

# Illinois Natural History Survey Medical Entomology Lab: Quick-Start Guide to Tick Dragging

Emily D. Struckhoff, Erica Cimo-Dean, Dr. Holly C. Tuten  
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INHS Medical Entomology Lab - Illinois Statewide Tick Surveillance Program  
<https://medical-entomology.inhs.illinois.edu/>



[What's this?](#)

## PREPARING FOR TICK COLLECTIONS

Collecting ticks takes us into potential high-risk tick habitats. The INHS Medical Entomology Lab has stringent personal protection measures to prevent tick bites. The foundation of our protection is a FOD-suit<sup>1</sup> treated with 0.5% permethrin formulated for clothing and gear (Fig. 1); This permethrin formulation can be purchased on-line or at most outdoor/farm supply stores; it can be applied to cloth or leather suits, socks, boots, and other field gear (make sure to thoroughly read directions on every new bottle purchased). FOD-suits are sturdy enough to last multiple field seasons, but stakeholders on 1-2 day investigations (e.g., personnel from local health depts) have applied the same treatment to long-sleeved Tyvek suits with success. Tuck suit legs into permethrin-treated calf/knee high socks with a tight weave (so small ticks cannot burrow through). We use rain or snake boots with double-sided carpet tape around top (to catch ticks). For more information on avoiding and responding to tick bites, please see our publication, INHS-MEL v3: Spring 2022 guide to “Fieldworker Tick Safety”.



**Figure 1.** Personal protection equipment and other gear needed to drag for ticks

<sup>1</sup> <https://www.fodcontrol.com/product/the-fod-suit-coveralls/>

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Beyond personal protection equipment, other supplies we use include:

- A tick drag (See “How to build a drag” section next page)
- A field bag
- 1.5ml microcentrifuge tubes with rubber O-rings (or similar) filled with 85% ethanol (the INHS Med Ent Lab can send these to IL partners; send requests to Holly Tuten: [htuten@illinois.edu](mailto:htuten@illinois.edu))
- Jeweler’s forceps (for transferring ticks from drag to ethanol vials)
- Slips of paper and pencils (to write location/collector labels to put inside vials with ticks)
- Painter’s tape (can apply to pants to write on and keep track of transects and stops)
- Visibility gear, such as orange vests or hats, if working in an area open to hunting
- Water for hydration
- Lint roller (to capture larval ticks on drags or clothing)
- Ziploc bags (to put individual lint roller sheets in after capturing ticks)
- Marker (for writing on Ziploc bag or lint roller sheet)

### **CHOOSING A SITE TO DRAG**

Known tick habitats (e.g., from resident reports) are great sites to drag. Local recreational parks with hiking trails and/or campgrounds are also good sites to drag. Blacklegged ticks are most likely to be found in forests, shaded grassy areas, and transition areas between these two habitats; shaded, grassy trail-sides (human or animal) next to or in forests can be highly productive habitats.

If possible, it is recommended to prioritize areas of greater human risk (e.g., popular trails, picnic areas, playgrounds). Grassy edges of game trails can also be good places to drag. It is not advised to drag on dewy or wet vegetation, directly after or during rain, or during the hottest part of the day (in summer). During mid-Spring through mid-Autumn 8am-11am and 4pm-7pm tend to be periods of highest tick activity during the day (although questing ticks can be found throughout the day).

### **TICK DRAGGING: CDC REQUIREMENTS**

Tick dragging is a method for collecting ticks where you pull a drag horizontally along the leaf litter, ground cover, plants, and shrubbery while walking through favorable tick habitat at a leisurely steady pace. As the drag is pulled behind you, questing ticks will attach themselves to the drag, and you can use forceps to transfer these ticks from the drag to collection vials with 85% ethanol. While dragging, stop every 10 meters to check yourself and then both sides of the drag, including the seams and edges for ticks. Check yourself first by visually scanning your body, start at your chest, scan down legs, then scan back up - front, back, sides for both passes. The easiest way to estimate distance is by counting steps, and for most people 15-20 steps is equal to 10 meters. It’s best to use measuring tape or rulers before going in field to determine how many of your steps fit cover 10 meters.

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The CDC has two requirements which must be met for tick surveillance:

- *To obtain an estimate of tick density:*  
A minimum of 750 meters must be dragged at each site (i.e., 1125-1500 steps total). See below for details.
- *To obtain an estimate of pathogen prevalence:*  
A minimum of 25 ticks of each host-seeking life stage (i.e., 25 nymphs and 25 adult females for blacklegged ticks) must be collected within a calendar year; ideally collect 50 or more of each.



