

Targeted Residential Fire Risk Reduction

A Summary of At-Risk Aboriginal Areas in Manitoba



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Background

In 2007, the Canadian Mortgage and Housing Corporation (CMHC) released a report on “Fire Prevention in Aboriginal Communities”. Within the paper it was noted that the “First Nations per capita fire incidence rate is 2.4 times the per capita rate for the rest of Canada. The death rate is 10.4 times greater; the fire injury rate is 2.5 times greater; and the fire damage per unit is 2.1 times greater” (CMHC, 2007, p.1). These statistics alone identify Aboriginal communities as being at a greater risk for fires. It was also noted in the report that “many Aboriginal communities tend to have a low number of smoke detectors”.

As with the rest of Canada, Aboriginal¹ communities are not homogeneous. While some face inordinately high fire risks, others do not. Using a rating method developed for the general population, this report identifies communities in Manitoba that are likely to experience the greatest risk of a fire incident. By communities, we are referring both to Aboriginal or “on reserve” communities, and to “off reserve” communities that have a high proportion of residents of Aboriginal origin.

Reducing fires and saving lives is the core mandate for all Fire Services. Globally, many departments have implemented door-to-door campaigns to educate their citizens on fire reduction and safety (TriData, 2009). However, focusing on an entire community is expensive, time consuming, and overall, an inefficient use of limited resources. A 2007 TriData report on best practices in residential fire safety in England, Scotland, Sweden, and Norway noted that “of all the best practices identified in this study, one stands out. To reduce fire casualties in the home, the British fire service is *visiting large number of high-risk households* [emphasis added] to do fire safety inspections and risk reductions, especially to ensure they have a working smoke detector” (TriData, 2007, p.vi). Similarly, in the publication, the *Reduced Frequency and Severity of Residential Fires Following Delivery of Fire Prevention Education by On-Duty Fire Fighters: Cluster Randomized Controlled Study* Clare, Garis, Plecas, and Jennings (2012) reviewed best practices from other countries on residential fire safety and concluded that “targeted home visits have produced promising results examining a range of outcome measures, from reduction in rates of fires and fire-related casualty through to increased presence of working smoke alarms when residences were audited” (p. 123).

Research has substantiated that certain groups are at an elevated risk of experiencing fires. In particular, children under the age of 6, adults over the age of 64 (e.g. Jennings, 1996; LeBlanc et al., 2006; Scholer, Hickson, Mitchel & Ray, 1998; U.S. Fire Administration, 1997, 2004), and those living in socio-economic disadvantage (e.g., Jennings, 1999; Schaenman et al., 1990; Shaw, McCormick, Kustra, Ruddy & Casey, 1988; U.S. Fire Administration, 1997, 2004) are the populations most at-risk for experiencing a residential fire. Residential fires also account for the vast majority of fire fatalities (Chien & Wu, 2008), typically as a result of smoke inhalation or carbon monoxide poisoning (Miller, 2005). Young children and older adults are also at higher risk of dying from a residential fire due to their inability to hear and/or respond to a smoke alarm (Marshall, Runyan, Bangdiwala, Linzer, Sacks, & Butts, 1998). Residents of low socio-economic areas are also at greater risk, primarily due to their

¹ Within this paper, the term “Aboriginal” is an all-encompassing term used to reference First Nations, Métis, and Inuit people.

tendency not to have a working smoke alarm in the home (Miller, 2005; Duncanson, Woodward, & Reid, 2002). Within in this paper, Aboriginal “on-reserve” locations are being considered at-risk until research states otherwise.

Aware of these relative risk levels, the Surrey Fire Services engaged in an evidence-based smoke alarm distribution campaign. Known as the HomeSafe program, it targeted high-risk locations in the city identified in an analysis of 20 years of municipal fire incidence data (McCormick, 2009). The program mandate was to have all homes with working smoke alarms to reduce the number of residential fires, as well as fire-related injuries and deaths within the community. To achieve this, firefighters conducted door-to-door visits with all addresses in the identified zones. They distributed fire safety education materials which included information on high-risk groups, and identified the leading causes of residential fires in the city (i.e., cooking and non-smoking related open flame fires, such as candles or matches; McCormick, 2009). They also asked residents about the presence of working smoke alarms, and offered to install smoke alarms free of charge if one was not present in the home (Clare et al., 2012). They left educational material for those not at home to read and inform themselves on fire safety. Over the course of one week, 18,473 residential dwellings in seven high-risk zones were visited by fire services.

