mmcd
METROPOLITAN MOSQUITO CONTROL DISTRICT

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July 18, 2019

MN Legislative Reference Library
Attn: Chris Steller
645 State Office Building
100 Reverend Dr MLK Jr. Blvd
St Paul, MN 55155-1050

Hi Chris,

Enclosed is your copy of the 2018 *Ixodes scapularis* distribution study report.

Our results from 2018 again represent a higher tick collection year. We detected *I. scapularis* at 64 of 100 sampling sites; a lower tabulation than in the four years prior. However, while in six of the past nine years we have tabulated positive site totals higher than 64, our positive site totals were lower than 64 in all years prior to 2010.

I. scapularis comprised 80% of our total collections (the record is 81% (2017)), and we tabulated our 2nd highest total number of *I. scapularis* collected per mammal (1.498) since our study began in 1990.

Since 2014 (and including 2018), our average number of *I. scapularis* collected per mammal has averaged > 1.0 (range 1.209 – 1.679).

From 2000 – 2013 [except for 2003 (.389), 2005 (1.180), and 2013 (.401)], the number of deer ticks collected per mammal averaged > 0.500 and < 1.0 (range 0.616 - .950).

From 1990 - 1999 the number of deer ticks collected per mammal averaged < 0.500 (range .089-.496).

I emailed the pdf to reports@lrl.leg.mn

Sincerely,

Janet Jarnefeld
MMCD - Tick Vector Services
janjarne@mmcd.org
651.643.8384

Metropolitan Mosquito Control District

2018 *Ixodes scapularis* distribution study report

Author: Janet Jarnefeld

Metropolitan Mosquito Control District
IXODES SCAPULARIS DISTRIBUTION STUDY
2018

Abstract

A black legged tick (*Ixodes scapularis*) distribution study designed to detect any changes in *I. scapularis* distribution over a many year period was conducted in the seven-county metropolitan area by the Metropolitan Mosquito Control District. Small mammal sampling was used to collect ticks from 100 wooded locations that have all been sampled since 1990 or 1991. Our results from 2018 represent a higher tick collection year. Except for 2011, since 2007 we collected *I. scapularis* from at least one site in all seven counties that comprise our service area. Our overall positive site total for 2018 was 64; a lower tabulation than in the four years prior. However, while in six of the past nine years we have tabulated positive site totals higher than 64, our positive site totals were lower than 64 in all years prior to 2010. Twenty-three of our positive sites in 2018 were tabulated from counties south of the Mississippi River, also a lower number than in recent years. Overall, we collected a total of 1,146 *I. scapularis* removed from 765 mammals for a season mean of 1.498 *I. scapularis* per mammal; our 2nd highest average yet. We have tabulated an average > 1.0 *I. scapularis* per mammal in only 2005 (1.180), 2014 (1.213), 2015 (1.450), 2016 (1.679). 2017 (1.209) and 2018 (1.498). However, our averages since 2000 are all generally similar (all years but 2003, 2008, 2011, and 2013 were ≥ .806). In 2018 70% of our total *I. scapularis* were collected in Anoka (26%), Washington (24%), and Hennepin (20%) counties. Townships maintaining 2018 *I. scapularis* per mammal averages ≥ 3.0 included Hugo, Afton (Washington County) Ham Lake, Coon Rapids, Blaine (Anoka County), and Shoreview (Ramsey County), all north of the Mississippi River (range 3.556-7.357), and Bloomington (Hennepin County), Burnsville, and Hastings (Dakota County) south of the Mississippi River (range 3.273-12.800). Anoka County maintained the highest 1990-2018 overall season mean (1.160), followed by Washington County (1.020). Both small mammal and immature tick species diversity in 2018 appeared comparable to past years. *I. scapularis* comprised 80% of our overall collections; similar to our record high of 81% tabulated in 2017. As in past years, *Peromyscus leucopus* was the predominant mammal species collected, although it was a low small mammal collection year. As of July 2, 2019, the MN Dept Health (MDH) did not have 2018 tick-borne disease case totals prepared but there had been 1,408 Lyme and 638 human anaplasmosis cases in 2017. Our results continue to indicate that a Twin Cities resident's risk of encountering *I. scapularis* locally is now greater than it once was and that this risk has risen over time in counties south of the Mississippi River.

Introduction

In 1990 the Metropolitan Mosquito Control District initiated a Lyme Disease Tick Surveillance Program to determine the distribution and prevalence of *I. scapularis* and *Borrelia burgdorferi* within the Minneapolis- Saint Paul metropolitan area. District re-structuring in 1996 integrated the former tick surveillance program activities into the District's overall field processes. Small mammal trapping has been the primary sampling method used, with examination of road-killed mammals and flagging (dragging flannel cloth along vegetation) each used as secondary collection methods in the past.

A total of 545 sites were sampled from 1990 through 1992, including 100 sites that had been selected for repetitive sampling prior to the 1991 or 1992 field season. Baseline *I. scapularis* distribution data for our area was determined from the 1990 and 1991 studies with most of the ticks collected north of the Mississippi River in Anoka, Washington, and northern Ramsey counties. The 1992 study was designed to inspect areas that had not been sampled as intensely in the past, with emphasis on locations south and west of the Mississippi River, but the majority of *I. scapularis* collections continued to be obtained in the northeastern counties.

Since 1993, our distribution study has focused on the re-sampling of 100 sites to detect any potential changes in *I. scapularis* distribution over time. Seventy-five of these sites were re-sampled beginning in 1991 and were selected from the previous study based on three criteria: representative habitat of an area, locations that were unlikely to be developed, and areas where small mammal collections had been sufficient in the past. An additional twenty-five sites were selected from Dakota, Hennepin, Scott, and Carver counties in 1992 to increase our data collections south of the Mississippi River. We plan to monitor these sites indefinitely to track areas that have shown potential *I. scapularis* range expansion.

Periodically, additional sites have been sampled:
From 1995-1997 two additional sites were sampled; section 7 of New Market Township in Scott County (where a single adult *I. scapularis* tick had been collected in 1995) and section 19 of West Saint Paul Township in Dakota County (Dodge Nature Center- to foster improved relations through providing a general risk assessment). Sampling at these two locations was discontinued in 1998 since zero *I. scapularis* had been collected in either location in the three-year period.

From 2007-2009 several park sites were sampled and results compared to our 1990 results. Although we are still sampling a limited number of parks today, in 1990 a larger number of our sites had been selected inside metropolitan parks to provide a primitive assessment of park user risk to potential *I. scapularis* encounters. Included were Joy Park in North Saint Paul (62-08-01) and a location near Pigs Eye Lake in St Paul (62-13-02). In 1990 *I. scapularis* had not been collected at either park in three rounds of sampling. We re-sampled both parks, for two rounds only, as extra sites in 2007 and 2008. The 2007-08 Pigs Eye site was moved over one section, to section 3 while the 2007-08 Joy Park site was in the same (square mile) section, but east of our 1990 location. Unlike 1990, we detected *I. scapularis* in both parks in both years. In 2009 Joy Park and a previously unsampled Ramsey County location, Priory Preserve (62-04-24), were both sampled for three rounds and *I. scapularis* was found again at Joy Park. Zero mammals were collected at Priory Preserve.

In 2010 Joy Park and Priory Reserve were sampled for two rounds and a new site, section 18 of Laketown Township in Carver County (a single adult *I. scapularis* had been collected in late July 2009), was sampled for all three rounds. *I. scapularis* was not found at Joy Park in 2010 but was detected at both Priory Reserve and Laketown Township.

Materials and Methods

Of the 100 repeat sites, 56 are located north of the Mississippi River in Anoka (28 sites), Washington (25 sites), and Ramsey (3 sites) counties. The 44 repeat sites located south of the Mississippi River are distributed throughout the counties of Dakota (15 sites), Hennepin (14 sites), Scott (8 sites), and Carver (7 sites).