**Figure 2.** Tick in vial with paper label written in pencil

For a single site, each collector will have two vials. Put all ticks from dragging in one vial and all ticks from yourself in a second vial. Use pencil on paper label to write date, site name or abbreviation, and collector initials and place inside vial (Fig. 2). On labels, for ticks from dragging, write “drag”; for ticks from self, write “self”. Larvae can be collected with lint roller sheets – after collection put the glossy side of another sheet on top of trapped ticks, then add the sticky side of a 3<sup>rd</sup> sheet to the exposed sticky side of the 2<sup>nd</sup> sheet. Put in Ziploc and record collection details with marker.

The 750 meters required by the CDC can either be completed by dividing this distance into several smaller transects spread throughout the site (e.g., 5 x 150 meter transects, or 50 x 15 meter transects). If necessary, a single 750 meter transect can be dragged (e.g., forward along one side and back along the other side of a popular hiking trail) but CDC prefers several different drag locations at a site. Ideally, you will visit each site 2-3 times during the collection season.

Dragging 750 meters usually takes 1-2 people ca. 3 hrs for first visit, and 2 hrs for subsequent visits. Dragging more than 750 meters during a single visit to a site is fine. Keep track of total meters dragged – that is the sum of all meters dragged by every individual dragging.

The target number of ticks doesn't have to be reached in a single visit – it can be obtained over several sampling visits to a site within a calendar year.

The two peak seasons for blacklegged ticks in Illinois are mid-April to end-June and late-September to early-December. If you want to conduct additional dragging outside of these collection season windows (e.g., to capture different species), we will accept those ticks as well.

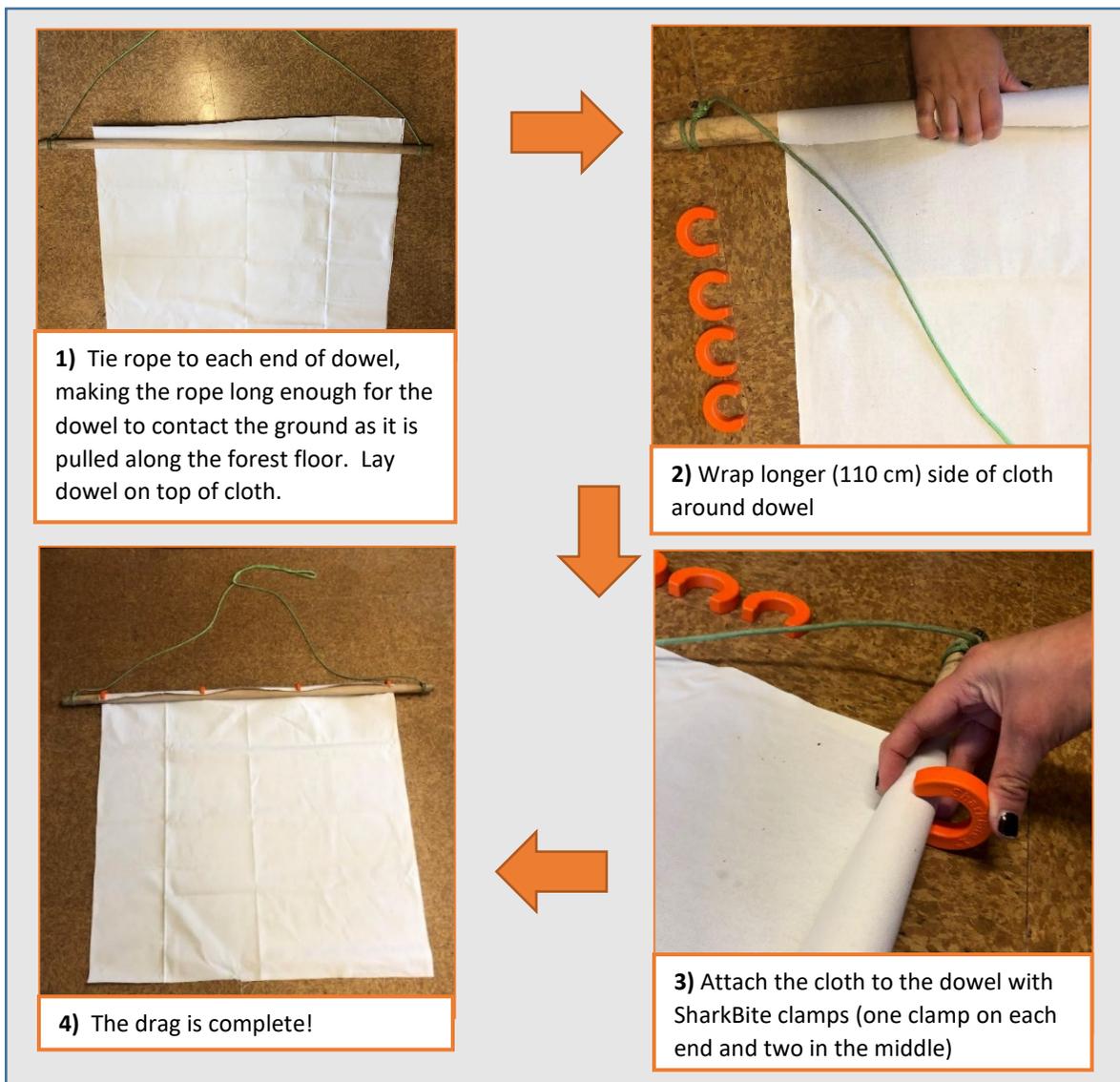
For more information on CDC dragging requirements, you can find their surveillance guides here:

