## Canadian Lyme Disease Research Network

### Pillar 2 - Risk Reduction

CLyDRN AGM November 4<sup>th</sup>, 2020

## Trainees and Projects

Student	University (Supervisor)	Project
Andreea Slatculescu (PhD)	U. Ottawa (Kulkarni)	Examining associations between environmental and epidemiological risk of Lyme disease in Ontario: a case-control study
Camille Guillot (PhD)	U. Montréal (Leighton)	Sentinel surveillance for vector-borne disease: tracking the emergence of Lyme disease in Canada
Cyril Akwo (PhD)	U. Guelph (Clow/Jardine)	One Health approaches to Tick and Tick-borne disease surveillance (including establishment of veterinary surveillance)
Daniel Szaroz (PhD)	U. Montréal (Zinszer)	Multi-site case control study of Lyme disease risk factors (linked to patient cohort) + spatial diffusion using pan-Canadian data
James Logan (PhD)	U. Ottawa (Kulkarni)	Landscape-scale modelling and impacts of urban planning on Lyme disease risk
Natasha Bowser (PhD)	U. Montréal (Aenishaenslin)	Evaluating the adaptation of the Canadian population to Lyme disease using a "One Health" approach
Katarina Ost (PhD)	U. Ottawa (Kulkarni)	Assessing strategies for the prevention and control of emerging tickborne diseases in urban and peri-urban settings

### Working Groups

#### Surveillance WG

**Objectives:** Plan and oversee the implementation of the Canadian Lyme Sentinel Network (CaLSeN)

**Leads:** Patrick Leighton, Claire Jardine

#### **Epidemiology WG**

**Objectives:** Plan and oversee the implementation of the Longitudinal Risk Study

Leads: Manisha Kulkarni, Kate Zinszer

#### Modelling WG

**Objectives:** Establish research priorities for risk modelling and mapping in Canada; plan and oversee the implementation "modelling and mapping" component of the Risk Reduction Innovation Program.

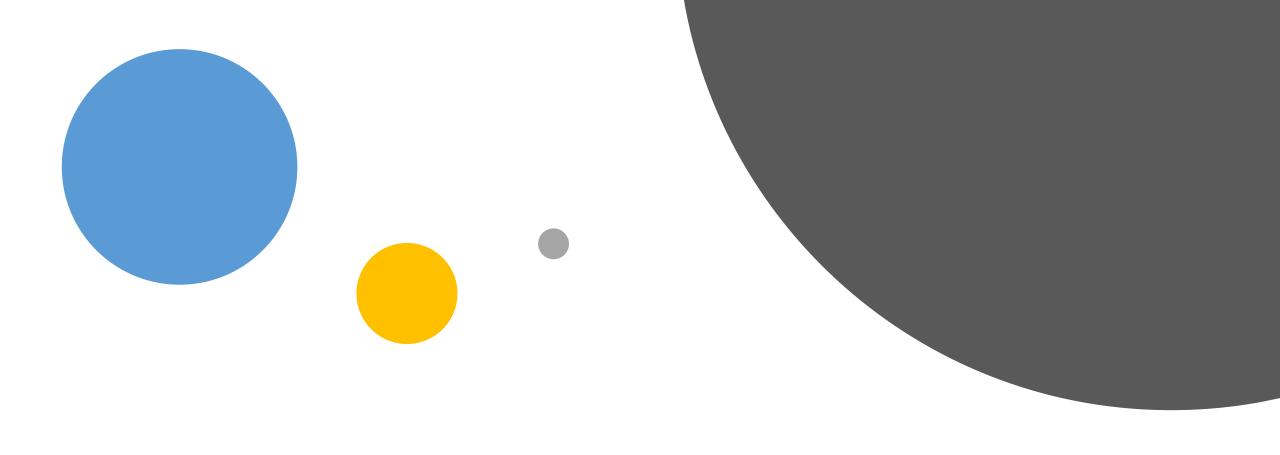
Leads: Nicholas Ogden, Jianhong Wu

#### Intervention WG

**Objectives:** Establish research priorities for Risk Reduction Interventions in Canada; plan and oversee the implementation of the "risk reduction interventions" component of the Risk Reduction Innovation Program.