Sampling was initiated on April 23, 2018 and ended on October 25, 2018. Small mammal trapping was used as the primary sampling method. As in past years, the twenty-seven week study was divided into three nine-week sampling periods, and all sites were sampled for twenty-one trap nights (7 traps x 3 consecutive nights) per period. Weeks of site visitation were randomly selected within each sampling period. http://www.earth-pics.com/gallery/10most/the-most-amazing-ice-formations

One three-hundred foot transect was established at each sampling location and Sherman live traps (H. B. Sherman Traps, Inc., Tallahassee, Fla.), baited with peanut butter and oats, were placed along these transects at fifty foot intervals. We euthanized all small mammals caught in the traps, removed any ticks found, and stored the ticks in alcohol for later identification.

Results

- **2018 Study (Repeat Sites):**

Except for 2011, since 2007 and again in 2018 we collected *I. scapularis* from at least one site in all seven counties that comprise our service area. Specifically, we found at least one *I. scapularis* at 64 of our 100 sampling sites, with 41 of these positive sites located north of the Mississippi River in Anoka (19 sites positive of 28 sites sampled), Washington (20 sites positive of 25 sites sampled), and Ramsey (2 sites positive of 3 sites sampled) counties. Twenty-three additional positive sites were detected south of the river in Dakota (9), Hennepin (8), Scott (5), and Carver (1) counties (Figure 5A).

Overall, 765 mammals (Figure 1 and 2018 results in Table 2) were inspected: 359 from north of the Mississippi River and 406 from south of the river and a total of 1,305 *I. scapularis* (Figure 2 and 2018 results in Table 3) were collected from them. The Anoka County sites accounted for the majority (26%) of our 2018 collections, with the highest numbers collected in Coon Rapids (79L; 8N) township. Washington County accounted for another 24% of our total *I. scapularis* collections, with the highest numbers collected in May township (55L: 11N). An additional 20% of our total was collected in Hennepin County, in Bloomington township, specifically (191L; 1N).

The overall season mean number of *I. scapularis* collected per mammal in 2018 was 1.498 (larvae: 1.316, nymphs: .182). The mean increases to 2.118 (larvae: 1.861, nymphs: .257) when all sites negative for *I. scapularis* are excluded (see 2018 results in Figure 6). The highest average number of *I. scapularis* per mammal was calculated for Ramsey County (6.474), followed by Hennepin (2.462), Washington (1.717) and Anoka (1.657) counties (see 2018 results in Figure 3). North of the Mississippi River, townships in Washington County averaging ≥ 1.0 *I. scapularis* per mammal in 2018 were Hugo (7.571), Afton (4.071), Cottage Grove (2.071), Woodbury (2.0), May (1.269), and

Denmark (1.250), in Anoka County, Ham Lake (6.883), Coon Rapids (4.143), Blaine (3.556), Andover (2.190), East Bethel (1.545), Oak Grove (1.067), and Lino Lakes (1.050), and in Ramsey County, Shoreview (7.357). Averaging ≥ .500 *I. scapularis* per mammal north of the Mississippi River in 2018 was Grant (.895) and New Scandia (.800) of Washington County, and Linwood (.885) and Saint Francis (.722) of Anoka County. South[1] of the Mississippi River (no figure), townships maintaining averages ≥ .500 *I. scapularis* per mammal were, in Dakota, Hastings (5.273), Burnsville (3.8), Vermillion (.800) and Inver Grove Heights (.800) townships, in Hennepin, Bloomington (12.8), Maple Grove (2.0), and Brooklyn Park (.750) townships, and in Scott County, Saint Lawrence (1.4) and Blakeley (.500) townships (Figure 4).

- **Compiled Results (Repeat Sites) from 1990 – 2018 or 1991 - 2018:**

The 1990-2018 mean number of *I. scapularis* collected per mammal is .672, with averages in some townships south of the Mississippi River becoming comparable in recent years to the consistent higher averages many of the townships from north of the river have maintained over time. Washington County maintained the highest yearly county season means from 1990-1997 as well as 2010 and 2012 while Anoka County maintained the highest yearly county season means from 1998-2009, as well as 2011, 2014, 2015, 2016, 2017, and 2018. In 2013, Ramsey County had the highest county season mean (.842), for the first time (Figure 3). Anoka County's compiled 1990-2018 overall season mean is 1.160 and is followed by Washington County (1.020). The 1990-2018 township averages (all > 1.0), north of the Mississippi River include May, Hugo, Afton, Grant, and New Scandia of Washington County and Coon Rapids, Blaine, Saint Francis, Ham Lake, East Bethel, and Linwood of Anoka County, while the averages for Oak Grove, Andover, and Lino Lakes of Anoka County and Lakeland, Forest Lake, Lake Elmo, and Cottage Grove townships of Washington County are > .500 *I. scapularis* per mammal (Figures 4A and B—inserts on Figure 4). Shoreview of Ramsey County maintained a compiled 1990-2018 average of 1.045. In compiled results from south of the Mississippi River (1991 – 2018), Burnsville (2.590), Inver Grove Heights (1.078), and Vermillion (.927) townships of Dakota County, and Bloomington township (.588) of Hennepin County maintained 1991-2018 averages > .500 *I. scapularis* per mammal[2] (no figure). We have tabulated an overall yearly average of > 1.0 *I. scapularis* per mammal in only 2005 (1.180), 2014 (1.213), 2015 (1.450), 2016 (1.679). 2017 (1.209) and 2018 (1.498).

I. scapularis status at the 100 repeat sampling locations is shown on Figure 5. The status has changed at 96 of the sites since 1990 or 1991 (see 2018 results in Table 1). While the number of sites where *I. scapularis* is detected every year has decreased since 1992, we have detected *I. scapularis* at all but three of our sampling locations since 2016 (Table 1).

Our positive sites have been primarily located north of the Mississippi River in Anoka and Washington counties, with one consistently positive Ramsey County site (northern Shoreview Township). We tabulated two positive Ramsey County sites (both of our Shoreview Township sites) for the first time in 2003. These two sites were positive for *I. scapularis* again in 2005, 2006, 2008, 2010, 2013, 2014 and 2015. Our Roseville site has been positive since 2013. South of the river from 1990 – 1999 it had been typical to tabulate a maximum total of 3-4 positive sites each season. Except for 1991 when several *I. scapularis* were collected at one site each in Scott and Carver counties, positive sites were located only in Dakota County from 1990 through 1997.

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[1] Prior to 2005, township averages south of the river were not tabulated. See footnote 1 (and the report text) in the 2005 report for detailed yearly averages for positive townships south of the Mississippi River through 2005. In brief, Inver Grove Heights Township first averaged > .500 in 1998 while Vermillion Township first averaged > .500 in 1991. 2005 was the first year that Hassan Township (Hennepin County) had an average ≥ .500.

[2] Inver Grove Heights Township has maintained a compiled 1991-current year average of > .500 *I. scapularis* per mammal since 1999 while Vermillion's first compiled 1991-current year average > .500 *I. scapularis* per mammal occurred in 2004.

In 1998 we first detected *I. scapularis* in Hennepin and Scott counties[3] and in 2000 we began to tabulate more sites south of the river than in past years. In 2014 we first tabulated 30 positive sites south of the river and we tabulated generally that number in 2015 (30 positive sites), 2016 (29 positive sites), and 2017 (30 positive sites). In 2018 we tabulated 23 sites south of the river (Table 1A).