<https://www.cdc.gov/ticks/surveillance/index.html>

**HOW TO BUILD AN “INHS-MEL QUICK DRAG”**

A tick drag is a white one-meter square of cloth which is pulled across the top of the forest floor, plants, and shrubbery to pick up ticks. Tick drags can be constructed for less than \$20 using supplies purchased from stores such as JoAnne Fabrics, Walmart, Home Depot/Lowe’s, or similar (Fig. 3). You will need:

- A 110 cm x 100 cm square of sturdy white cloth (e.g., corduroy, mattress ticking, crib flannel, and canvas)
- To keep edges of cloth from fraying and prolong drag life cut an extra 5 cm in every direction and fold the excess 5 cm back on itself and glue with “liquid stitch” for fabrics or similar.
- To add weights to trailing end of drag leave an extra 10 cm at bottom edge of cloth. Fold cloth over 3 zinc-plated washers (2” outer diameter, 3/4” inner diameter) and glue in place, one at each side and one in middle.
- A 1<sup>1/8</sup>” x 48” wooden dowel (in stock at molding/chair rail sections of home improvement box stores)
- “SharkBite” brand 1” disconnect clamps x 4 (on-line and in plumbing sections)
- Rope – we use paracord



**Figure 3.** How to construct an “INHS-MEL Quick Tick Drag”

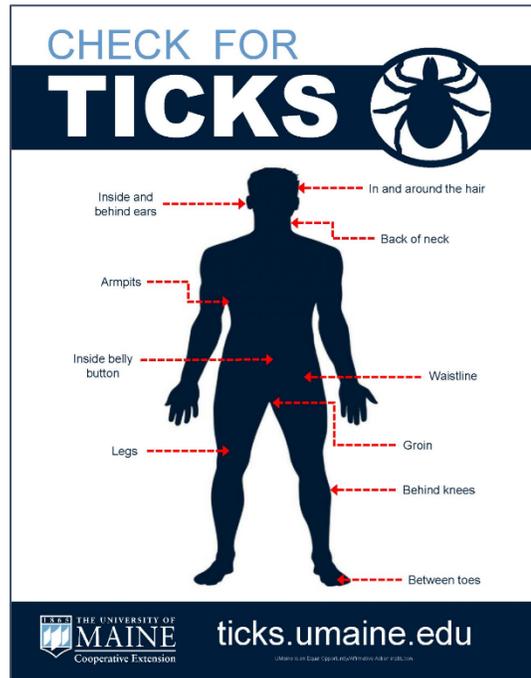
RETURNING FROM THE FIELD

- 1) Visually check self, gear, and drags for ticks one last time before getting in car.
- 2) Shake gear, suits, and drag out before putting in car – store in closed trash bags in back of car or trunk. Store suits separate from drags.
- 3) Heat, not water, kills ticks. As soon as possible after returning home, place field clothes in the dryer on the hottest temp for 10-20 minutes (longer for damp clothes) to kill any hidden ticks.
- 4) Take a shower within two hours of leaving the field and perform a thorough tick check of the whole body, especially in areas where ticks commonly attach (Fig. 4), by both sight and fingertip feel. Using a mirror can be helpful.