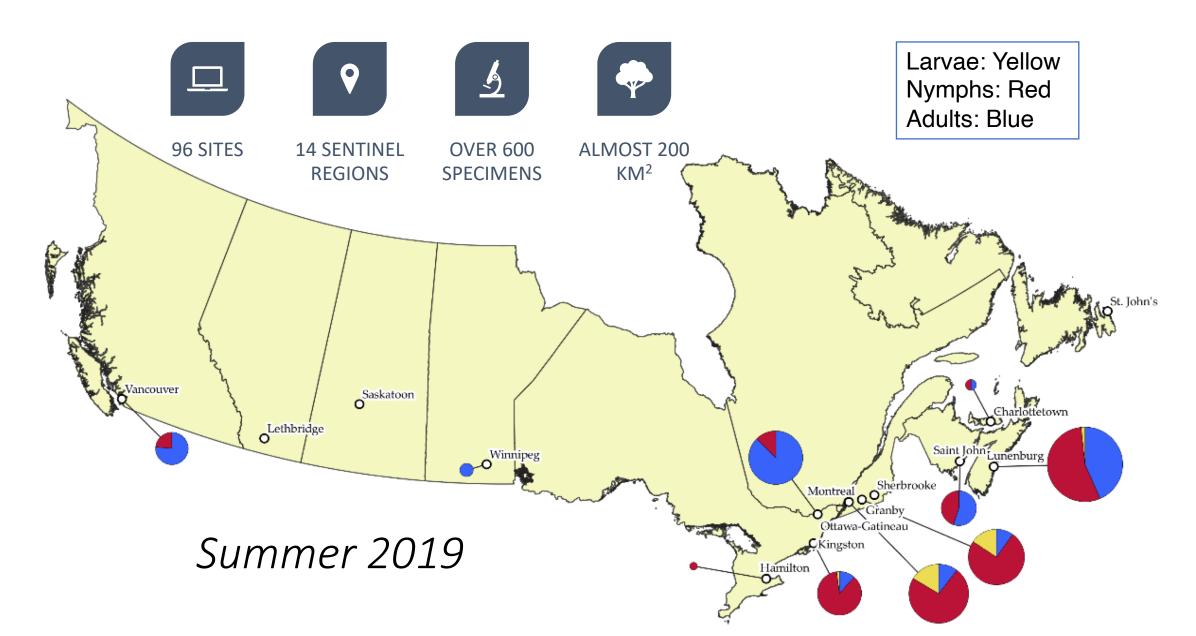
Leads: Catherine Bouchard, Jean-Philippe Rocheleau

CLyDRN



Surveillance Working Group Update

## Canadian Lyme Sentinel Network (CaLSeN)



## Canadian Lyme Sentinel Network (CaLSeN)

Table 2: Ixodes spp. tick abundance in sentinel regions of the Canadian Lyme Sentinel Network in 2019 and infection prevalence of tick-borne pathogens