Comparing our 2018 small mammal and immature *I. scapularis* collection results with past study efforts, small mammal (Table 2) and immature tick (Table 3) species diversity appears comparable to past years. As in past years, *Peromyscus leucopus* was the predominant mammal species collected. In our tick collections, *I. scapularis* comprised 80% of our overall collections; close to our record high of 81% from 2017. Since 2002 and including 2018 *I. scapularis* has comprised $\geq$ 50% of our overall collections 13 times. This compares to the 16 times that *Dermacentor variabilis* has comprised the majority, including for the first 12 years of this study. The total number of ticks collected in 2018 (*D. variabilis*, *I. scapularis,* and *I. muris* combined) was 1,430 (Table 3). As Figures 3 and 6 show, our 2018 overall season mean of 1.498 *I. scapularis* per mammal is similar to the averages we have come to expect in recent years (in addition to 2018, 2000 – 2002, 2004, 2005, 2007, 2009, 2010, 2012, 2014, 2015, 2016, and 2017 were all $\geq$ .806). *P. leucopus* consistently has been the predominant mammal species collected each year with some variability in the total percentages collected[4] (Figure 1 and Table 2). The 2018 average number of mammals collected per site (7.65) is a lower than average yearly small mammal collection total (Table 2). Our compiled average small mammal collection success level per site for 1990 through 2018 is 12.40 (1991-2018 average of 11.80 for100 repeat sites only), with results ranging from 2013's low of 5.96 mammals collected per site to the high of 20.61 (23.54 at the 100 repeat sites only) in 1991.

Discussion

Our results seem to indicate that *I. scapularis* populations are now established throughout our seven county service area. Although our study was not designed to specifically answer the question of tick establishment, we feel that our relative *I. scapularis* density estimates are accurate enough for a general risk assessment. While it remains our view that the greatest Lyme disease risk continues to occur in the northern metropolitan area[5], greater *I. scapularis* exposure opportunities and therefore higher tick-borne disease risk is occurring now across our seven county service area.

Looking at the overall numbers of *I. scapularis* collected, *I. scapularis* comprised 80% of our total collections in 2018 (the record is 81% (2017)), and *I. scapularis* has now comprised $\geq$70% of our tick collections for the sixth time (Table 3). However, we "only" tabulated 64 positive sites in 2018. Looking at the entirety of positive site totals by year since the study started in 1990, however, we have tabulated positive site totals of lower than 64 in 22 years versus six years (all tabulated within the last nine years) that we have tabulated positive site totals of higher than 64. Therefore, while our 2018 positive site total of 64 does seem low in comparison to recent years totals, it does again show that the metro *I. scapularis* population continues to be elevated compared to the majority of years of this study. Overall, our first positive site total in the 70's had been in 2010, while our first positive site total in the 80's was 2015 (Figure 3).

[3] *I. scapularis* was collected previously in Hennepin County in a collaborative study with Dr. R. Johnson of the University of Minnesota and in very small numbers in Scott and Carver counties (one site each) in our 1991 study effort. In 1995 District staff performing pest mosquito activities inadvertently found a single adult tick in Scott County's New Market Township but no additional *I. scapularis* were detected there in a 3 year sampling effort. Staff or the public have continued to occasionally turn in adult *I. scapularis* from Scott County, especially from New Market Township, since 1995.

[4] see the discussion sections in the 1993 (*I. scapularis* population estimates) and 1994 (graph handout-mammal density equality across sites) *I. scapularis* distribution study report

[5] Yearly metro human exposure case totals vary from 1 case per year occurring sporadically in Scott and Carver counties to double-digit amounts (typically teens to twenties) for both Anoka and Washington counties (personal communication MN Dept Health).

In 2018 we tabulated our 2nd highest total number of *I. scapularis* collected per mammal (1.498) since this study began in 1990. Since 2014 (and including 2018), our average number of *I. scapularis* collected per mammal has averaged > 1.0 (range 1.209 – 1.679). In comparison, from 2000 – 2013 and except for 2003 (.389), 2005 (1.180), and 2013 (.401), the number of *I. scapularis* collected per mammal ranged from .616 - .950. From 1990 - 1999 the range was .089-.496 *I. scapularis* per mammal.

Looking only at our 2018 results for Ramsey County, we tabulated an average of 6.474 *Ixodes scapularis* per mammal, which is the highest average we have ever tabulated for a county (Figure 3). However, if we excluded one *Blarina brevicauda* with a tick load[6] of 67 larvae, it would bring Ramsey County's average down to 2.611 *Ixodes scapularis* per mammal; an average similar to what has been previously tabulated for both Anoka and Washington counties.

Minnesota human tick-borne disease statewide case totals began to rise in 2000. Case data for 2018 as provided by the Minnesota Department of Health (MDH) is not yet available (as of July 1, 2019) but in 2017 there had been 1,408 Lyme and 638 human anaplasmosis (HA) cases. Comparatively, statewide Lyme case totals from 1992-1999 had been roughly 250 Lyme cases per year while the MDH had been compiling an average of roughly 15 HA cases per year statewide from 1997 to 1999. The median number of Lyme cases from 2000 to 2008 that the MDH had tabulated was 913 (range 463 - 1,239) and from 2009 - 2017 was 1,203 (range 896 - 1,431), while the median number of human anaplasmosis cases from 2000 - 2009 was 163 (range 76-322) and from 2010-2017 was 633 (range 448-788).

During the time the MDH had been separating metro residents from people who reside elsewhere in the state for their statewide data tallies, they had consistently documented that metro residents comprised roughly half of the Lyme cases tallied[7]. Although metro-exposed case tallies have not been available since 2008, metro case totals were also rising over time, just not as dramatically as the statewide totals. The last available (2007) totals had been at all-time highs (80 Lyme, 9 HA). Comparatively, the range for metro-exposed Lyme cases was 15 to 43 from 1991 – 1999 and 40 to 69 from 2000 – 2006 for all seven counties combined. Although HA had been detected in MMCD collaborative research in metro-collected small mammals beginning in 1995[8], locally acquired human HA cases were not documented by MDH until 2000. From 2000 – 2007 the MDH had typically tabulated a few metro-exposed HA cases each year (range 0-9). Case totals obviously would be higher if using metro resident data, not just people who were exposed in the metro.

Metro residents north of the Mississippi River have been used to encounters with *I. scapularis* but south of the river these encounters have changed over time from extremely infrequent to what is now commonplace. The risk of metro tick encounters is higher than it used to be and is based both on our higher collections of *I. scapularis* in recent years compared to the early years as well as that we are collecting ticks from a broader geographic area now than in years past.

[6]*Blarina brevicauda* typically do not carry heavy tick loads (yearly *Ixodes scapularis* distribution study data). We are unsure why this *Blarina* specimen had such an unusually heavy tick load for this species.

[7]Slide 37 www.health.state.mn.us/divs/idepc/diseases/**lyme**/**lyme**slide.ppt CHANGE TO 7

[8]Several serology studies have been performed since 1995 using both distribution-study collected small mammals and small mammals collected at different sites. A map showing the results of our 1995 and 1997 efforts is available on our website (http://www.mmcd.org/tick_links.html). The 1995 work has been published--Walls, J. J., B. Greig, et al. (1997). "Natural Infection of Small Mammal Species in Minnesota with the Agent of Human Granulocytic Ehrlichiosis." Journal of Clinical Microbiology **35**(4): 853-855. Additional unpublished studies have been performed in collaboration with Dr. Russell Johnson, UM Microbiologist. Serology results of the later distribution study serology efforts are similar overall to the 1995 and 1997 work shown on the website map.

ADDITIONAL UPDATES/RESEARCH:

STUDIES/PROJECT UPDATES AND PLANS FOR 2019.

- ***Ixodes scapularis* distribution study** (sites unchanged from 1993).
- **Publication coming soon.** In 2014 MMCD had provided *I. scapularis* nymphs from 1990 - 2014 to Steve Bennett (UM-St Paul), for testing. Steve is preparing a paper for publication. His dissertation was titled "The Complex Eco-Epidemiology of Tick Borne Disease: Ticks, Hosts and Pathobiomes in an Urbanizing Environment".

