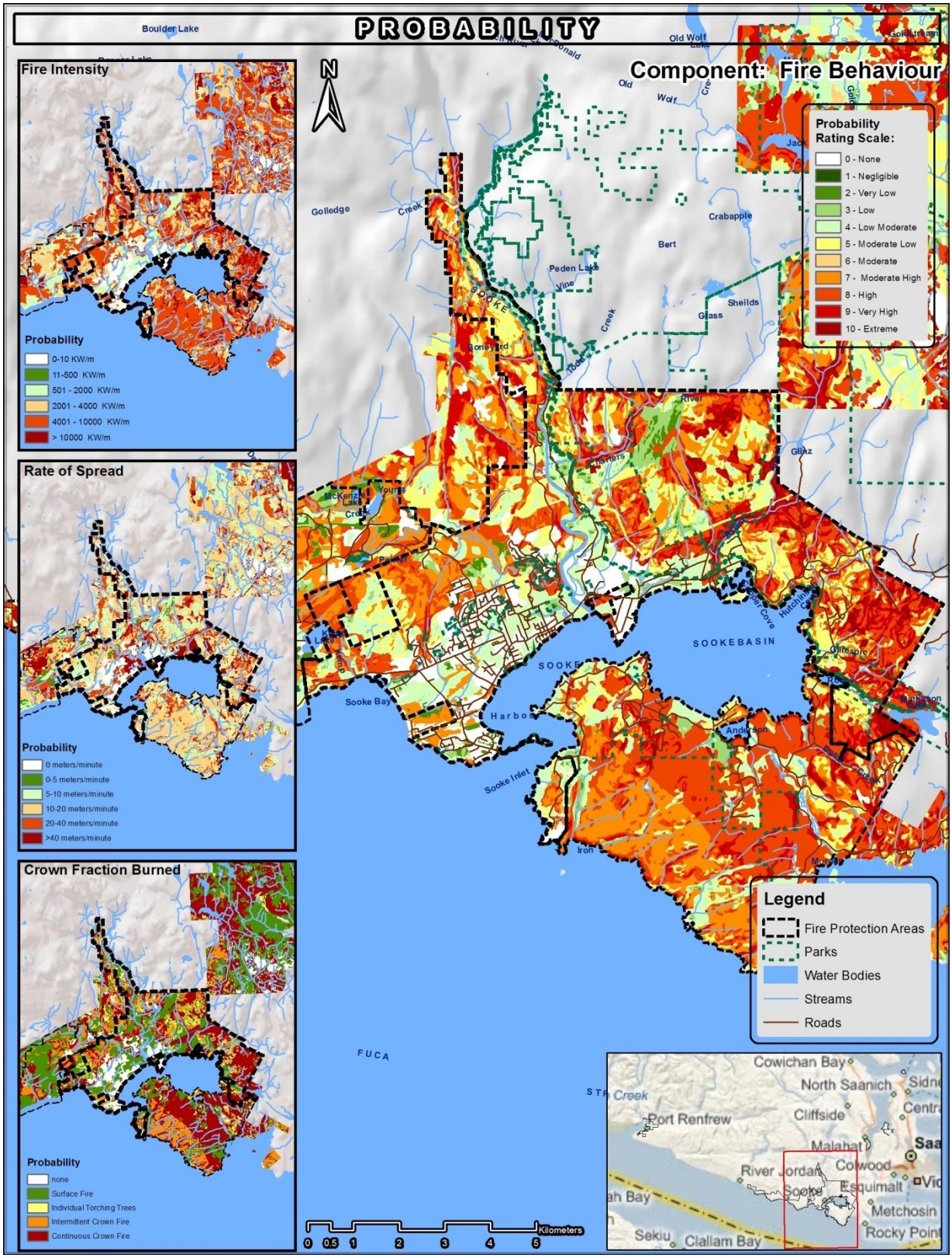
Air Quality Impact (Consequence)



