Survey of Indiana Deer for *Ixodes scapularis* Ticks: 1999 Final Report

Robert R. Pinger, Ph.D
Public Health Entomology Laboratory
Department of Physiology and Health Science
Ball State University, Muncie, IN 47306-0510
Phone: (765) 285-5961

Introduction

The purpose of the Survey of Indiana Deer for *Ixodes scapularis* Ticks is to monitor the expanding geographic distribution of *I. scapularis*, the blacklegged tick, in Indiana. The information gathered form this survey is key to a clear understanding of the risk of exposure to this important vector and the diseases it transmits in various regions of the State. These diseases include Lyme disease, human granulocytic ehrlichiosis and babesiosis. Thus far, only Lyme disease has been reported in Indiana.

The Public Health Entomology Lab (PHEL) at Ball State University has coordinated annual surveys of hunter harvested deer since 1990. Passive and active surveillance activities are conducted in cooperation with the faculty and students from several Indiana universities, and representatives of the Indiana State Department of Health (ISDH), several local health departments, and the Indiana Department of Natural Resources (IDNR). This report describes the surveillance procedures and summarizes the data collected in this the tenth year of the survey.

Methods

In September 1999, a letter describing the survey of hunter harvested deer for ticks was sent to each of the 381 official deer check stations listed in the 1999-2000 Indiana Hunting and Trapping Guide published by the IDNR's Division of Fish and Wildlife. The letters encouraged individuals involved with checking and weighing deer to send any ticks found to our lab for identification. A "Ticks Wanted" poster was included with each letter to raise awareness on the part of deer check station operators and hunters about ticks encountered on deer. Approximately one week later, a tick mailing kit containing a vial and data sheet was sent to each check station to enable operators to return any ticks found to the Public Health Entomology Lab.

In addition to contacting the official deer check stations of Indiana, an effort was made to involve local health departments in each county of Indiana. In October, a letter and a tick mailing kit were sent to each of the 92 county health departments in Indiana. The letter described the annual survey and encouraged environmental health specialists to visit local deer check stations to check deer during the opening weekend of firearm season (November 13 and 14, 1999). A "Ticks Wanted" poster was also included with each letter. To support this effort, Dr. Michael J. Sinsko, Senior Medical Entomologist of the ISDH, compiled a letter of encouragement which also accompanied the materials from the PHEL. These processes constituted the passive surveillance portion of the survey.

Twenty-six deer check stations in 21 counties were selected for active surveillance during the 1999 firearm season. The majority of active surveillance occurred on November 13 and 14, 1999, the opening weekend of firearm season. These dates were chosen in order to maximize the number of deer examined at each site. Deer were also examined at special hunts in selected State Parks. Permission to examine deer at stations located on state properties was obtained from IDNR. Permission to examine deer at privately owned stations was obtained from local owners.

Nearly 50 volunteers participated in the active inspection of hunter harvested deer at Indiana deer check stations (Table 1). Participants received written guidelines for examining deer for ticks

(Appendix I) and data forms on which to record the number of deer examined, the county the deer was killed in, and the number of ticks found (Appendix II). Any ticks removed from the deer were stored in small plastic vials. The vials and data forms were then sent or carried to the Public Health Entomology Lab at Ball State University for review and identification of ticks.

Results

A total of 1053 deer from 56 counties were examined at 26 check stations where active surveillance took place. A total of 214 *I. scapularis* ticks were found on 75 (7.1%) of the 1053 deer examined. These ticks were collected from deer harvested in Bartholomew, Cass, Fountain, Franklin, Fulton, Hamilton, Jasper, Johnson, Knox, Kosciusco, LaPorte, Porter, Pulaski, Starke, Vigo, and White. These sixteen counties are shaded in Figure 1. Ticks were found on deer in Hamilton and Knox and Kosciusko Counties for the first time.

Considering only the counties from which ten or more deer were examined, the highest infestation rate occurred in Pulaski County where 66% (35/53) of the deer examined harbored ticks. The second highest infestation rate was recorded in Starke County where 40% (4/10) deer were infested; this was followed by Jasper County where 16.7% (7/42) of the deer were infested.