AMBLYOMMA AMERICANUM

Amblyomma americanum (lone star tick) records are significant because these ticks vector human monocytic ehrlichiosis, they are an aggressive human biter, and their range is known to be moving northward. Though found here since 1990 on a rare, sporadic basis, Minnesota is not within their historic range. In 2009 there were several *Amblyomma* collections (one adult, submitted to the MDH, one nymph, submitted to MMCD) in one year; an unusual event. This trend continued in 2010, with *Amblyomma* submitted to MMCD from Eagan, Mound, and the Orono/Lake Minnetonka areas of the metro. Either agency has continued to identify *A. americanum*, on a yearly basis, as shown in Table 4.

Table 4. Amblyomma americanum collections by MMCD and the MN Dept Health, 2009 -2018.

Year	Stage and sex	Location	Agency
2009	1 female 1 nymph	? ?	MDH MMCD
2010	3 females	Eagan, Mound, Orono/Lk Mtka area	MMCD
2011	3 females	Shakopee, Lindstrom, Hennepin Co.	MDH
2012	3 females	Eden Prairie or Burnsville, Bloomington, Rice Co.	MDH
2013	3 females	Afton, Scandia, Western WI- sent to WDH	MMCD
2014	1 female	Zumbrota	MDH
2015	1 male, 1 nymph 1 female	Elk River area ? – collected by Jordan dog groomer	MMCD
2016	2 nymphs 3 females (pictures) 2 females (reported)	Florida travel history Scott Co., Ramsey Co., on a dog – loc ? Wabasha Co., Dakota Co.	MMCD MDH MDH
2017	1 male (dragging) May 6 1 female (picture) 1 female (reported) June 27 1 female July 6 1 female July 7	Cold Spring (Stearns Co.) Ottertail Co. found on child Chippewa Co Stillwater, Washington Co. Golden Valley, Hennepin Co.	MDH
2018	1 adult (reported) before June 29 1 female (dragging) June 29	Itasca State Park Near same area as above tick, at Itasca State Park	MDH
TOTAL	25 female, 2 male, 4 nymph 1 unknown	32 *Amblyomma americanum* 2009-2018	

HAEMAPHYSALIS LONGICORNIS

The longhorned tick (*H. longicornus*, also known as the bush tick/cattle tick) was first detected in New Jersey in the fall of 2017 and is now known to have been the United States since at least 2010. It has been found mostly on the eastern seaboard but has also been found in Arkansas.

The longhorned tick has the potential to spread various diseases. While its principle host is cattle, it does feed on many different mammal species. In the United States it is known to have fed on sheep, goats, horses, and cattle, and has been collected from wildlife including raccoon, opossum, and deer. It has the potential to feed on humans as well.

There appear to be two types of this tick species, and also a race that is capable of reproducing using either of the two types. The first type reproduces through mating while the other type, the type apparently introduced into the U.S., is parthenogenic, meaning a female doesn't need to mate to produce eggs. Therefore, an introduction of a single female tick into an area could potentially cause the longhorned tick to become established there.

The "good news" for Minnesota is that there is some question as to temperatures and survivability of this parthenogenetic form of tick. The lowest temperatures that the known type that has been introduced into the US, the parthogenetic longhorned tick, is known to be able to withstand is 14°F. Whether it can survive in lower temperatures is unknown at this time. Also, temperatures in the range of 81 °F – 86 °F and higher are detrimental to egg development of the parthogenetic type of longhorned tick.

MMCD is in a good position to detect introductions of *H. longicornus*. Our tick surveillance would pick up the immature stages and our staff would turn in any adult ticks to be identified. We also have had our tick identification service in place for many years and will continue to utilize Facebook to keep the public informed and to enlist their help to turn in suspected ticks.

We are partnering with other Minnesota agencies, including the MDH. All agencies will keep each other informed of any longhorned ticks found, and all ticks will be sent to Dr. Ulrike Munderloh, UM – St Paul, for confirmation of identifications.

➢ NEW *AMBLYOMMA AMERICANUM/ HAEMAPHYSALIS LONGICORNIS* DOUBLE SIDED TICK CARD

MMCD created a longhorned/lone star tick card that was ready by spring of 2019. The card is being used to educate as well as to solicit the public's assistance in finding any introductions of either species into our service area or the state of Minnesota. It is being distributed across the metro along with our other tick materials and we will also have the card available for distribution at booths at various events across the metro, at our county fairs, and also at our booth at the annual Minnesota State Fair.

POSTING AT DOG PARKS.

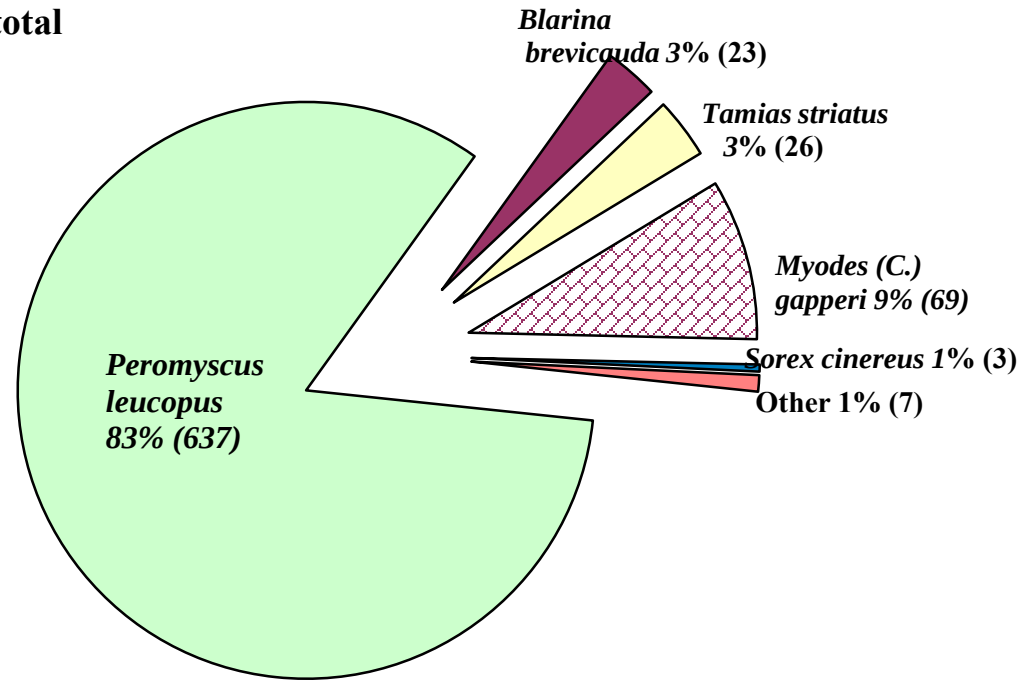
Since the initial suggestion of the Technical Advisory Board (TAB) in 2010, we have visited dog parks and vet offices as part of our outreach. Signs have been posted in at least 21 parks with additional signs posted in active dog walking areas. In 2017 we had posted a total of 41 signs at over 36 locations throughout the metro with most signs removed in winter. Signs are being re-posted in spring 2018.

DISTRIBUTING MATERIALS TO TARGETED AREAS

In 2017 brochures, tick cards, and/or posters were dropped at roughly 292 locations (city halls, libraries, schools, child care centers, retail establishments, vet clinics, parks) across the metro as well as distributed at fair booths and city events, with many more mailed upon request. We began materials distribution in spring 2018.