To review the effect of this distribution method, Clare and colleagues (2012) conducted an experimental study measuring the outcomes in the high-risk zones receiving the targeted outreach compared to a randomized control sample of equally high-risk areas that had not received the targeted outreach. The specific analysis conducted to identify the high-risk population for the City of Surrey is summarized as follows:

First, the specific addresses of all relevant types of residential fires that had occurred in the city since late 2006 were mapped, and high-density areas were identified. In addition to this, Census information was used to identify areas of the city that would be expected to have an elevated likelihood of experiencing fires. This use of Census data built on research evidence that demonstrates an elevated risk of experiencing fire as a function of individual characteristics. As a result, areas of interest were identified if they had a proportionally high representation of: (a) children under 6 years, (b) adults aged over 64, (c) single parent families, (d) high-residential mobility residents, (e) unemployed residents. (Clare, et al., 2012, p.125)

The authors compared statistically the rate of residential fire incidents occurring two years pre-intervention against the rate of residential fire incidents two years post-intervention occurring in the experimental and control locations. Where the control locations experienced a 15% reduction in residential fires over time, the experimental locations experienced a 64% reduction. In addition, the length of time between fires increased by only 4 days in the control locations, versus 193 days in the experimental locations (Clare et al., 2012). In other words, the evidence-based fire education and smoke alarm distribution method that targeted high-risk locations reduced both statistically and substantially the rate of residential fires in high-risk jurisdictions and increased the length of time between fires. This study provided definitive evidence for the increased efficiency and effectiveness of using local fire data to guide education and distribution campaigns.

As of April 2016, Surrey Fire Services has made contact with approximately 40,000 residents through the HomeSafe program and have installed over 1,000 smoke alarms in homes. The program has been an overwhelming success. Working smoke alarms have increased from 16% in 2008 to 59% in 2015. Casualty rates (injuries and fatalities combined) saw a 65% reduction and fire rates were reduced by 47% between the years 2006 and 2015. This program provides an effective model that can be easily adopted by fire services in other communities to better achieve their mandate of reducing fires and saving lives. However, many communities may lack the analytical resources required to identify their high-risk locations. As such, the purpose of this report is to highlight communities from the province of Manitoba that are at the highest risk for residential fires based on the risk factors identified by research and adopted by the HomeSafe program in Surrey, B.C.

Method

To determine the at-risk Aboriginal areas within the province of Manitoba, the following approach was applied.

1. As there is limited information available from the 2011 Census and for the 2011 National Household Survey for Dissemination Areas deemed “on-reserve”, these areas are included as well as any Dissemination Areas that had a Census Subdivision type of:
 - a. Indian Reserve (IRI);
 - b. Indian Settlement (S-É);
 - c. Indian Government District (IGD);
 - d. Terres réservée aux Cris (TC);
 - e. Terres réservée aux Naskapis (TK); or
 - f. Nisga’a Land (NL).

As well, Dissemination Areas were included that had a higher proportion of Aboriginal population (top 10th percentile) in its associated Census Subdivision.

2. Of those off-reserve Dissemination Areas that had any (one or more) of the at-risk HomeSafe criteria were then selected (which includes populations of)
 - a. Over 65;
 - b. Under 6;
 - c. High mobility (movers);
 - d. Unemployed; and
 - e. Lone-parent families.

Again for these risk factors, it is the top 10th percentile of Dissemination Areas that fall into the Census Subdivision that are included.