Figure 2 depicts the counties in which at least one deer was positive for *I. scapularis* since the annual survey began in 1990. With the addition of the three new counties mentioned above, the number of Indiana counties from which *I. scapularis* ticks have been found on deer has increased to 29 (Fig. 2). It is important to note that this distribution does not include *I. scapularis* ticks sent into our lab from other hosts, such as humans or dogs. For example, in 1999, for the first time we received one *I. scapularis* each from Elkhart and Sullivan Counties. These ticks were collected from humans. This brings the total number of Indiana counties reporting at least one *I. scapularis* tick to 47.

None of *I. scapularis* ticks collected from deer in 1999 were tested for *Borrelia burgdorferi*, the spirochete that causes Lyme disease. Thus far, our Lab has detected spirochetes in ticks from four northwestern counties in Indiana: Jasper, Newton, Porter, and Pulaski Counties.

Discussion

The 1999 survey of Indiana hunter-harvested deer for *I. scapularis* ticks produced significant data. Active surveillance of deer in 1999 resulted in a higher percentage of deer positive for *I. scapularis* (7.1% or 75/1053) than in 1998 (4.5% or 52/1167) or 1997 (1.8% or 30/1652), even though the total number of deer examined was smaller each successive year.

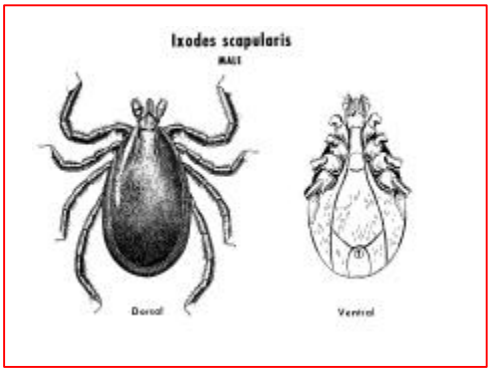
The findings presented here support the view that the *I. scapularis* tick population is continuing to extend its range in Indiana. Although active surveillance of hunter-harvested deer at check stations is limited because of the availability of volunteers, it has continued to provide useful information about the expanding range of *I. scapularis* in Indiana.

Acknowledgments

I extend my thanks to all who participated in the survey, including all of those whose names appear in Table 1. I especially thank Dr. Joe Camp of Purdue University-North Central, Dr. John Whitaker of Indiana State University, and Dr. Tom Morrell, Ball State University who encouraged their students to participate.

Special thanks also goes to Dave Spitznagle at Willow Slough FWA in Newton County, who has diligently conducted surveillance on *I. scapularis* ticks for many years. I also thank Dr. Michael Sinsko, Brad Foster, Keri Karris, and Vivie Dunn (ISDH) for their many years of help on this annual survey.

This report will be made available on line from the Public Health Entomology Lab web site.