Small Mammals Collected
2018: 765 total

Figure 1



Ticks, by Species and Stage, Removed from Small Mammals
2018: 1,609 total

Figure 2

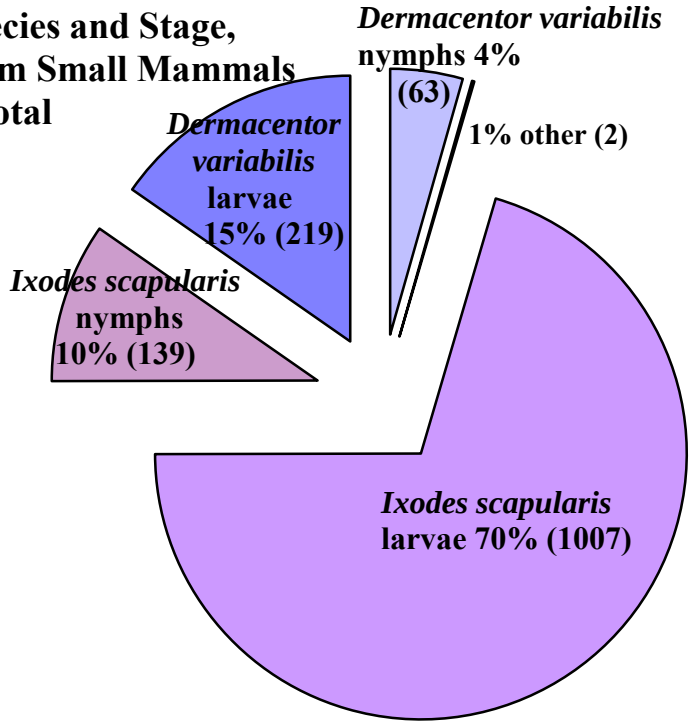
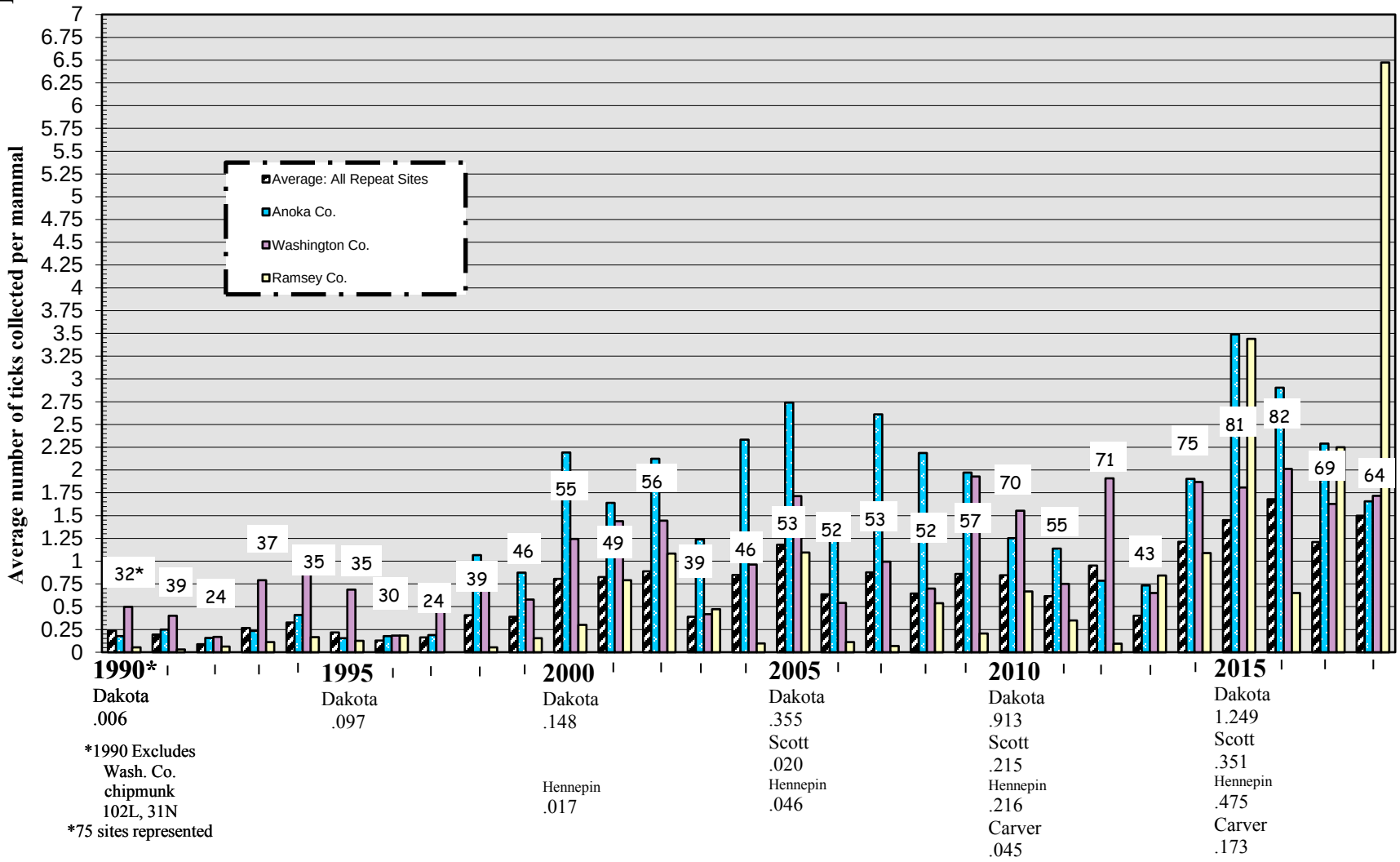


Figure 3

Average number of *I. scapularis* collected per mammal at 100 sampling locations in Anoka, Washington, and Ramsey counties: 1990 - 2018
(white box shows the total number of sites where at least one *I. scapularis* was found: by year)



1990*
Dakota
.006

*1990 Excludes Wash. Co. chipmunk 102L, 31N
*75 sites represented

1995
Dakota
.097

2000
Dakota
.148

Hennepin
.017

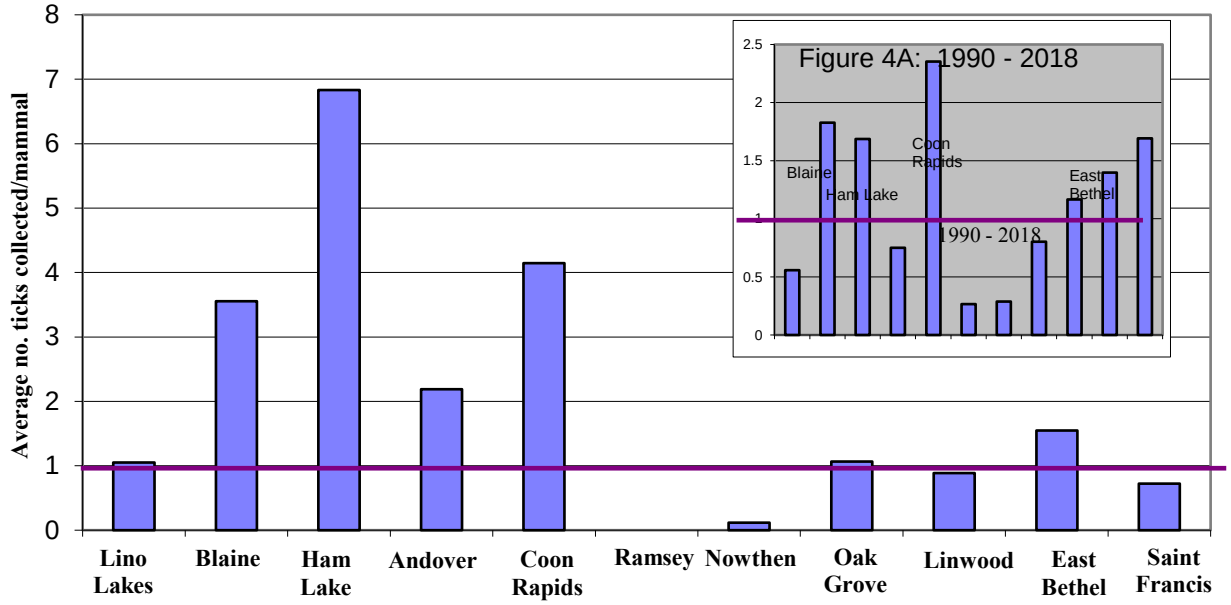
2005
Dakota
.355
Scott
.020
Hennepin
.046