For example, the Census Subdivision “Winnipeg” consists of 1,118 Dissemination Areas. Using the method detailed above, there are 13 Dissemination Areas that fall within the top 10th percentile of Aboriginal population for Winnipeg, but do not fall within the top 10th percentile of

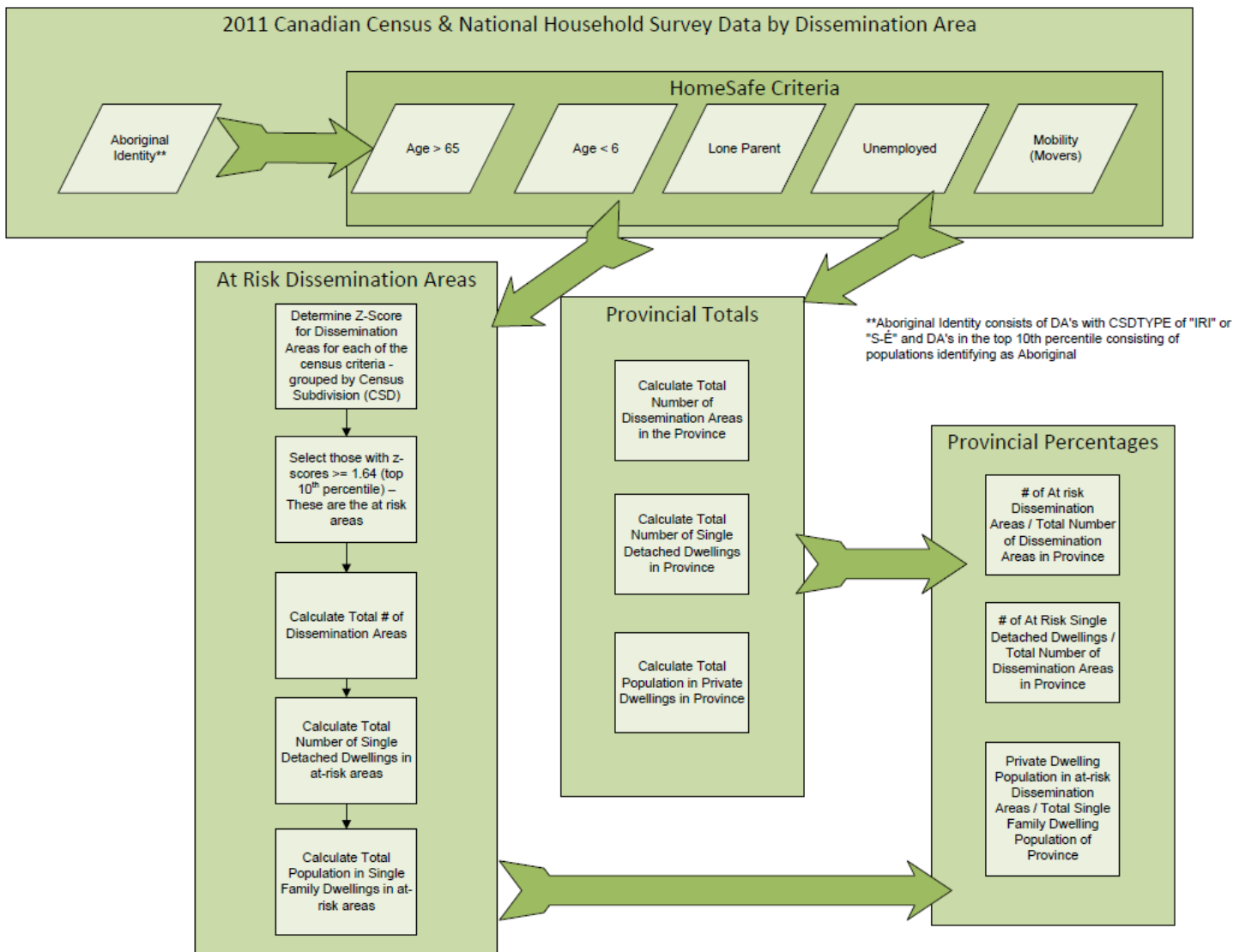
HomeSafe criteria; therefore, these areas would not be considered at-risk. However, there are 41 Dissemination Areas within Winnipeg consisting of the top 10th percentile of Aboriginal population that do include one or more of the HomeSafe risk factors. As these areas fall into one or more of the HomeSafe risk factors. These areas should be considered at-risk, and campaign efforts should be focused on them.