**5) If you find an attached tick**

- CDC “Tick Removal” instructions: [https://www.cdc.gov/ticks/removing\\_a\\_tick.html](https://www.cdc.gov/ticks/removing_a_tick.html)
- The CDC does not recommend testing ticks for xenodiagnosis of potential human infection.
- What we do with attached ticks - put them in a container (e.g., Ziploc or vial) labeled with the person, date, and site, then store in the freezer (*don't ship to INHS-MEL*).
- We mark the date of the bite on a calendar and stay aware for any symptoms of tick-borne illness for at least 60 days.
- Knowing the tick species and life stage can be helpful. If you would like assistance identifying a tick, please see instructions for e-mailing Holly photos, here:

<https://medical-entomology.inhs.illinois.edu/research/free-tick-identifications/>



**Figure 4.** Outstanding tick check diagram from the University of Maine Cooperative Extension Tick Lab

- 6) Before shipping, double-check that all ticks collected in the field are in vials with 85% ethanol, each containing a paper label with the date, site name, collector initials and either “drag” or “self” designation written in pencil. Make sure all vial tops are secure.
- 7) Enter sampling metadata into fillable “Tick Submission Form”, on last page of this guide.
- 8) Mail the form along with the ticks to the INHS Medical Entomology Lab (shipping instructions next page).

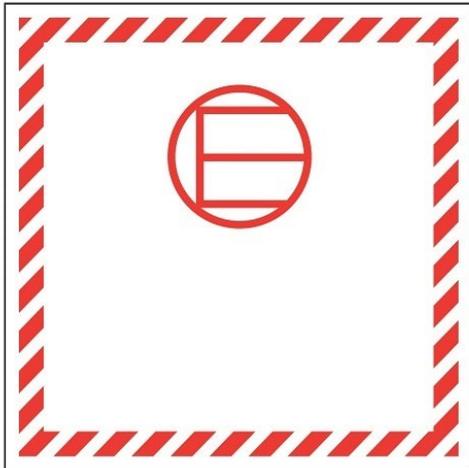
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### SHIPPING TICKS IN 85% ETHANOL TO THE INHS MEDICAL ENTOMOLOGY LAB

Ethanol in postal mail is generally considered a “hazardous good”. Natural history specimens (such as ticks for research) are exempt from comprehensive DOT and USPS hazardous goods shipping requirements but must be packed according to them. If the total amount of ethanol to be shipped exceeds 5 liters, split into multiple packages for shipping.

#### To make a package:

1. Overfill vials with ethanol or pack with tissue before closing them (to minimize the formation of an air bubble and specimen movement in the vial which can damage specimens during shipping).
2. Place vials in a small, sturdy box.
3. Place box inside large Ziploc bag along with some type of absorbent material (in case vials leak during shipping). This may be a small stack of paper towels or similar absorbent material.
4. Place bagged box with absorbent material inside of a second Ziploc bag. Make sure both bags are completely sealed.
5. Place the double bagged box inside of a bubble-wrap lined mailing envelope.
6. If Styrofoam or other packing material is available and there is room in the envelope it may be helpful to insert some around the box to minimize jostling during transit.
7. Seal package and address to: **Illinois Statewide Tick Surveillance Program, c/o Dr. Holly Tuten, INHS Medical Entomology Lab, 1816 S. Oak St., Champaign, IL 61820**
8. Because of shipping restrictions on ethanol, you will need to print out the below label and attach it to the outside of the package (it does NOT have to be printed in color). The UN number for ethanol is 1170 and the class number is 3 - write a large “3” on this label. This will inform workers what hazardous material is in the package. Any further questions should be directed to FedEx at (901) 375-6804 and press 4 to speak to Biohazards.



**If you have any questions, please contact Holly Tuten ([htuten@illinois.edu](mailto:htuten@illinois.edu))**

## Tick Submission Form

Place all ticks collected by one person at one location on one day in either "drag" or "self" vials, each containing 85% ethanol and a paper label with date, site name, collector initials, and either "drag" or "self" designation - all written in pencil. Send form and vials to: Illinois Statewide Tick Surveillance Program, c/o Dr. Holly Tuten, INHS Medical Entomology Lab, 1816 S. Oak St., Champaign, IL 61820.

### Submitter Information

Organization Name:

Submitter Name:

Phone Number:

Email:

### Tick Collection Information

Have ticks been submitted from this location before?      Yes      No

Location Name:

Address:

City:

ZIP Code:

County:

Habitat Type:

Property  
Ownership:

Collection Method:

Total distance  
dragged, sum across  
all collectors:                      meters      Collection Date:

Collector Names &  
Comments:                      Number of Ticks (estimate is fine):