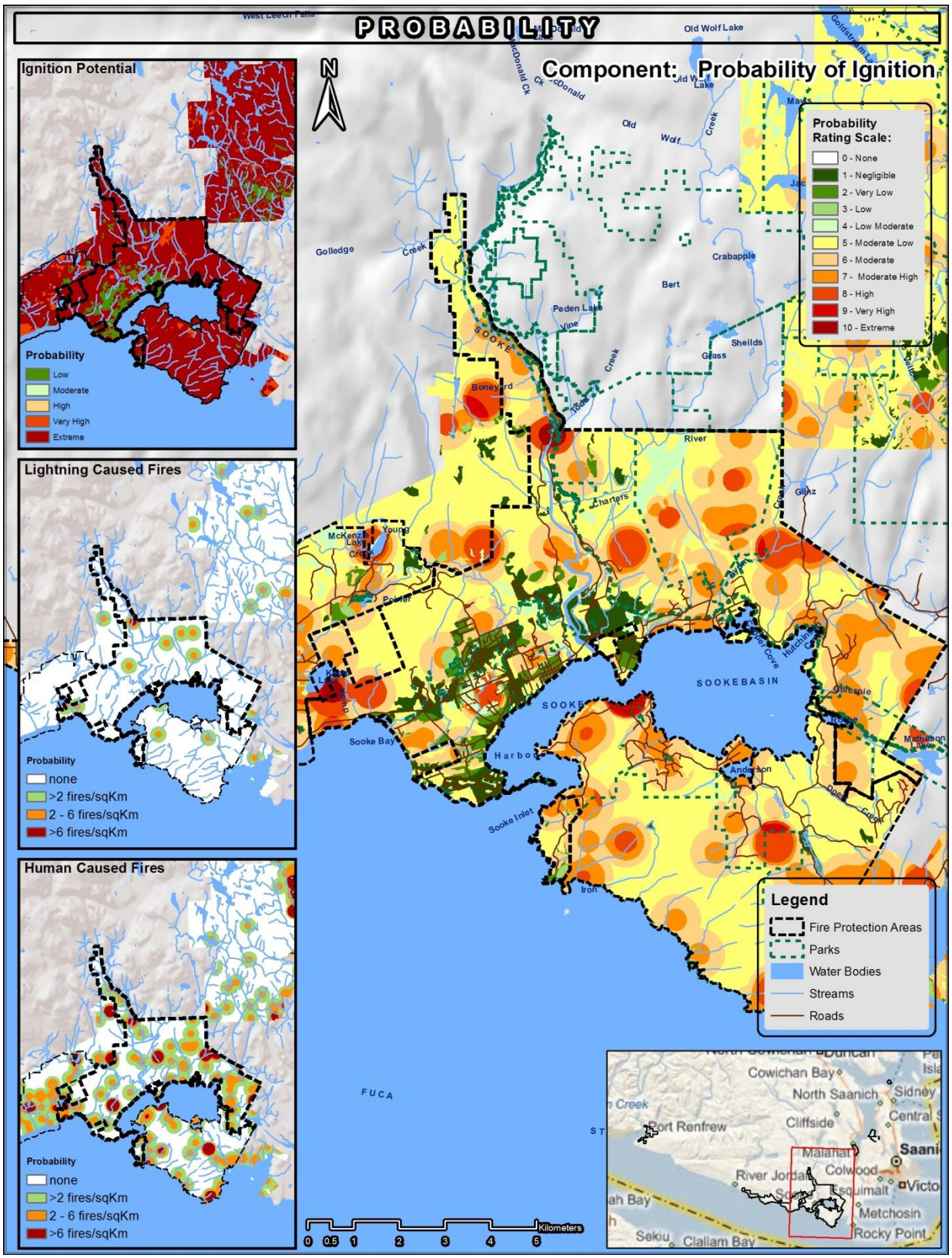
Biodiversity (Consequence)



Fire Behaviour (Probability)



Probability of Ignition (Probability)



Suppression Response Capability (Probability)