Summary for Manitoba

Using the 2011 Statistics Canada Census and National Household Survey, the HomeSafe criteria – residents over age 65 and under age 6, lone parent families, frequent movers, and the unemployed – was evaluated to determine the top 10th percentile of areas within municipalities that would be at most risk for fires to occur in their home. The actual geographical units we analysed are what Statistics Canada calls “Dissemination Areas.” Briefly, “a dissemination area (DA) is a small, relatively stable geographic unit composed of one or more adjacent dissemination blocks. It is the smallest standard geographic area for which all census data are disseminated. DAs cover all the territory of Canada” (Statistics Canada, 2012). Groups of Dissemination Areas are often grouped to form Census Sub-Divisions (CSDs) that often more closely align with municipal boundaries.

The majority of these high-risk areas were found in the more populated centres of the province. The primary focus of the HomeSafe initiative is on single-family detached dwellings. Residences such as condominiums, townhouse complexes, and apartments, which are regularly inspected through mandated annual inspections are excluded from the program. Figure 1 details the process flow to calculate the values (Dissemination Area counts and sums for single detached dwellings and population) for at risk areas and total values for the province.

FIGURE 1: PROCESS FLOW FOR DATA ANALYSIS & CALCULATIONS



Based on the selection process shown above, the totals for Aboriginal Areas in Manitoba were:

- Total number of Dissemination Areas in Manitoba is 2,179
- Total number of private single detached dwellings is 319,985 (includes non-Aboriginal housing counts)
- Total population in private single detached dwellings is 856,403 (includes non-Aboriginal population)
- Total number of at-risk Dissemination Areas is 220
- Total number of at-risk private single detached dwellings is 28,600 (includes non-Aboriginal housing counts)
- Total population in at-risk private dwellings is 58,723 (includes non-Aboriginal population).

- The percentage of at-risk Dissemination Areas is 10.09%
- The percentage of at-risk private single detached dwellings is 8.94% (includes non-Aboriginal housing counts)
- The percentage of at-risk population in at-risk private single detached dwellings is 6.85%.

Table 1 provides a Provincial summary of at-risk populations. The Table provides information for three main categories of interest to fire services. First, the number of at-risk Dissemination Areas (DA's; which represent populations of between 400-700 persons) and the total number of Dissemination Areas within the Province are compared to produce the percent of at-risk Dissemination Areas. Second, the number of single detached dwellings in at-risk areas and the total number of single detached dwellings in the province are compared to produce the percent of at-risk single detached dwelling. Third, the total Aboriginal population in private dwellings (this would include townhouses and condominiums) and the estimated at-risk population are compared to produce the percent of population at-risk. It is to be noted that the population in private dwellings is inflated as it accounts for populations living in townhouse and condominiums, and is not specific to single detached dwellings.

TABLE 1: PROVINCE OF MANITOBA DISTRIBUTION OF THE PERCENTAGE OF DISSEMINATION AREAS, PRIVATE SINGLE DETACHED DWELLINGS, AND POPULATION AT-RISK FOR RESIDENTIAL FIRES

Community	# of At-risk DA's	Total DA's in Manitoba	% of At-risk DA's	# of Private Single Detached Dwelling in At-risk DA's	Total Private Single Detached Dwellings in Manitoba	% of At-risk Private Single Detached Dwellings	Aboriginal Population of At-risk DA's	Single Detached Dwelling Population Total of Manitoba	% of At-risk Population
Aboriginal Areas Meeting HomeSafe Criteria	72	2,179	3.3%	17,345*	319,985	5.42%*	12,112	856,403	1.41%
Aboriginal IRs NOT Meeting HomeSafe Criteria	148	2,179	6.79%	11,255	319,985	3.52%	46,611	856,403	5.55%
Total	220	2,179	10.09%	28,600	319,985	8.94%	58,723	856,403	6.85%

*Areas also include Non-Aboriginal counts

Table 1 indicates that approximately 7% of the Aboriginal population in Manitoba is at a heightened risk of residential fires. The areas shown on the map (p.11) could benefit from the adoption of targeted fire safety public education combined with smoke alarm distribution campaigns. This is determined since they contain large numbers of residents meeting one or more criteria for elevated residential fire risk. However, this level of analysis is still too broad to be of much benefit in a targeted campaign. Therefore, the subsequent sections of the report identify the high at-risk Aboriginal populations at a municipal level.