2010
Dakota
.913
Scott
.215
Hennepin
.216
Carver
.045

2015
Dakota
1.249
Scott
.351
Hennepin
.475
Carver
.173

Figure 4

Average number of *I. scapularis*collected per mammal in Anoka county (by township): 2018 results



Average number of *I. scapularis*collected per mammal in Washington county (by township): 2018 results

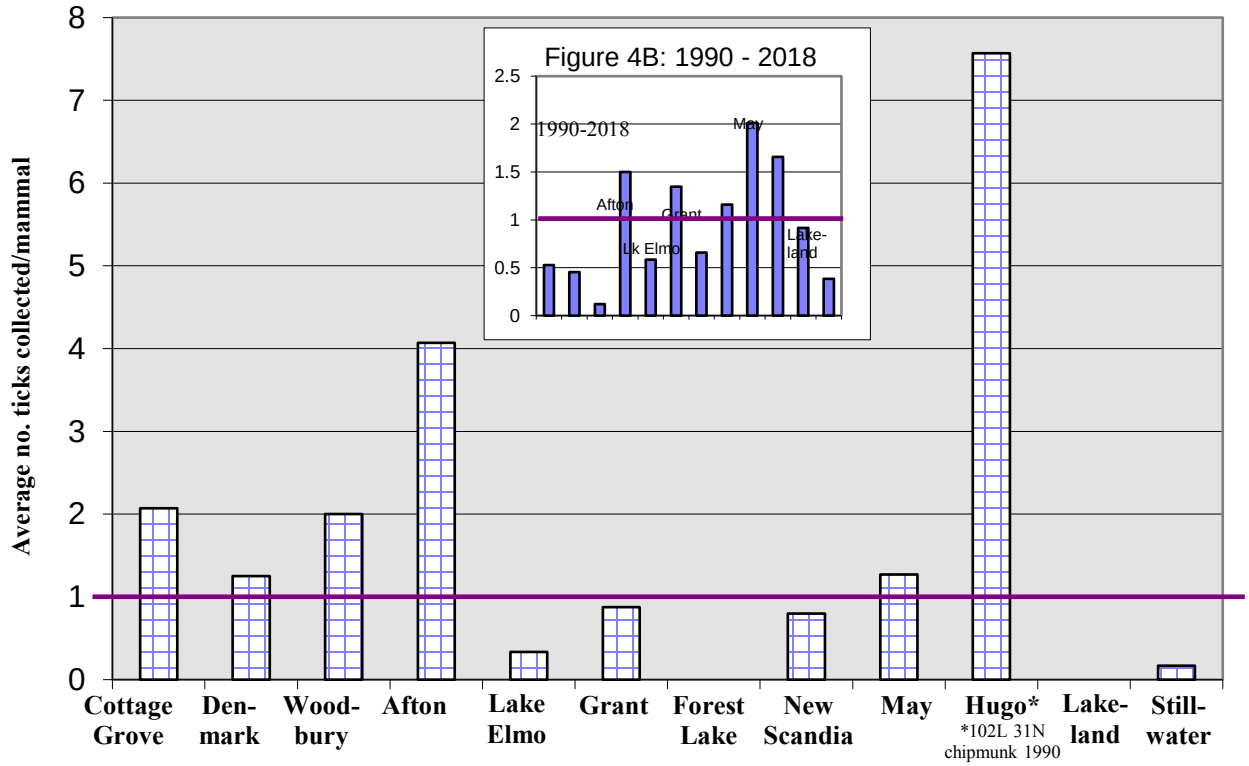
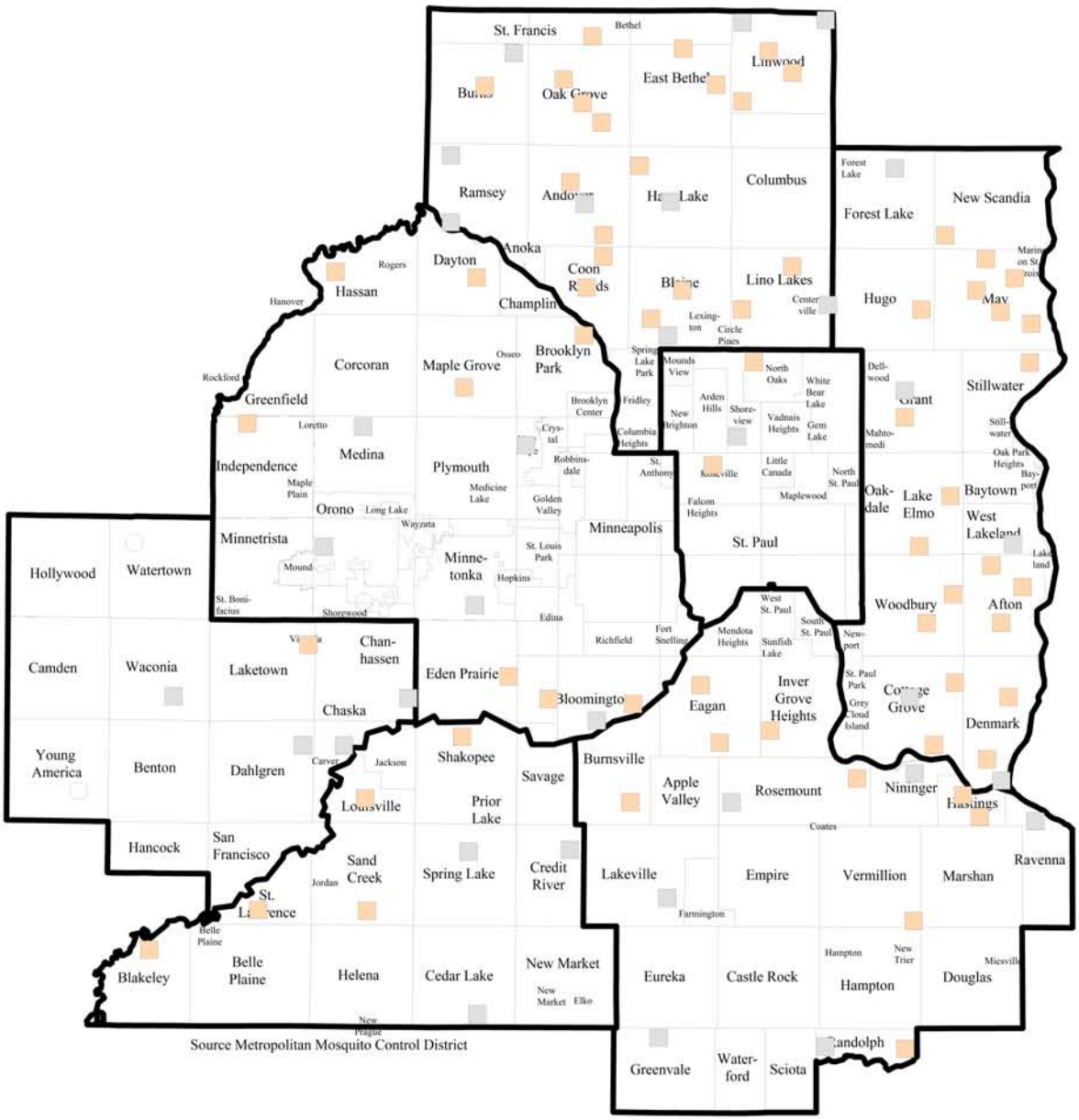


Figure 5A

Ixodes scapularis Presence/Absence status: 1990 - 2018

(present if at least one I. scapularis is collected during a year)