Sentinel region	lxodes spp. abundance (n)			Infection prevalence (%) <sup>a,b</sup>							
	Larva	Nymph	Adult	Total	BbN	BbA	ВЬТ	Bm	Ap	Bmi	POWV
Vancouver, BC	0	4	13	17	O <sup>e</sup>	0°	Oc	O=	0°	5.9*	Oc
Lethbridge, AB	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Saskatoon, SK	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Winnipeg, MB	0	0	3	3	NA	0°	Oc	O=	Oc	0c	0¢
Hamilton, ON	0	2	0	2	0°	0°	Oc	O=	0°	0°	O <sup>c</sup>
Kingston, ON	2	82	11	95	28.0 <sup>f</sup>	54.5f	31.2	0°	1.1 <sup>d</sup>	0°	0°
Ottawa-Gatineau, ON/QC	0	12	83	95	33.3f	39.8	38.9	1.1 <sup>d</sup>	0°	0°	O <sup>c</sup>
Montréal, QC	19	85	12	116	14.1*	66.71	20.6	1.0 <sup>d</sup>	1.0 <sup>d</sup>	0°	0°
Granby, QC	3	37	5	45	13.5*	60'	19.0*	O <sup>e</sup>	2.4 <sup>d</sup>	0°	0°
Sherbrooke, QC	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Saint John, NB	0	9	11	20	55.6 <sup>t</sup>	36.4	45	O=	5*	0°	0°
Charlottetown, PEI	0	1	1	2	0°	0°	O=	O=	O <sup>c</sup>	0°	0°
Lunenburg, NS	3	96	73	172	24.0 <sup>f</sup>	31.5	26.6	0=	4.1d	0¢	0.6 <sup>d</sup>
St. John's, NL	0	0	0	0	NA	NA	NA	NA	NA	NA	NA
Total number	27	328	212	567	NA	NA	NA	NA	NA	NA	NA
Overall prevalence	-	-	-	-	22.0	36.3	26.6	<0.01	0.02	<0.01	< 0.01

Abbreviations: AB, Alberta; Ap, Anaplasma phagocytophilum; BbA, Borrelia burgdorferi infection prevalence in adult ticks; BbN Borrelia burgdorferi infection prevalence in nymphal ticks; BbT, Borrelia burgdorferi infection prevalence in adult and nymphal ticks; BC, British Columbia; Bm, Borrelia miyamotoi; Bmi, Babesia microti; MB, Manitoba; NA, not applicable; NB, New Brunswick; NL, Newfoundland and Labrador; NS, Nova Scotia; ON, Ontario, PEI, Prince Edward Island; POWV, Powassan virus; QC, Québec; SK, Saskatchewan; spp., species

Only adult and nymphal Ixodes spp. ticks were tested

h Infection prevalence presented as tick numbers in some sentinel regions are too small to infer a prevalence rate

Every Zero (green) no infected ticks

Infection prevalence <5% (blue)</p>

Infection prevalence 5–20% (yellow)

<sup>1</sup> Infection prevalence >20% (red)