An important caveat to note is that the data collected for the 2011 National Household Survey was completely voluntary. Information was suppressed if the global non-response rate to the National Household Survey was greater than 50% or greater than 25% for the Census of Population (Statistics Canada, 2016). The results presented below are intended to highlight an estimate of households and population that are at-risk for residential fires. However, a more thorough analysis using local planning data (zoning and addressing), municipal distribution of residential structure fires over a five-year period, and identification of the at-risk areas using census data would refine the at-risk properties for each particular jurisdiction.

Manitoba Review

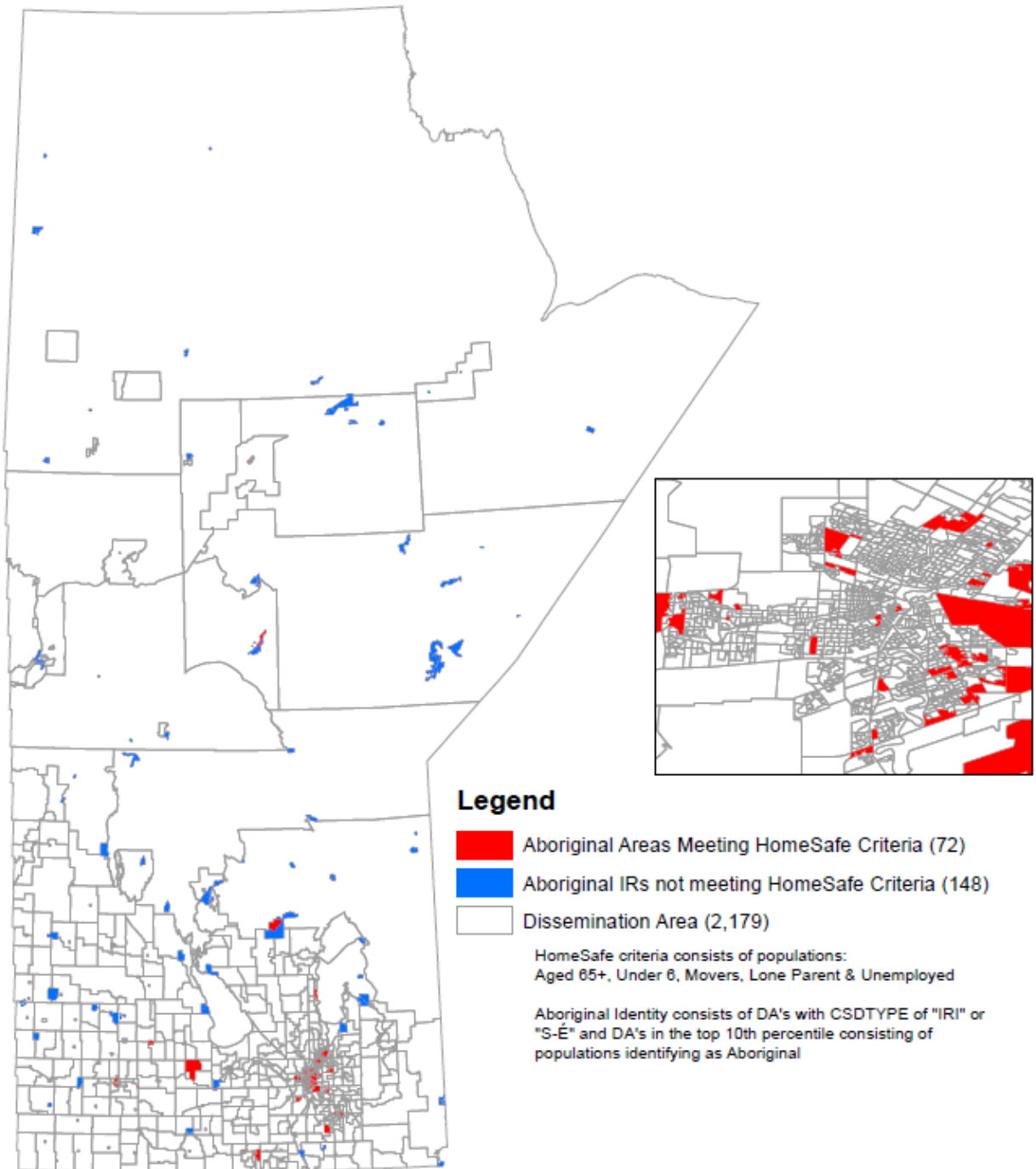
In the following section a Provincial map and detailed analysis of the communities that meet any of the HomeSafe criteria for the Province is provided. Again, the HomeSafe criteria used to identify these populations in the 2011 Census and 2011 National Household Survey were:

- Age Over 65;
- Age Under 6;
- Lone Parent;
- Movers (reside at current residence for less than a year); and
- Unemployed.

As well, a table summarizing the following information for each at-risk community in the province is provided:

- Number of at-risk Dissemination Areas;
- Total number of Dissemination Areas in the community;
- Percent of at-risk Dissemination Areas in the community;
- Number of private single detached dwellings in at-risk Dissemination Areas;
- Total number of private single detached dwellings in Dissemination Areas in the community;
- Percent of private single detached dwellings in at-risk Dissemination Areas in the community;
- Aboriginal population in at-risk Dissemination Areas;
- Total population in Dissemination Areas for the community; and
- Percent of the population that resides in at-risk Dissemination Areas in the community.

MANITOBA - MAP OF DISSEMINATION AREAS IN TOP 10TH PERCENTILE OF HOMESAFE CRITERIA



MANITOBA – AT-RISK COMMUNITY DETAILS THAT MEET HOMESAFE CRITERIA

Community	# of At-risk DA's	Total DA's	% of At-risk DA's	# of Private Single Detached Dwelling in At-risk DA's*	Total Private Single Detached Dwellings*	% of At-risk Private Single Detached Dwellings*	Aboriginal Population in At-risk DA's	Single Detached Dwelling Population Total*	% of At-risk Population
Brandon	5	78	6.41%	1,570	11,030	14.23%	768	26,741	2.87%
Cornwallis	1	7	14.29%	115	1,180	9.75%	40	3,157	1.27%
Dauphin	1	21	4.76%	230	3,660	6.28%	156	8,203	1.90%
Gimli	1	10	10.00%	290	2,210	13.12%	82	4,582	1.79%
Hanover	2	22	9.09%	445	3,555	12.52%	104	12,654	0.82%
Macdonald	1	9	11.11%	400	1,920	20.83%	99	5,709	1.73%
Morden	1	11	9.09%	415	2,310	17.97%	57	5,694	1.00%
Neepawa	1	7	14.29%	165	1,120	14.73%	12	2,633	0.46%
North Norfolk	1	6	16.67%	140	820	17.07%	26	2,303	1.13%
Norway House 17	1	12	8.33%	475	1,055	45.02%	2,072	4,411	46.97%
Peguis 1B	1	5	20.00%	200	715	27.97%	703	2,407	29.21%
Portage la Prairie	1	41	2.44%	195	5,555	3.51%	157	13,557	1.16%
Ritchot	1	10	10.00%	230	1,665	13.81%	125	4,888	2.56%
Selkirk	1	19	5.26%	135	2,595	5.20%	210	6,252	3.36%
Springfield	2	25	8.00%	725	4,665	15.54%	137	13,070	1.05%
St. Andrews	1	21	4.76%	240	4,010	5.99%	89	11,090	0.80%
St. Clements	2	20	10.00%	590	3,375	17.48%	178	9,017	1.97%
Stanley	1	9	11.11%	450	1,875	24.00%	3	7,946	0.04%
Steinbach	2	18	11.11%	820	3,045	26.93%	151	8,094	1.87%
Taché	1	17	5.88%	340	3,050	11.15%	216	9,536	2.27%
Thompson	2	29	6.90%	230	2,725	8.44%	514	7,568	6.79%
Winkler	1	15	6.67%	525	2,635	19.92%	50	7,362	0.68%
Winnipeg	41	1,118	3.67%	8,420	161,765	5.21%	6,163	427,852	1.44%
Total	72	1530	4.71%	17,345	226,535	7.66%	12,112	604,721	2.00%