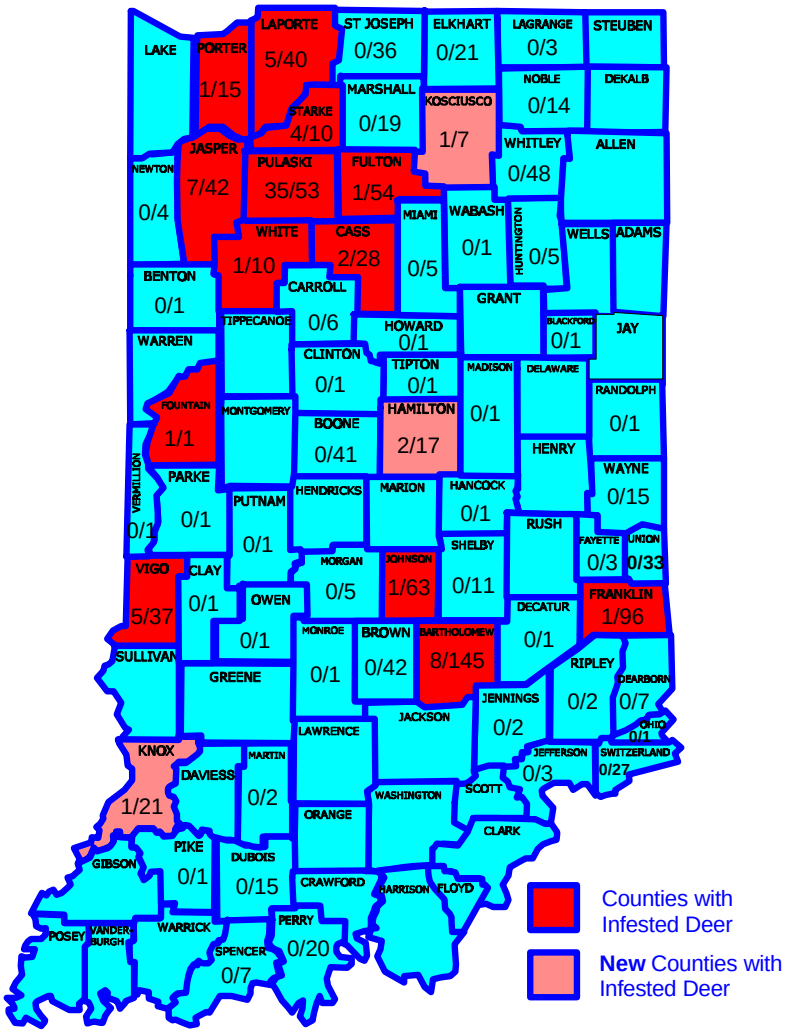


Fig. 1 Number of Deer positive for *Ixodes scapularis* Ticks and Number of Deer Examined by County, Indiana, 1999

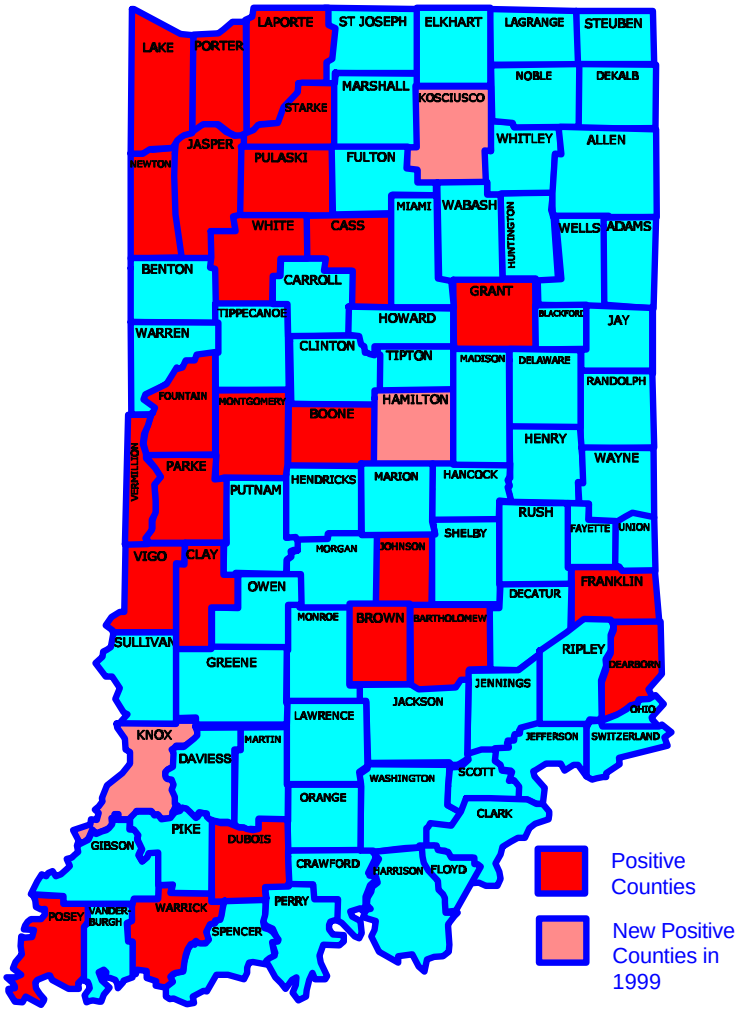


Fig. 2 Indiana Counties with at Least One Deer positive for *Ixodes scapularis* Ticks, 1990-1999