Source Metropolitan Mosquito Control District

Status 2018

present	(64)
absent this year	(33)
not found 1990-2018	(3)

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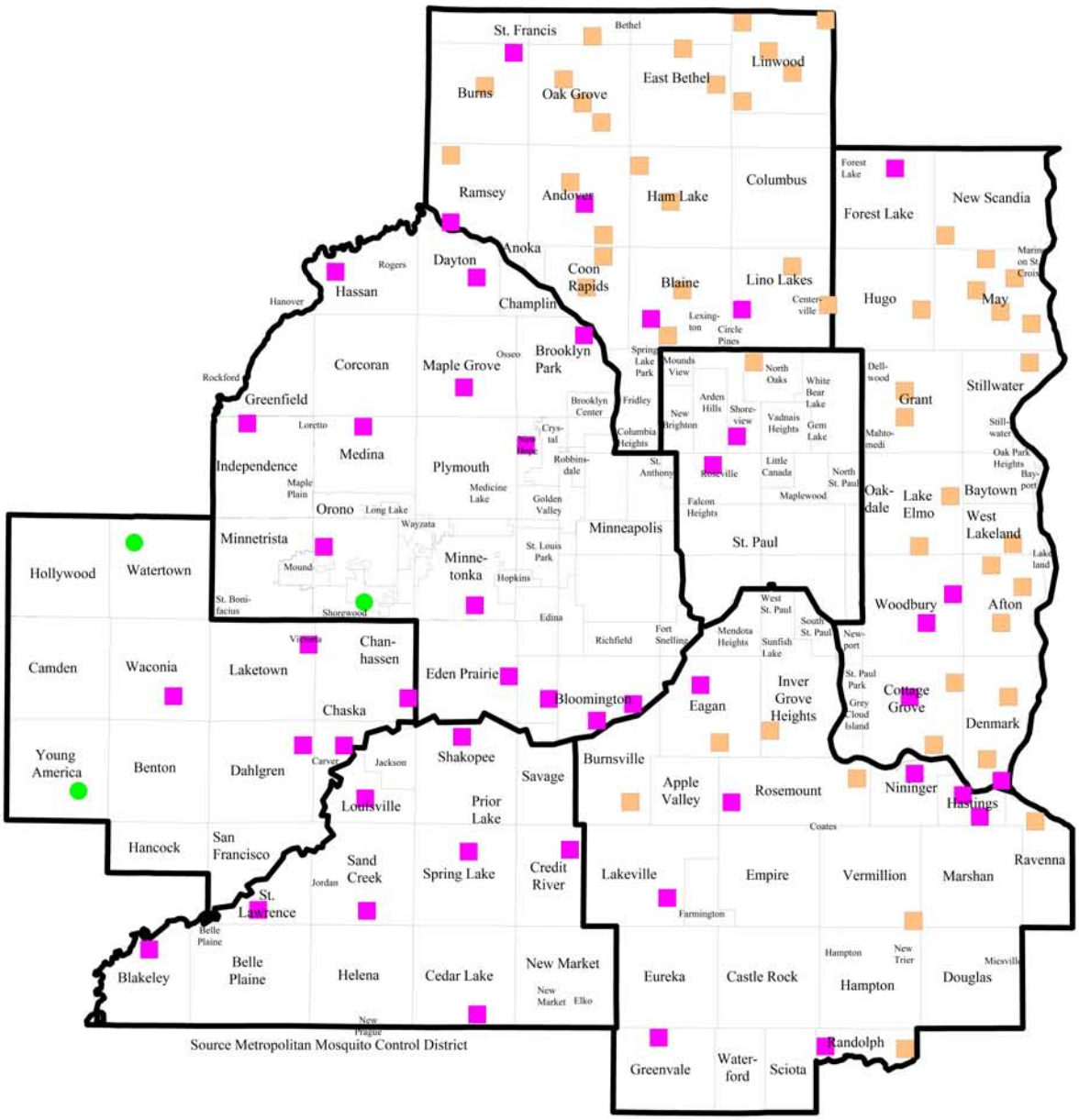
Figure 5

Ixodes scapularis Presence/Absence status: 1990 - 2018

(present if at least one I. scapularis is collected during a year)



Source Metropolitan Mosquito Control District

At least one tick found during:

- all/most years (51)
- at least one year (46)
- (not found) (3)

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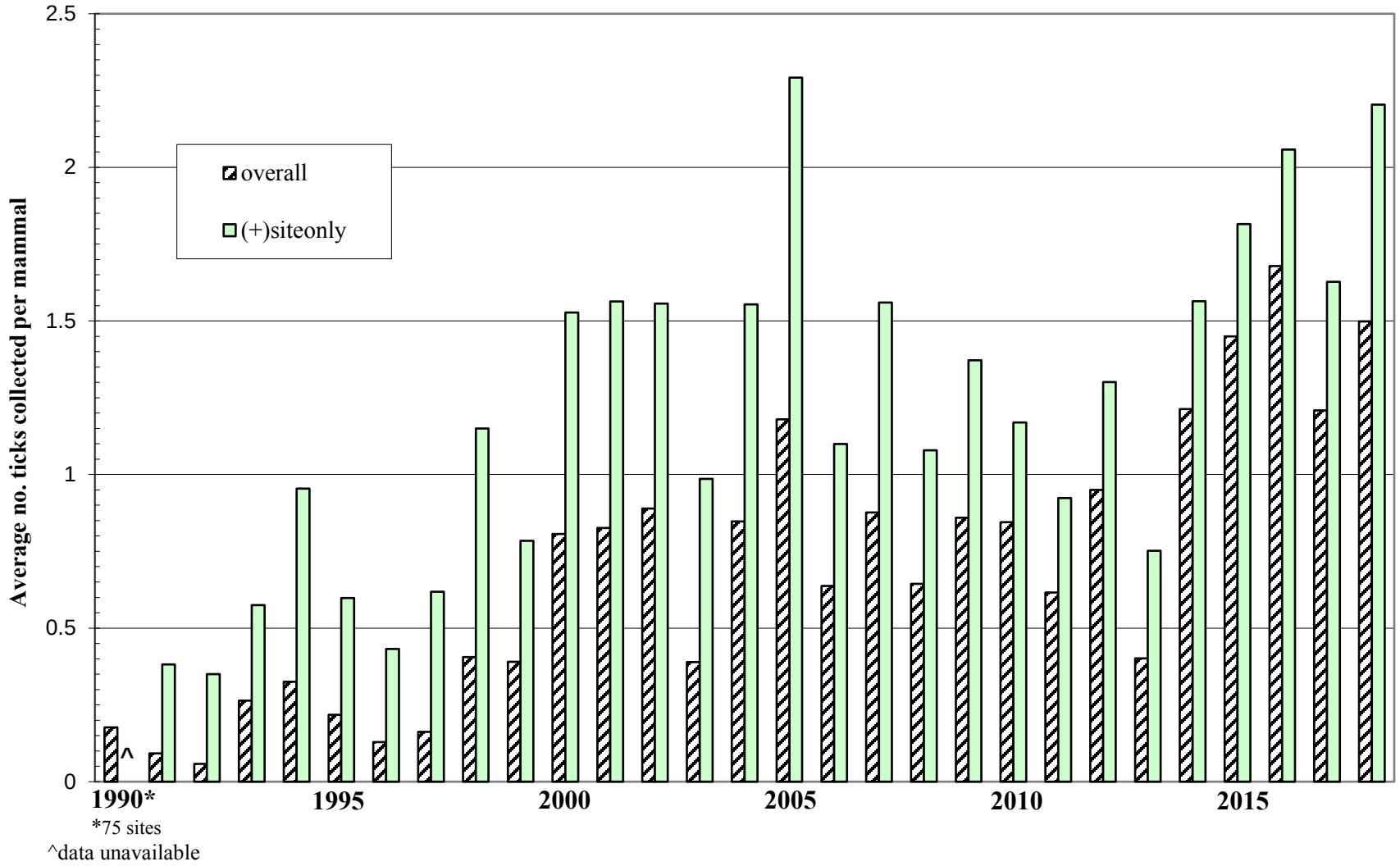
Figure 6