* Areas also include Non-Aboriginal counts

MANITOBA – AT-RISK COMMUNITY DETAILS THAT DO NOT MEET HOMESAFE CRITERIA BUT ARE DESIGNATED INDIAN RESERVE OR INDIAN SETTLEMENT

Community	# of Private Single Detached Dwelling in At-risk DA's	Aboriginal Population Total
Berens River 13	215	1015
Birdtail Creek 57	105	405
Black River 9	120	525
Bloodvein 12	135	630
Brochet 197	105	515
Brokenhead 4	0	0
Buffalo Point 36	75	62
Canupawakpa Dakota First Nation (Oak Lake 59)	100	0
Chemawawin 2	185	1120
Chemawawin 3	0	0
Churchill 1	80	0
Crane River 51	115	465
Cross Lake 19	295	1750
Cross Lake 19A	320	1920
Cross Lake 19E	120	680
Dakota Plains 6A	0	0
Dakota Tipi 1	20	50
Dauphin River 48A	0	0
Dog Creek 46	0	0
Ebb and Flow 52	385	1295
Fairford (Part) 50	225	0
Fisher River 44	410	1190
Fisher River 44A	0	0
Fort Alexander 3	485	2020
Fox Lake 2	0	0
Gambler 63 (Part)	30	0
Garden Hill First Nation	420	2655

Community	# of Private Single Detached Dwelling in At-risk DA's	Aboriginal Population Total
God's Lake 23	35	188
God's River 86A	105	590
Grand Rapids 33	135	710
Granville Lake	0	0
Hole or Hollow Water 10	140	670
Ilford	35	140
Jackhead 43	70	225
Keeseekoowenin 61	135	435
Lac Brochet 197A	160	800
Little Grand Rapids 14	210	810
Little Saskatchewan 48	105	410
Long Plain (Part) 6	310	0
Moose Lake 31A	160	975
Nelson House 170	385	2340
Norway House 17	580	2470
Opaskwayak Cree Nation 21A	15	170
Opaskwayak Cree Nation 21B	0	0
Opaskwayak Cree Nation 21C	0	0
Opaskwayak Cree Nation 21E	470	2245
Opaskwayak Cree Nation 21I	45	131
Oxford House 24	320	1870
Pauingassi First Nation	100	365
Peguis 1B	515	1867
Pine Creek 66A	195	680
Poplar River 16	180	830
Pukatawagan 198	330	1815
Red Sucker Lake 1976	155	895
Rolling River 67	0	0
Roseau Rapids 2A	0	0

Community	# of Private Single Detached Dwelling in At-risk DA's	Aboriginal Population Total
Sandy Bay 5	420	2102
Shamattawa 1	150	995
Shoal Lake (Part) 39A	0	0
Shoal Lake (Part) 40	0	0
Shoal River Indian Reserve 65A	220	805
Sioux Valley Dakota Nation	0	0
South Indian Lake	150	755
Split Lake (Part) 171	315	0
St. Theresa Point	480	2821
Swan Lake 7	135	335
Swan Lake 65C	10	45
The Narrows 49	340	0
Valley River 63A	0	0
Wasagamack	0	0
Waterhen 45	100	375
Waywayseecappo First Nation	0	0
York Landing	100	450
Total	11,255	46,611

Conclusion

The analyses conducted for this report substantiate the importance of examining fire trends at a local level. It is estimated that within Manitoba there are roughly 29,000 private single detached dwellings containing approximately 59,000 people that are at a heightened risk of having a fire in their home. Having firefighters go door to door promoting fire risk reduction and safety, as well as smoke alarm testing and installation has been a proven method both in the United Kingdom as well as in Surrey, BC. However, it is essential that fire services examine their local fire trends at community levels before undertaking public education and/or smoke alarm distribution campaigns. The research discussed in this report identified the relative risk levels of communities across Manitoba; however, it is important that fire services not only conduct the HomeSafe analysis at a localized level but also take the added step of overlaying their recent historical residential fire data when considering where to focus their resources in order to maximize returns. Fires will happen, but the overall mandate to reduce residential fires and fire-related casualties will be reached more quickly and efficiently by using localized data-driven approaches.

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