### 2019 Surveillance Report – CCDR

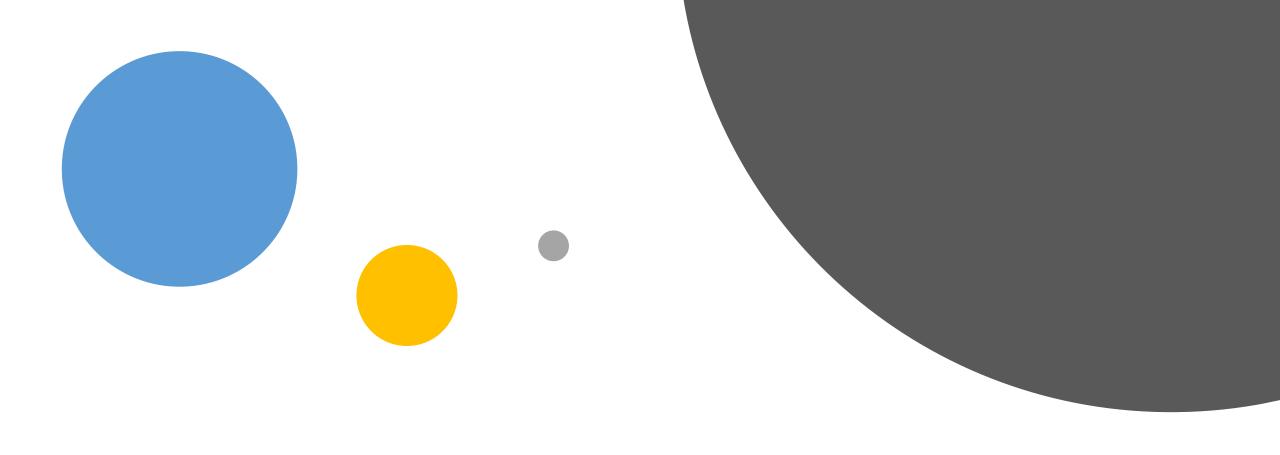


# Sentinel surveillance of Lyme disease risk in Canada, 2019: Results from the first year of the Canadian Lyme Sentinel Network (CaLSeN)

Camille Guillot<sup>1,2\*</sup>, Jackie Badcock<sup>3</sup>, Katie Clow<sup>4</sup>, Jennifer Cram<sup>5</sup>, Shaun Dergousoff<sup>6</sup>, Antonia Dibernardo<sup>7</sup>, Michelle Evason<sup>6,8</sup>, Erin Fraser<sup>9,10</sup>, Eleni Galanis<sup>11</sup>, Salima Gasmi<sup>12</sup>, Greg J German<sup>13</sup>, Douglas T Howse<sup>14</sup>, Claire Jardine<sup>6</sup>, Emily Jenkins<sup>15</sup>, Jules Koffi<sup>13</sup>, Manisha Kulkarni<sup>16</sup>, L Robbin Lindsay<sup>8</sup>, Genevieve Lumsden<sup>6</sup>, Roman McKay<sup>17</sup>, Muhammad Morshed<sup>12</sup>, Douglas Munn<sup>18</sup>, Mark Nelder<sup>19</sup>, Joe Nocera<sup>19</sup>, Marion Ripoche<sup>20</sup>, Kateryn Rochon<sup>21</sup>, Curtis Russell<sup>20</sup>, Andreea Slatculescu<sup>17</sup>, Benoit Talbot<sup>17</sup>, Karine Thivierge<sup>22</sup>, Maarten Voordouw<sup>16</sup>, Catherine Bouchard<sup>1,23</sup>, Patrick Leighton<sup>1</sup>

Can Commun Dis Rep 2020; 46(10): 354–361

https://doi.org/10.14745/ccdr.v46i10a08



Epidemiology Working Group Update

## Pillar 2 – Epidemiology Working Group: Longitudinal Risk Study

#### Aim:

To identify
epidemiological risk
factors for human
LD infection in the
Canadian
population



#### **Research questions:**

- How does LD environmental risk relate to risk of human LD infection in different regions of Canada?
- What individual and community-level factors are important drivers of human LD risk, and how do these change over time?



#### **Expected outcome:**

Results will inform the development, tailoring and targeting of risk mitigation approaches and interventions to prevent human LD infection in the Canadian population

## Component #1 - Retrospective case-control study (A. Slatculescu PhD project)

#### Objectives:

 To evaluate the association between environmental risk and human Lyme disease infection at the postcode level

#### Study area:

• Southern/eastern Ontario

#### Data sources:

- PHOL dataset of lab-confirmed human LD cases in Ontario from 2006-2018 (held at ICES)
- Age- and sex-matched controls from Registered Persons Database (held at ICES)
- Ecological niche model of *I. scapularis* for southern/eastern ON (Slatculescu et al., 2020; PLOS ONE)

Spatial linkage of environmental risk data with human case data; incorporation of census data on relevant socioeconomic factors

Pending access to data at ICES; analysis to be conducted 2021

## Component #2 – 'Prospective' case-control study (D. Szaroz PhD project)

#### Objectives:

- To identify risk factors for human Lyme disease infection, including exposure to risk areas and use of preventive measures
- To assess changes in risk factors and knowledge, attitudes, practices (KAP) between regions and over time (i.e. at multiple timepoints)