Table 1. Deer Check Stations and Participants, 1999

County	Deer Check Station	Date	Participants
Boone	Big R Store	11/14/99	Pat Minnick Boone County Health Department
Cass	Cass County Health Department	11/13/99	J. Vest and J. Komes Cass County Health Department
Dearborn	The Getting Place	11/14/99	Cory Rieman, BSU-TWS
Dubois	Uebelhor's Baits & Guns	11/13/99	Jeff Thompson, IDNR, Richard Dunn & Valina Mikel, BSU-TWS
Franklin	52 – Pick-up	11/13/99	John Russell, IDNR, Alex Talley & Tamara Gross, BSU-TWS
Fulton	Wildlife Re-creations	11/13/99	Pete Meyer, IDNR, Janet Creamer & Jamie Surface, BSU-TWS
Hamilton	Schwartz's Bait & Tackle	11/13/99	Glenn Lange, IDNR, Douglas Hohman, BSU TWF
Hendricks	Fish-N-Fun Marine	11/14/99	Brian Wolff Hendricks County Health Department
Howard	Bryant's Outdoor Store	11/13/99	Joe Cross & Jason McGinnis Howard County Health Department
Jasper	Fisher's Grocery Jasper-Pulaski FWA	11/13/99 11/13/99 11/21/99	Scott Miller, Lesa Workman, BSU; Fran McDaniel, Jasper County Health Dept. Tom Sobat & R. R. Pinger, BSU David Lachowicz & Joyce Miller, PU-NC
Johnson	Atterbury	11/26/99	Nancy S. Morris, IDNR & others
Knox	Siever's Custom Cutting	1/13/99	G.R. Rees Knox County Health Department
LaPorte	Kingsbury FWA Rod & Reel Bait Shop Sport Circle	11/13/99 11/13/99 12/4/99	Terry Busse, PU– NC C. Maslankowski & R. Hagenow, PU-NC Carole Chesko, PU–NC
Perry	E & E Guns & Sporting Goods	11/13/99	Vivie Dunn Indiana State Dept. Health
Porter	Fetla's Fetla's Dunes State Park	11/16/99 11/20/99 11/16/99	Ashlie & Jordan Dehaven, PU-NC Carrie Curtis & Chris White, PU-NC Erin Crizer, Crystal Ashcraft, PU–NC
Pulaski	Tippecanoe River State Park	11/15/99 11/16/99	Keri Karris, ISDH Josh Milo, Christina Pulliam, & Mindy Nichols, PU-NC
St. Joseph	Carpenter Meats Jaworski Meat Market & Processing	11/13/99 11/13/99	Sarah Tague & Jim Hogan, UND Shanon Franklin & Mitch Wheeler
Starke	Bolze Taxidermy	11/16/99 11/28/99	Rachel Lehker & Michelle Hoos, PU-NC Katey Corey, PU-NC
Switzerland	West End Shell	11/13/99	Ed Guijas, IDNR & Carrie Rieman, BSU-TWS
Union	Frames Outdoor Sports	11/13/99	Jim Mitchell, IDNR & Jeremy Whitted, BSU-TWS
Vigo	Poff's Sporting Goods	11/13/99	Jacques P. Villeux Indiana State University
Whitley	Mike's Sport Shop	11/13/99	Tom Hewitt, IDNR & Aaron Holbrook & Jill Begala, BSU-TWS

BSU: Ball State University
BSU-TWS: Ball State University-The Wildlife Society
IDNR: Ind. Dept. of Natural Resources
ISDH: Indiana State Department of Health
ISU: Indiana State University
PU-NC: Purdue University - North Central
UND: University of Notre Dame

APPENDIX I

GUIDELINES FOR EXAMINING DEER FOR TICKS

HOW TO EXAMINE DEER FOR TICKS: Recently killed deer (within 24 hours) should be examined using the following procedure. Confine your checks to the head and neck area. The area to be examined should begin just in front of the ear and extend back to the shoulder. The ear should be examined, but not the face. Pay particular attention to the back of the neck between the ears. Ticks should be grasped with forceps, or with fingers protected with tissue, as close to the skin of the deer as possible and pulled out with steady pressure. The entire check should take 3-5 minutes.

Ticks found should be placed in a small vial, such as the one provided in the tick mailing kit, and mailed to the **Lyme Disease Tick Surveillance Program, Public Health Entomology Lab, Ball State University, Muncie, Indiana, 47306-0510**. Make sure the vial cap is tightly secured! Be sure to include your name, telephone number, the date and county in which the deer was killed with each tick submitted.

APPENDIX II

RECORD KEEPING FROM FOR LYME DISEASE STUDY
BALL STATE UNIVERSITY
DEPARTMENT OF PHYSIOLOGY AND HEALTH SCIENCE

COLLECTOR(S): _____ DATE:
LOCATION : _____ TIME:
WEATHER :

Number Of Deer	Antler/ Antlerless	Weight	Age	County in which Deer was Killed	Number of Ticks Found
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					