Average number of *I. scapularis* collected per mammal at 100 repeat sampling locations 1990-2018 overall vs. sites where at least one *I. scapularis* was collected (positive sites)



*75 sites

^data unavailable

Table 2. Numbers and Percentages of Small Mammals Collected by Year

Year	No. sites	Total mammals collected	Avg collected per site and [100 repeat sites only]	*Peromyscus leucopus* percent (n)	*Tamias striatus* percent (n)	*Myodes (Clethrionomys) gapperi* percent (n)	*Blarina brevicauda* percent (n)	Other* percent (n)
[a] 1990	250	3651	14.6 [17.15 @75 sites]	80% (2921)	6% (224)	7% (240)	4% (155)	3% (111)
1991	270	5566	20.61 [23.54]	77% (4308)	7% (395)	5% (264)	7% (402)	4% (197)
1992	200	2544	12.72 [12.68]	71% (1804)	9% (223)	4% (103)	13% (329)	3% (85)
1993	100	1543	[15.43]	81% (1243)	4% (69)	7% (101)	7% (107)	1% (23)
1994	100	1672	[16.72]	78% (1309)	10% (171)	5% (79)	5% (76)	2% (37)
1995	100	1406	[14.06]	79% (1114)	11% (156)	4% (56)	4% (61)	1% (19)
1996	100	791	[7.91]	79% (628)	11% (84)	3.5% (29)	3.5% (28)	3% (22)
1997	100	728	[7.28]	71% (515)	13% (98)	3% (24)	10% (71)	3% (20)
1998	100	1246	[12.46]	84% (1041)	4% (51)	3% (42)	6% (72)	3% (40)
1999	100	1627	[16.27]	85% (1376)	7% (108)	3% (46)	4% (63)	2% (34)
2000	100	1173	[11.73]	83% (968)	7% (86)	5% (55)	2% (28)	3% (36)
2001	100	897	[8.97]	80% (719)	6% (58)	7% (63)	4% (39)	2% (18)
2002	100	1236	[12.36]	87% (1074)	6% (73)	3% (42)	2% (27)	2% (20)
2003	100	1226	[12.26]	88% (1081)	6% (72)	3% (36)	1% (16)	2% (21)
2004	100	1152	[11.52]	87% (1007)	6% (71)	3% (40)	2% (20)	1% (14)
2005	100	965	[9.65]	87% (841)	6% (54)	4% (37)	2% (16)	2% (17)
2006	100	1241	[12.41]	85% (1056)	4% (54)	8% (94)	0% (2)	3% (35)
2007	100	849	[8.49]	85% (721)	8% (71)	5% (42)	1% (5)	1% (10)
2008	100	702	[7.02]	80% (560)	8% (53)	6% (45)	4% (29)	2% (15)
2009	100	941	[9.41]	86% (809)	4% (40)	5% (47)	1% (14)	3% (31)
2010	100	1320	[13.20]	82% (1084)	4% (55)	6% (78)	5% (70)	3% (33)
2011	100	756	[7.56]	73% (549)	8% (62)	11% (81)	6% (43)	3% (21)
2012	100	1537	[15.37]	86% (1322)	3% (49)	7% (103)	2% (31)	2% (32)
2013	100	596	[5.96]	80% (474)	5% (31)	9% (56)	3% (18)	3% (17)
2014	100	1396	[13.96]	85% (1192)	5% (69)	7% (101)	2% (23)	1% (11)
2015	100	1195	[11.95]	84% (1006)	5% (62)	7% (83)	2% (22)	2% (22)
2016	100	1374	[13.74]	84% (1149)	5% (67)	6% (86)	3% (46)	2% (26)
2017	100	1079	[10.79]	83% (894)	5% (56)	8% (88)	2% (25)	1% (16)
2018	100	765	[7.65]	83% (637)	3% (26)	9% (69)	3% (23)	1% (10)

*Other includes *Microtus pennsylvanicus, Spermophilus tridecemlineatus, Zapus hudsonius, Mustela erminea, Tamiasciurus hudsonicus, Glaucomys volans, Sorex articus, Sorex cinereus* , *Mus musculus* and several ground-feeding bird species.

Table 3. Numbers and Percentages of Tick Species Collected by Stage and Year

Year	No. sites	Total ticks collected	*Dermacentor variabilis* L[b] percent (n)	*Dermacentor variabilis* N[c] percent (n)	*Ixodes scapularis* L[b] percent (n)	*Ixodes scapularis* N[c] percent (n)	Other species[d] percent (n)
[a] 1990	250	9957	83% (8289)	10% (994)	6% (573)	1% (74)	0% (27)
1991	270	8452	81% (6807)	13% (1094)	5% (441)	1% (73)	0% (37)
1992	200	4130	79% (3259)	17% (703)	3% (114)	1% (34)	0% (20)
1993	100	1785	64% (1136)	12% (221)	22% (388)	1% (21)	1% (19)
1994	100	1514	53% (797)	11% (163)	31% (476)	4% (67)	1% (11)
1995	100	1196	54% (650)	19% (232)	22% (258)	4% (48)	1% (8)
1996	100	724	64% (466)	20% (146)	11% (82)	3% (20)	1% (10)
1997	100	693	73% (506)	10% (66)	14% (96)	3% (22)	0% (3)
1998	100	1389	56% (779)	7% (100)	32% (439)	5% (67)	0% (4)
1999	100	1594	51% (820)	8% (128)	36% (570)	4% (64)	1% (12)
2000	100	2207	47% (1030)	10% (228)	31% (688)	12% (257)	0% (4)
2001	100	1957	54% (1054)	8% (159)	36% (697)	2% (44)	0% (3)
2002	100	2185	36% (797)	13% (280)	42% (922)	8% (177)	0% (9)
2003	100	1293	52% (676)	11% (139)	26% (337)	11% (140)	0% (1)
2004	100	1773	37% (653)	8% (136)	51% (901)	4% (75)	0% (8)
2005	100	1974	36% (708)	6% (120)	53% (1054)	4% (85)	0% (7)
2006	100	1353	30% (411)	10% (140)	54% (733)	4% (58)	1% (11)
2007	100	1700	47% (807)	8% (136)	33% (566)	10% (178)	1% (13)
2008	100	1005	48% (485)	6% (61)	34% (340)	11% (112)	1% (7)
2009	100	1897	48% (916)	9% (170)	39% (747)	3% (61)	0% (3)
2010	100	1553	21% (330)	7% (101)	65% (1009)	7% (107)	0% (6)
2011	100	938	40% (373)	10% (97)	28% (261)	22% (205)	0% (2)
2012	100	2223	25% (547)	9% (211)	59% (1321)	6% (139)	0% (5)
2013	100	370	24% (88)	11% (42)	40% (147)	25% (92)	0% (1)
2014	100	2427	24% (580)	6% (149)	67% (1620)	3% (74)	0% (4)
2015	100	2217	15% (390)	4% (91)	65% (1442)	13% (291)	0% (3)
2016	100	3038	19% (576)	5% (153)	68% (2055)	8% (252)	0% (2)
2017	100	1609	16% (253)	3% (45)	68% (1101)	13% (204)	0% (6)
2018	100	1430	15% (219)	4% (63)	70% (1007)	10% (139)	1% (2)

[a] 1990 data exludes one *Tamias striatus* with 102 larval & 31 nymphal *I. scapularis*

[b] L = larvae

[c] N = nymphs

[d] Other species mostly *Ixodes muris* 1999-2nd adult *I. muris* collected 2007-collected 7 *I. marxi* nymphs