#### Study area(s):

• Sites with CLyDRN patient cohort recruitment

#### Data sources:

- Early localized & early disseminated human LD cases identified though the patient cohort (n=90)
- Age-and sex-matched controls recruited from same hospitals/clinics (n=180)
- Questionnaire data: knowledge, attitudes, practices, demographics, socioeconomic factors (e.g. income, occupation), and history of exposure to risk areas
- Local-scale ecological models of *I. scapularis*

To be piloted in
Kingston starting Dec
2020 with roll out in
Kingston and
Lunenburg in 2021



Modelling Working Group Update

## Objectives of the WG

1. Be a point of contact for CLyDRN members involved in modelling and mapping relevant to network objectives

2. Be a source for sharing expertise amongst WG members.

3. Be a resource for members to develop proposals for funding modelling/mapping projects

4. Assist CLyDRN in developing research priorities.

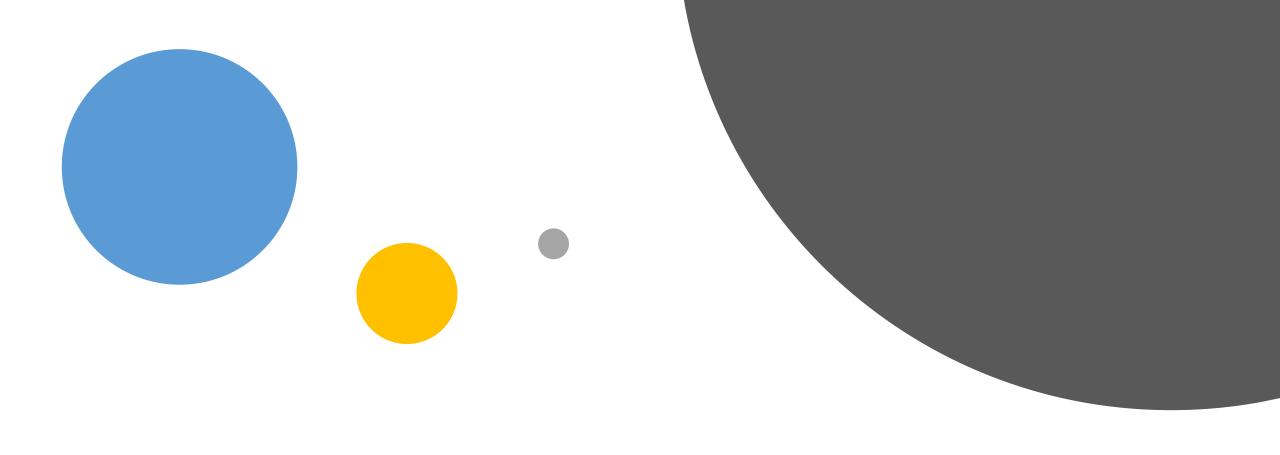
#### Current status

Core membership formed (9 Canadian CLyDRN members)

 Additional preferred members identified (1 US-based CLyDRN member, 3 Canadian and 4 international non-members)

 First teleconference completed and broad summary of tasks and objectives identified

Funding for face-to-face meeting obtained



Intervention Working Group Update

### Objectives of the WG

- 1. Identifying the most promising research topics for reducing LD risk across Canada
- 2. Continuous scientific monitoring, knowledge sharing about the new intervention/mitigation strategies (from the WG to the CLyDRN) and facilitating their implementation in Canada.
- Developing guidelines to evaluate tick and LD intervention/mitigation strategies including (1) the potential public health impact of the existing or novel approaches and (2) obstacles and levers to the implementation of these interventions.

### Current projects

- Development of a research proposal for cost-utility modeling and MCDA for rodent-targetted interventions (draft completed) and review and improvement of the research proposal with PCAC members (upcoming weeks)
- Launching of the research program (spring 2021)
- Add collaborators from pest management industry, US agencies, members of the public to the working group (2021)